Research on the Online Word-of-Mouth and Continuous Investment of Film and Television Works Based on Data Analysis

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Abstract
The influence of online word-of-mouth on box office and continuous investment of film and television works has always been concerned. Taking Mao Yan, Tencent and Douban and other platforms as data sources, this paper analyzes the influence of new opinion carriers such as film review and Danmu on the popularity of online word-of-mouth and continuous investment of film and television works. The results show that the popularity of online word-of-mouth is one of the key factors to determine the success of a work. The online word-of-mouth can promote the increase of box office and broadcast amount. Meanwhile, a continuous investment decision will be made based on the online word-of-mouth which reflects the reaction of audiences. The market response consisting of the online word-of-mouth and the box office is an important support for decision makers to predict. Based on good word-of-mouth, the malleable development of the film-television industry provides continuity in its life cycle and greater sustainable investment in its commercial value.
Key Words: online word-of-mouth, investment, Internet comment, data analysis

I. Introduction

With the mutual integration of various terminals, mobile and social communication has become an important form of audio-visual consumption [1]. According to the survey statistics result, as of June 2019, the number of Internet users in China has reached 854 million, and the Internet penetration rate has reached 61.2%. The number of Internet video users in China has reached 759 million, accounting for 88.8% of the total number of Internet users [2]. The spread of film and television works in such a large-scale information network mode has begun from one-way linear terminal transmission mode such as cinemas and TV stations to the integration of new media mode. The new media platforms rely on the information exchange of point-to-multipoint radial multi-dimensional to extend the propagation depth and breadth of film and television works dramatically [3]. With the spread of such explosive and diffused tree structure[4], consumers' viewing choices of film and television works are more dependent on the popularity of online word-of-mouth. Online word-of-mouth information has gradually become the main information collection channel for consumers due to its advantages of easy searching and high credibility [5]. In this case, compared with the traditional evaluation system, a series of evaluation criteria such as network evaluation, movie ratings, and the popularity of the whole network are added to promote consumers' choice of watching movies and the expression of their attitudes. For the online word-of-mouth, studies have confirmed that consumers have a greater willingness to re-transmit negative online word-of-mouth than positive online word-of-mouth [6]. Therefore, how to use media opinion and propaganda means to guide consumers to spread positive word-of-mouth and maintain the popularity of online word-of-mouth is the key to the commercial success of the film-television industry [7]. For example, the film of *Last Night on Earth* was not highly evaluated. However, it created a good public opinion environment and a good word-of-mouth effect through public relations such as critics and journalists before its premiere [8]. The measure made its comprehensive box office on opening day account for 93 percent of all. However, the comments on the Internet were all negative, and the subject matter was not understood by the public, leading to a sharp decline in box office reputation. It can be seen that online word-of-mouth is very important to realize the commercial value of film and television works [9, 10]. The evaluation and popularity of the word-of-mouth are further influencing factors [11, 12]. We studied the influencing mechanism of online word-of-mouth and provided reasonable suggestions of investment through data collection and analysis from the film-television industry [13,14].

II． Data sources

The data source of film and television work reviews are mainly from digital platforms such as Tencent Video, Maoyan film review and Douban film community. The popularity of online word-of-mouth is mainly measured by Baidu search index and the number of retweets of Weibo within one month of their premiere. Danmu data and film review data are collected mainly according to the Tencent Video and the webpage version of Maoyan film. Some technical means are used to find the data packets that store comments and Danmu, The content in the data packets can be   transferred and restored. For Danmu data in data packets, Danmu data with high number of likes is mainly selected, because it is displayed without user name in the client, so the opinion with high number of likes is supported by more people and has higher authenticity. Finally, 4,400 pieces of Danmu data were collected and sorted out for *All Is Well*, and 9,510 pieces of movie review data for *Dying to Survive*, *Last Night on Earth*, *Avengers 4* and *Green Book*. At the same time, a questionnaire entitled *On the Influence of Network Evaluation on Movie Viewing* was issued, and 460 valid answers were collected.

