

Research on the Best Time to Intervene into Network Public Opinion for Managers -Based on "Nankai Buick Affair"-

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Abstract. This study is based on network public opinion of the case - "Nankai Buick Affair". The daily number of posts as the variable, quantitative research is carried out on the law of change in network public opinion, which provides the scientific basis for managers to choose the best time to intervene. This article first begins from the three aspects: a number of changes in daily posts over time, the constitute of main topics and statistical analysis, and then gives a in-depth analysis of the law of change in network public opinion. After the emergency, performed by the number of posts, the shape of the rise and fall in network public opinion has three categories: sharp peak, severe right-skewed and fat tail. On this basis, then we study the changes of major issues in network public opinion in different stages: In the two periods: "Start- Peak" and "Peak-End", not only the number of posts in BBS is not the same, but also the main topics in the BBS articles are different for the network public opinion of emergency. Finally, points out, If the managers issue truth of the incident in the prime time through the channels of authority, we can reduce the distance between the peak and the state of equilibrium for the network public opinion system, which is conducive to a smooth landing public opinion and social harmony.

Keywords: Network Public Opinion, Skewness, Kurtosis, The Best Time to Intervene.

According to the latest CNNIC statistics, by the end of June 2008, the number of Chinese Internet users has reached 253 million [1]. The Internet users' size ranks first in the world and has been a huge network of groups. At the same time, the Internet has become an important channel to gather public opinion information, which can quickly reflect the dynamics of public, hot spots and users' voice, to a certain extent, show the reality of people's emotional attitudes.

At present, network public opinion shows unprecedented level of activity and strong influence in the government's decision-making. The China's top leaders also increasingly pay attention to and concern about the messages in network forums, in order to grasp the pulse of the community to beat more quickly and accurately.

Against this background, carrying out exploratory phase about the law of change in network public opinion, which will no doubt provide the relevant decision-making reference to the government, and will further deepen and expand the basic theory of network public opinion.

1 Summary of the Network Public Opinion

Network public opinion is the staggering summed of a variety of emotions, attitudes and views held by the public over the public's interest or the various public offices closely related to their own self-interest, which are expressed and disseminated via Internet. Network public opinion has characteristics as follows: freedom controllability, real-time interactivity, richness and diversity, the occult and outside the dominant, emotional and irrational, personalized and polarized groups and so on [2].

Plekhanov once said: "The development in public's views, like the whole of human history, is a regular process." [3]The network public opinion, constituted by the emotion of the internet users, attitudes and views, from its formation to the end, all in a dynamic process of change, must follow a number of laws to run. At present, there has been much research on the rules of changes in network public opinion.

Yi Liu [2] (2007), in "Introduction to the research of network public opinion", from a macro point of view of public opinion, described the law in the process of change: the law of the rise and fall, the law of sequence changed, the law of conflict and the law of decay, and analyzed three types of situation in the law of the rise and fall: the wave-shaped, and the trapezoid-shaped single peak.

But more scholars research some specific case from the perspective of the network's transmission. Some scholars from the perspective of Internet media network study the law of public opinion. For example: Zhou Qin [4] (2005) in the article "the" peak "in public opinion of news" pointed out that :scientific inquiry , search and statistics of a major mining incident in the WEB pages in the mainstream search engines could reflect the generally network opinion of incidents of this kind of news.

Other scholars from the perspective of the network audience study the law of the network public opinion. For example: Hongmei Chen [5] (2005), in the article "BMW charging case in BBS", analyzed and interpreted the message content of posts about "Northeast BMW case" in "Strong China Forum" in the People's Network, concluded: the public discussion did not break through rational limit of the box and with the network platform; the public were likely to bypass the traditional media, set up a separate agenda, and thus affect the act of traditional media; the public expression in network not only developed a space of public discussion, but in a sense, but also formed a social movement, which has impact on the reality of the process. Xutong Chen and Lifeng Deng [6] (2004), through analysis of "Mingchung Wang events", "Zhao Wei clothing events" and "heavy snow blocking the traffic incident", got some of the main conclusions: driving force for the formation of the question, the cause of decay in the question, inherent convergence in the development of the of BBS issues, as well as a "social safety valve" function of BBS. Liang Guo [7] (2002) in the article "The First Day of Terrorist Attack to WTC :Discussions at "Strong China Forum"" analyzed the Chinese netizens' different attitudes on the "9.11" as well as the U.S. government and pointed out the relationship between volume of posts and news

reports, and described the dialogue between the public and network manager of the powerful forum on the same day, which is not only helpful to understand public opinion, but also to provide reference for strengthening guide and management in network public opinion.