III． Visual analysis of online word-of-mouth data

There are 460 questionnaires collected entitled *On the Influence of Network Evaluation on Movie Viewing*. Questionnaire analysis results show that 77.1% of the respondents indicated that online evaluation would affect their movie-watching choices. The netizens' evaluation which exceeds the movie score is the biggest factor affecting movie-watching choices in theaters, as shown in Figure 1. Similarly, in the survey of the influencing factors of online movie-watching, 59.57% of the respondents indicated that online evaluation would affect their choice. Based on this, we will take the TV series *All Is Well* and four films *Green Book*, *Dying to Survive* and *Last Night on Earth* as examples to study the popularity of online word-of-mouth and its continued investment.

3.1 The relationship between the broadcast amount and the whole network heat data

First of all, the broadcast amount and the whole network heat data of the TV series broadcast for a long period time are collected and analyzed. As shown in Figure 2, the whole network heat curve and the broadcast data of the selected sample TV series, *All Is Well*, show a change rule in the same direction. Their turning point are basically consistent. The broadcast amount and the popularity of the whole network interact with each other and both rise and fall at the same time. Meanwhile, SPSS, the statistical software was used for correlation analysis. As shown in Figure 3, the correlation value between the popularity of the whole network and broadcast amount was 0.831, and the significance level is 0.01. Therefore, there was a significant positive correlation between the popularity of the whole network and broadcast amount.

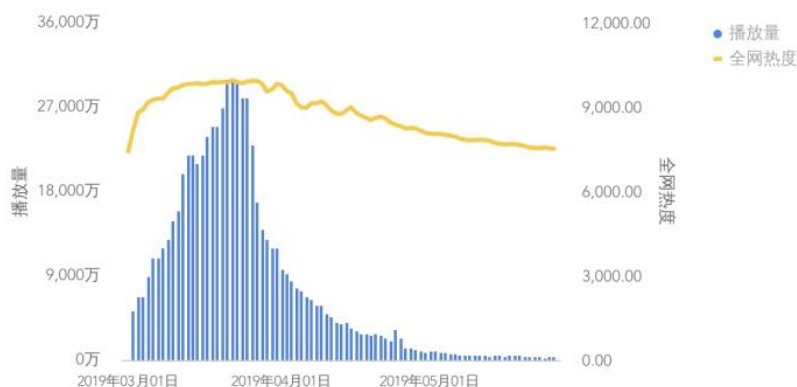**Figure 1   The influencing factors of online movie-watching choices**

Figure 2   The popularity of the whole network and the broadcast amount date of *All Is Well*

		全网热度
播放量	相关系数	0.831**
	p 值	0.000

* *p*<0.05 ** *p*<0.01

Figure 3   The correlation analysis results between the popularity of the whole network and the broadcast amount date of *All Is Well*

3.2 The relationship between the broadcast amount and the number of Danmu

According to the Danmu content of *All Is Well*, the word frequency cloud map is made, as shown in Figure 4. The word "Su Mingyu" appeared most frequently, and this word is the heroine of the drama. During the broadcast, this word has been on the hot search list for many times, and has triggered many discussions and retweets on Weibo. For example, the topic "Should Su Mingyu reconcile?" has attracted 91,000 discussions and 400 million views. It has also aroused a heated discussion among the netizens on the social issue of family of origin. Among all the topics related to this word, six have been read more than 100 million times, with a total of 4.54 billion views and 2.277 million discussions. During the broadcast period, the number of hot search has reached 148 times, ranking the top 22 times. According to statistics, it has become the urban drama with the highest topic interaction rate in the past two years. Analyze the relationship between the number of Danmu and broadcast amount, as shown in Figure 5. The basic broadcast amount keeps a trend of continuous rise and rises rapidly. Then, SPSS was used for linear regression analysis.

Figure 4   The word cloud of *All Is well*

Figure 5   The Danmu and broadcast amount data of *All Is Well*

As shown in Figure 6, the regression coefficient value of the total Danmu volume of the day was 143.672(t=2.972, P=0.007<0.01), which means that the amount of total Danmu of the day has a significant positive influence on broadcast amount.