To sum up, lack of quantitative research, these researches mainly provide in-depth qualitative analysis, which will lead to this problem: Although these studies can advise the managers can take what kind of measures, they has not been involved with when it did not take steps, and this is precisely a key issue.

Therefore, this study aims to carry out quantitative research on the law of changes in network public opinion, and provide a scientific basis for the managers to choose the best time to intervene.

2 Data Sources and Basic Statistical Indicators

2.1 Data Sources

We have studied a large number of cases. In this paper, we select the "Nankai Buick Affair" as the key point of emergency analysis. The "Nankai Buick Affair" is a typical mass incident which occurred in the Nankai University in December 24, 2007, due to the traffic accident between a Buick car outside the school and a student's bike. The number of participants amounted to more than 1000, including students, communities, teachers and police.

The object of this study is the number of posts. These posts focus on "Nankai Buick Affair" and come from the section of the Nankai University of the LiangQuanQiMei BBS [8]. We select this BBS for the following reasons: firstly, it has comprehensive coverage of the "Nankai Buick Affair" without deleting posts; secondly, it has a wide audience, including crowd in and out of school, whose views are representative; finally, it is easy to carry out statistics and monitoring.

The research time ranges from the first hours when the traffic accident occurred (Beijing time at 8:40 p.m. on December 24, 2007), to the time network public opinion of the events calmed (Beijing time on January 3, 2008).

2.2 Basic Statistical Indicators

In this paper, the skewness coefficient and the kurtosis coefficient are used to measure the degree of deviation from the peak level of network public opinion equilibrium. Basic statistical indicators are as follows:

If x_i variable is set x (the number of posts) the first i observations, on a n observations of the samples, the formulas to compute these statistics are as follows:

Sample average:

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n} \quad (1)$$

Sample variance:

$$s^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1} \tag{2}$$

Skewness coefficient:

$$Cs = \frac{n}{(n-1)(n-2)} \sum_{i=1}^n \left(\frac{x_i - \bar{x}}{s}\right)^3 \tag{3}$$

If $Cs < 0$, then it is a left-distribution; if $Cs > 0$, then it is a right -distribution. This indicator not only reflects the direction of deflection, but also the degree of deflection.

Kurtosis coefficient:

$$Ck = \frac{n(n+1)}{(n-1)(n-2)(n-3)} \sum_{i=1}^n \left(\frac{x_i - \bar{x}}{s}\right)^4 - 3 \frac{(n-1)^2}{(n-2)(n-3)} \tag{4}$$

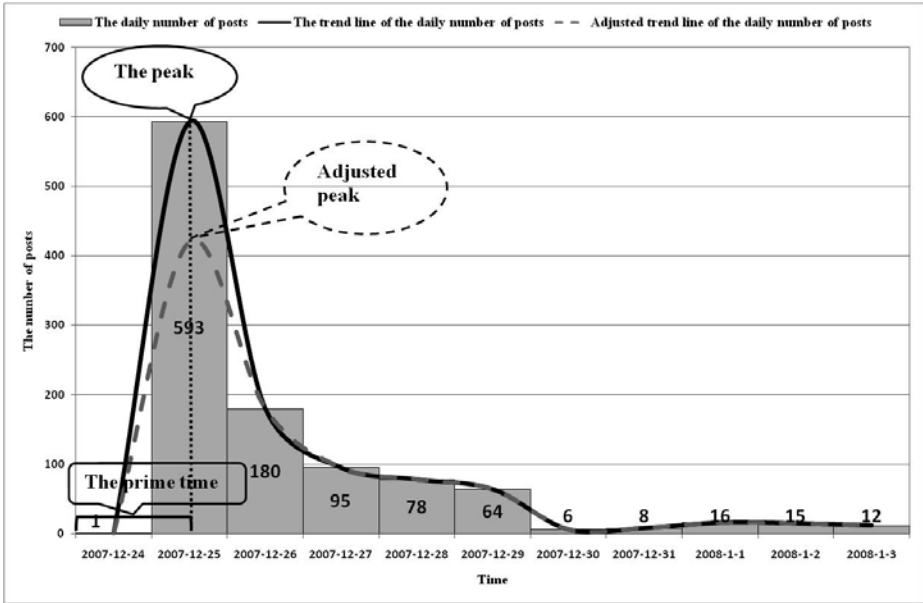
The range of the kurtosis coefficient is $[-2, \infty]$. Compared with normal distribution, if $Ck > 0$, the distribution will have sharper peak and fatter tail, and the greater the kurtosis coefficient, the fatter the tail, and vice versa [9].