	非标准化系数		标准化系数	*t*	*p*	VIF	R^2	调整R^2	*F*
	B	标准误	*Beta*						
常数	61776390.520	43928721.674	-	1.406	0.173	-	0.277	0.246	F(1,23)=8.834,P=0.007**
当日片集总弹幕量	143.672	48.340	0.527	2.972	0.007**	1.000			

因变量：播放量

D-W值：0.608

* *p*<0.05 ** *p*<0.01

Figure 6   The results of linear regression analysis between the broadcast amount and the total number of Danmu in the day

3.2 The relationship between the online word-of-mouth and the box office

The box office is the main revenue source of the film industry. The research mainly analyzes the influence of the online word-of-mouth, which is mainly composed of film reviews, on its box office. After the premiere of *Dying to Survive*, the overall online comments are shown in Figure 7 and 8. Most of the comments were praised for "moving", "realistic", "theme", "good-looking" and "plot". While a few comments were "insensitive" and "exaggerated", and a few comments reflected negative words such as "plagiarism". Box office changes are shown in Figure 9. The final box office is 3.1 billion rating a score of 9.6 which is higher than 99% of the film in Maoyan. This film has gained a high online reputation in terms of audience response.

Figure 7   The word cloud of *Dying to Survive*

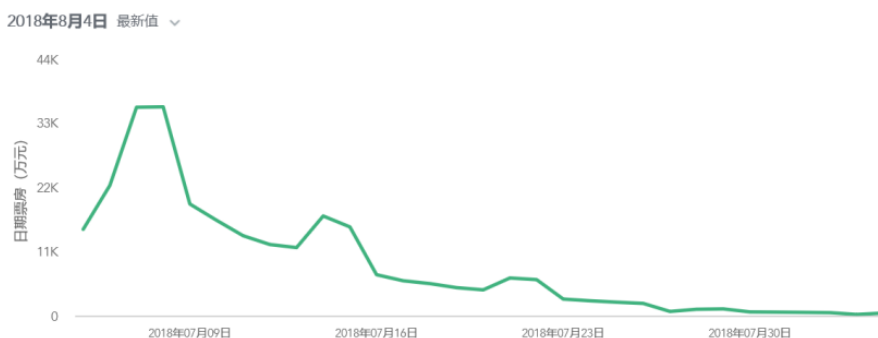**Figure 8   The online comments of *Dying to Survive***

Figure 9   Box office date of *Dying to Survive*

The Avengers series is a good example of how overseas productions perform in the film market of China. *Avengers 4*: *Endgame*, the final installment of Marvel's multi-film franchise, has become the fastest film to break 100 million pre-orders with a screening rate of 83 percent, breaking the record of *Transformers 3*, which held for many years. However, there was a drop in box office on the second day after the premiere. Observing the reviews, it is found that the reason why fans choose to watch the film is mostly youth complex, rather than the expected quality of the film. So there was a drop in box office after the opening day. However, its box office increased significantly in the weekend and the following May Day holiday, as shown in Figure 10. A linear regression analysis was conducted on the box office data, the number of retweets on Weibo and Baidu index in the whole premiere cycle. The regression coefficient of retweets on popular Weibo was 0.150 (t=3.251, P=0.003<0.01). The regression coefficient of Baidu index was 0.009 (t=2.141, P=0.041<0.05), It indicates that the number of retweets of Weibo and Baidu index both have a significant positive influence on the date box office.

The film of *The Last Night on Earth* is a representative of the high box office in a short period of time because of the grand preliminary publicity to attract the audience to the cinema and the information asymmetry of the audience. Its strong publicity of *The Last Night on Earth* in advance of its premiere helped its box office reach 150 million. However, most of the reviews on the premiere day were "unintelligible" and "not good-looking" after the premiere, as shown in Figure 11. An analysis of the reviews during its release was still worse. Then, its box office fell off a cliff along with the reviews. As for *the green Book*, according to statistics, 807,719 netizens had rated the film on Douban with 231,178 short comments and 5,128 long comments. The top reviews in terms of popularity are almost uniformly five-star reviews. The word cloud created by the film reviews in shown in Figure 15. The figure clearly shows the following hot words: "black", "white", "movie", "story", "beautiful", "Oscar" and "race". After four days of premiere, the box office reached 125 million yuan, but it stopped at 500 million yuan. Although the score was as high as 9.5, it failed to keep the trend of box office sales. As an art film, it was successful, but its high word of mouth did not boost its box office. Through the film reviews, it is found that the theme and shooting background of the film can not resonate with consumers and can't be appreciated by the perspective of spectators due to the different social backgrounds. The westernization of narrative mode failed to capture the interest and acceptance of domestic moviegoers which leaded the domestic audiences cannot understand it well. Most of the audiences want to know the Oscars, but they do not have a thorough understanding of the meaning of the films themselves. So although the score of the film is high, it does not drive the box office.

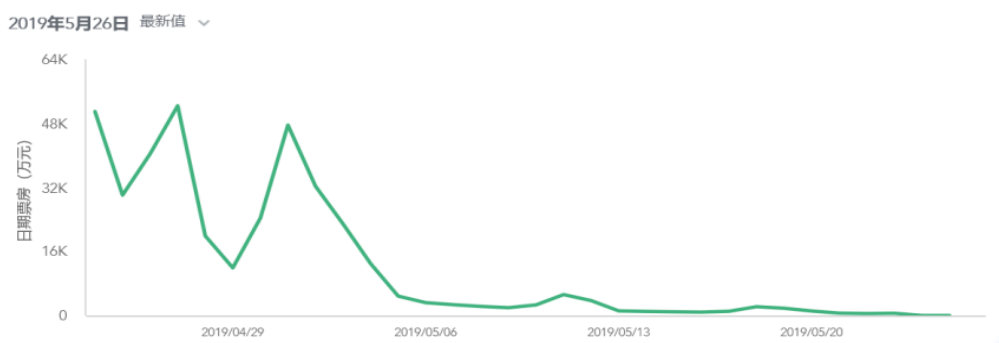**Figure 10   The box office of *Avengers 4***

Figure 11   The review entry of *The last night on Earth* on first day

Figure 12   The word cloud of *The last night on Earth*

Figure 13   The box office of *The last night on Earth*

Figure 14   The box office of *The Green Book*

Figure 15   The word cloud of *The Green Book*

IV．Policy Analysis

4.1 For TV Series Works

All Is well was chosen as an example to analyze the relationship between the world of mouth and the broadcast amount. Because its reading quantity of the microblogging topic reached 4.5 billion and triggered an in-depth discussion on the issue of the origin family in the whole society. Since its premiere, it has topped the popularity list of Maoyan for 21 consecutive days, which is a typical and successful case of both popularity and reputation. The result of data analysis shows that there is a significant positive correlation between the popularity of the whole network and broadcast amount, and the number of Danmu has a significant positive influence on the amount of broadcast.

With the rise of the popularity of the network, it brings high audience ratings in the prime time to the TV stations which purchase the copyright of its premiere. It has a good promotion effect on the increase of advertising fees during its broadcast. Behind the high audience rating of the TV series, the whole TV station has brought higher audience rating. During this period, the advertising effect has been doubled. The TV station has won more opportunities to gain profits by insert advertisement and re-investment. As for the TV series itself, market expectations are harder to predict before the premiere. Collecting and sorting out the online word-of-mouth and popularity data is conducive to its future investment and production. The producer can maintain the advantage what types of works are easily accepted by the market and what characters will arouse the audience's resonance and hot discussion next time. There will be more references in future productions synchronized with artistic and commercial values. When the next work is released, it may have a higher starting point when negotiating the price of the premiere copyrights due to the good representation of the work. Therefore, the popularity of its online word-of-mouth is closely related to its works. Its positive online word-of-mouth and viewing data lay a good foundation for its subsequent investment and market occupation of other works, increasing the value of its continuous investment.

4.2 For Film Works

For film works, four typical films were selected to explore an important part of the online word-of-mouth effect. How does online film criticism play an important role in directivity influence the

audience choice? The research found that for the best-selling films, the films themselves should be consistent with the current social background and combine with the concerns of the people. *Dying to Survive* firmly grasp this point to show the ultimate resonance of the public, leading the overall trend of its online word-of-mouth. Therefore, the audiences are willing to watch the movie and contribute to the box office. On the other hand, due to the different social and cultural backgrounds, Although *the Green Book* although praised constantly and scored highly, it can only be appreciated by a part of people rather than the whole market. Because it has not aroused the interest and attention of the public. The films like *The Avengers* constantly shocks the audiences with visual effects. In other words, its plot advancement and emotional accumulation have their own hot topics which arouse audiences' curiosity before the release and make them have a certain emotional connection. It makes the foundation of online reputation and the word-of-mouth. After its release, its popularity on the Internet has been constantly reflected by round after round of discussions about the plot and the novelty of special effects made by science fiction movie characters. Both positive and negative word-of-mouth strongly entered the audience's vision with certain word-of-mouth heat.