3 Analysis of Network Public Opinion

3.1 Change of the Number of Posts over Time

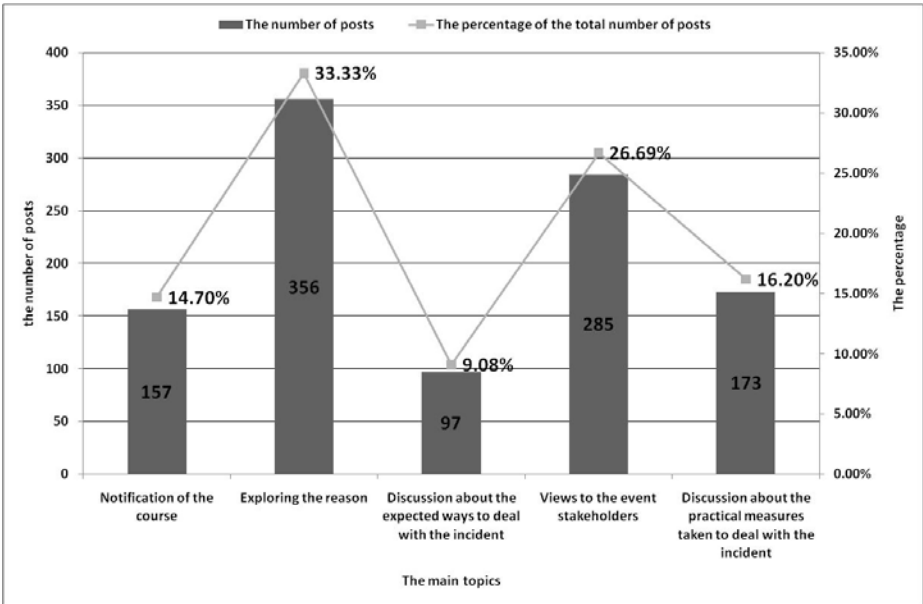
Through real-time monitoring the section of the Nankai University of the LiangQuanQiMei BBS, the number of posts about "Nankai Buick Affair" recorded reaches 1068. The specific distribution is shown in figure 1, which depicts the daily number of posts with histograms and trend lines.

In figure1, the first post on the theme of calling for help appeared at 11:58:43 pm on Dec. 24, 2007, and it only spent a few hours for the number of posts reaching the peak. The main topics in the peak period include the causes of the incident, the process of the incident, and solidarity for the students. Then, Nankai University published the official announcement for the incident, and network in Nankai was prohibited from visiting the LiangQuanQiMei BBS, the ShuiMu BBS, and other community forums. At the same time, the major forum also started to filter and control speech. Later, the leadership of the school held a school-wide meeting of student leaders, released notification of the situation of this accident and reported to the leadership of the Tianjin city on relevant work. The Tianjin's leadership pointed out that: great efforts should be paid to protect the beautiful quiet atmosphere of institutions. Then, the number of posts declined sharply from Dec.26. Public opinion also changed simultaneously from completely supporting the students to partly supporting the students, to remain neutral, or even opposition. Although dissatisfaction with some of the measures to deal with the matter



Data source: LiangQuanQiMei BBS

Fig. 1. The daily number of posts chart on "Nankai Buick Affair"



Data source: LiangQuanQiMei BBS

Note: The main topics refer to the number of posts more than 5% of the total number of posts in study period.

Fig. 2. The constitute of the main topics chart

caused a lot of discussion, (the measures such as the information blockade, control of the students ‘opinion, and so on.), the Nankai University School continue to publish favorable news, and at the same time, lack of access to schools Nankai latest news, most people who were in wait-and-see hoped that the school be able to correctly handle the matter. Then the number of posts slowly declined, and network public opinion gradually decayed.

3.2 The Constitute of the Main Topics

Posts are a kind of public opinion, which contains a variety of emotions, attitudes and opinions of Internet users. By sorting out the 1068 posts, we find that the discussion about "Nankai Buick Affair" in BBS can be divided into five main topics: notification of the course, exploring the reason, discussion about the expected ways to deal with the incident, views to the event stakeholders, and discussion about the practical measures taken to deal with the incident. In figure 2, the cause of the incident was discussed the most enthusiastically, which shows that people's concern remains not just at the top surface of things, but the deep-seated reasons for this incident.