Extensive publicity efforts should be undertaken as early as possible to attract consumers to pay for the films. In addition, the characteristics of the large flow of people during holidays further promote the rise of its popularity and box office success. At the same time, the Weibo reposts of these five film and television works were analyzed and compared with Baidu Index. As shown in Figure 16 and 17, the more Baidu index and the number of reposts of the film and television works on Weibo, the longer the duration, the higher the box office correspondence, and the longer the lifecycle of online word-of-mouth popularity. In other words, the longer a film's online word-of-mouth popularity lasts, the more likely it is to maintain certain exposure and stimulate its box office rise.
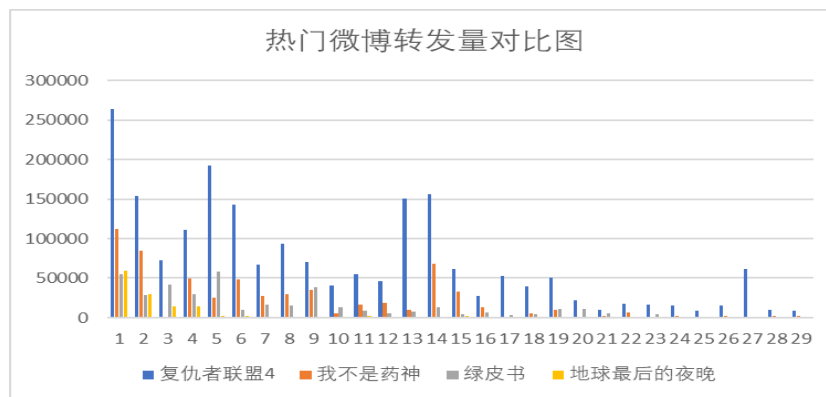

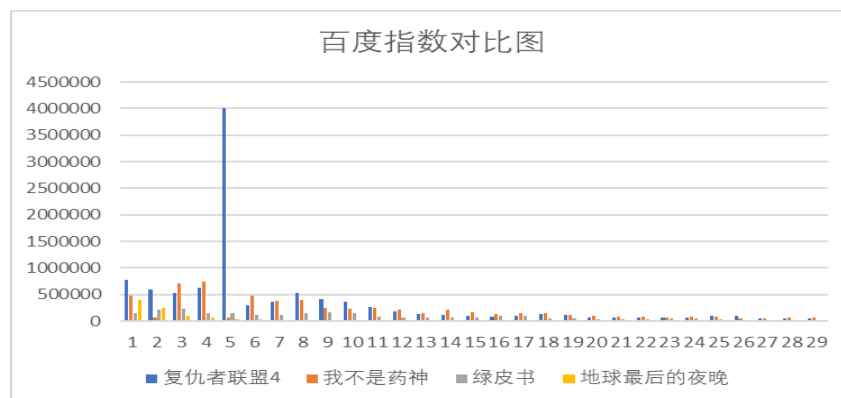**Figure 16 Comparison of the forwarding volume of popular Weibo**

Figure 17 Comparison of Baidu Index

V. Conclusions

Through the selection of different types of film and television works with different market responses, Data mining and data analysis are carried out in detail. Firstly, it is found that the popularity of online word-of-mouth is significantly positively correlated with the box office (or the number of plays). Online word-of-mouth provides audience support for box office (or views). The box office provides data source for online word-of-mouth and the popularity of online word-of-mouth drives box office (or views). On the premise of positive online word-of-mouth performance, the box office data will not appear a serious decline. On the

contrary, it will lead to a high box office or a temporary increase. Secondly, the duration of online word-of-mouth popularity will affect its exposure, and then affecting its box office data. Appropriately promoting the index related to online word-of-mouth popularity will increase the box office. Furthermore, in addition to the impact of online word-of-mouth, the story and market saturation of the work itself also become important factors to measure the sustainable investment decision. Based on positive word-of-mouth effect, the life cycle of film and television works will be successive. The screenwriters and investors should pay attention to the extensibility, the novelty and the market gap of the market. Therefore, the commercial value of the film-television industry will have greater sustainable investment value.

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