3.3 Statistical Analysis

Applying the formula (1), (2), (3) and (4), the results can be calculated as follows:

Table 1. Statistics of the daily number of posts

\bar{x}	s^2	Cs	Ck
97	30028.7	2.78	8.22

In table 1, skewness coefficient is 2.78, more than 0, which shows the shape of the rise and fall of the number of posts is a serious right-distribution; the kurtosis coefficient is 8.22, greater than 0, which shows that the shape of the rise and fall of the number of posts has sharp peak and fat tail. As is shown in figure1, with regard to the trend lines of daily number of posts, on the left side of the peak, the number of posts increases sharply, but on the right side of the peak it decreases more slowly, and leaves a long tail.

The reasons for forming this kind of shape of the rise and fall are as follows:

Theoretically, the rise and fall of posts in fact reflects the changes in network public opinion. It can be seen as simply as a "stimulus - reaction"[2] process: the source of stimulation is the emergency, then some irritative information disseminates into human brain and interacts with the inherent bias of internet users, at this time, the internet users look forward to expressing their emotions, attitudes or opinions on the incidents in BBS. When their concerns have been resolved, or the incidents don't generate any irritative information to internet users, the network public opinion on the incidents will naturally decline.

In this case, the first post was to inform people of this fact, and then the main topic of discussion quickly shifted to the cause of the incident. However, at this time,

because there was no authoritative information about the incident, the views are mainly speculations: some people think that owners should be responsible; others believe it is the responsibility of the students. At the same time, as measures to deal with have not yet been released, people launched a heated debate on how to deal with the incident. After the formation of public opinion, driven by a series of information, the number of posts rises sharply. At this time, the massive of public opinion was close to the stability of the critical point. Later, some measures were taken to deal with the incident: the leadership of school made three commitments, the school issued an official notice, student leaders were asked to guide students in emotion, and so on. Then, the measures to deal with the incident became the main topic and the number of main topics declined. That is, as a result of the reduction of irritative information, the main issues reduces, and then the number of posts also declines, so that network public opinion gradually cools down until disappear.

4 Choose the Best Time to Intervene for Managers

In the analysis of network public opinion, we find that: in the two periods: “Start-Peak” and “Peak-End”, not only the number of posts in BBS is not the same, but also the main topics in the BBS articles are different for the network public opinion of emergency.

In this case, the two periods: “Start- Peak” and “Peak-End”, correspond to the two stages before and after taking emergency measures. The changes of main issues can be expressed as figure 3.

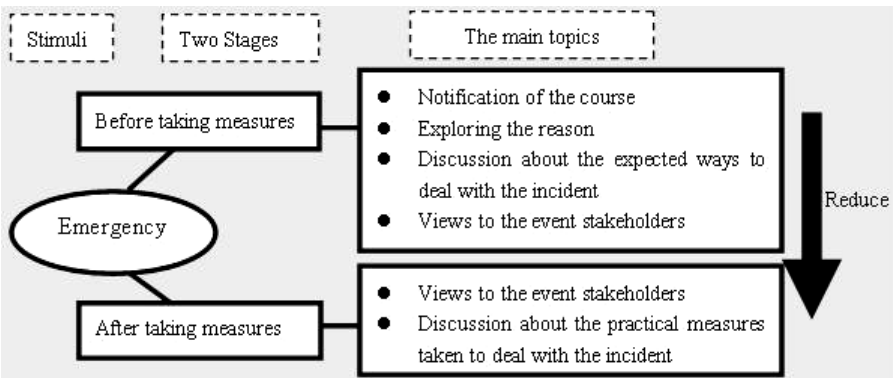


Fig. 3. The changes of main topics in the emergency measures taken before and after

By observing the changes of the main topics in two stages, we can find: compared with the previous stage, in the latter stage, on one hand, the number of the main topics reduced significantly; on the other hand, "notification of the course" and "exploring the reason" were no longer the major topics, and the subject has been changed into "discussion about the practical measures taken to deal with the incident" from "discuss the expected ways to deal with the incident". Combined with Figure 2, this conclusion

can be obtained: compared with the previous stage, the number of posts reduces significantly in the latter stage. It can be interpreted as: many people who do not know the truth in the initial stage of the emergency are urgent to learn about the process and the reasons for the incident. However, there is no authoritative source of information, they post messages or reprint information to clarify the issue. At the same time, some people who know the inside story more will send the information to the forum to inform others. However, the information is not authoritative and one-sided, which often leads to more dispute.

If the manager issued truth of the incident through the authoritative channels at this time, what about the result? By further fractionizing the posts, we found that: the number of the posts to repeatedly search confirmation issued by the people who did not know the truth, and the posts of doubting the non-authoritative information added up to 77, which was about 15 percent of the total number of posts on "notification of the course "and" exploring the reason ". After removing these posts, the trend line of the daily number of posts will be adjusted, as is shown in figure 1. Comparing with the two trend lines, we can see that the peak of the adjusted trend line significantly reduces. We can get the results by calculating: skewness coefficient is 2.41, kurtosis coefficient is 6.24. The comparison of skewness coefficient and kurtosis coefficient between the two trend lines is shown in figure 4. We can see that both skewness coefficient and kurtosis coefficient of the adjusted trend line are smaller, that is, the degree of right-skewed and steep decline. Therefore, it can be considered that: if the manager issued truth through the channels of authority at the time, the distance between the peaks and the equilibrium of public opinion system will reduce, and thus in favor of a smooth landing of public opinion and social harmony.

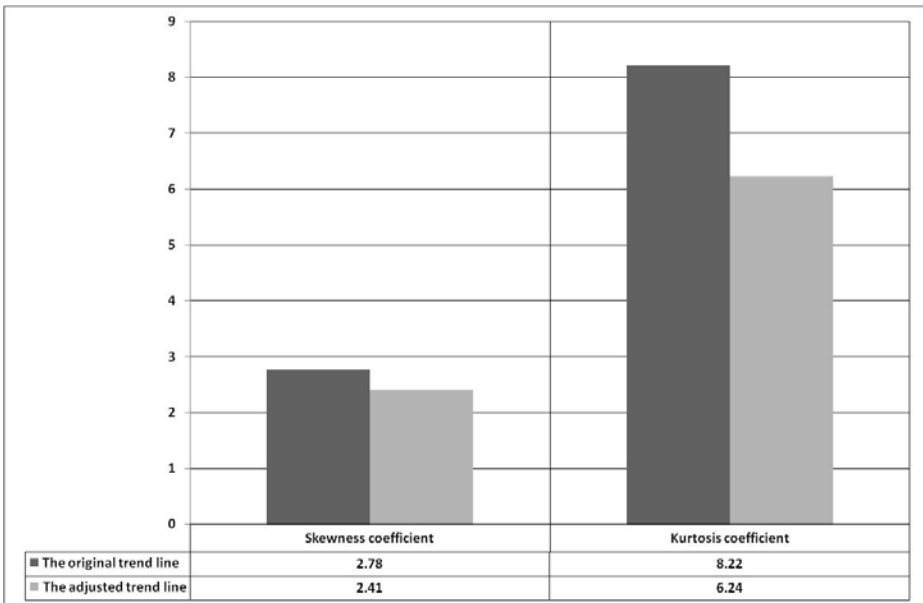


Fig. 4. The change of skewness coefficient and kurtosis coefficient between the two trend lines

To sum up, we believe that: the "start - peak" time, which is "the prime time" shown in Figure 1 is the best time to intervene for managers.

5 Conclusion and Prospect

At the 4th Plenum of the 16th CPC Central Committee, the establishment and improvement of the mechanisms on collecting and analysis of public opinion was written into the <CPC Central Committee' decision on Strengthening the Party's ruling capacity-building>. This shows that the leadership of the CPC Central Committee attaches great importance to the management of network public opinion. However, it is difficult to manage the network public opinion, due to some of the characteristics of the network public opinion, such as emotional, limitations, difficult to control, and so on. As a result, the research on the change in the law of network public opinion is important and urgent.

We can make a conclusion as follows: After the emergency, performed by the number of posts, the shape of the rise and fall in network public opinion has three categories: sharp peak, severe right-skewed and fat tail. In the two periods: "Start-Peak" and "Peak-End", not only the number of posts in BBS is not the same, but also the main topics in the BBS articles are different for the network public opinion of emergency. Finally, If the managers issue truth of the incident in the prime time through the channels of authority, we can reduce the distance between the peak and the state of equilibrium for the network public opinion system, which is conducive to a smooth landing public opinion and social harmony.

There is still a lot of deficiency in this research and much more efforts should be made in subsequent research. In the future, we should pay attention to the following areas. Establish the model to estimate the prime time accurately; Not only study the law of the "Start- Peak" period, also consider the length of the tail in the "Peak-End" period which reflects the duration of network public opinion.

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