The Impact of Hashtags and Sentiment on Public Engagement with Government Weibo: A Post-print

Authors: Li Yixiao, Luo Chunhua, Lin Jiaying

Date: 2023-10-08T00:00:00+00:00

Abstract

[Purpose/Significance] This study aims to explore the influencing factors of netizen participation level in government Weibo, providing reference suggestions for government Weibo operation. [Method/Process] Based on Weibo data from a certain government Weibo account from November 2015 to October 2017, this study analyzes the relationship between hashtag usage and netizen participation level, and investigates the impact of sentiment in Weibo text content on netizen participation level. [Results/Conclusion] Government Weibo hashtags exhibit localization characteristics; hashtag usage can enhance netizen participation level. The sentiment of Weibo text content influences netizen participation level, with positively-sentimented Weibo posts bringing higher netizen participation than negatively-sentimented ones. The results of this study have reference significance for improving netizen participation levels in government Weibo.

Full Text

The Influence of Hashtag and Sentiment on Netizen Participation in Government Microblogs

Li Yixiao[1], Luo Chunhua[2], Lin Jiaying[1]

[1]School of Information Management and Engineering, Zhejiang University of Finance & Economics, Hangzhou 310018
[2]School of Data Sciences, Zhejiang University of Finance & Economics, Hangzhou 310018

Abstract

[**Purpose/Significance**] This study explores influencing factors of government microblog users' participation, which provides suggestions for operations of government microblogs. [**Method/Process**] Based on data collected from a government microblog account spanning from November 2015 to October 2017, the relationship between hashtag usage and netizen participation was analyzed, and the effect of microblog posts' sentiment on netizens' participation was investigated. [**Result/Conclusion**] Hashtags of government microblog posts were localized and hashtag usage increased netizens' participation; microblog posts' sentiment influenced netizens' participation, and positive sentiment resulted in a higher level of netizens' participation than negative sentiment did. The findings of this study could provide useful insight into increasing government microblog users' participation levels.

Keywords: government microblog; sentiment analysis; hashtag; netizen participation

1 Introduction

As social media permeates human production and life, it expands the spatial and temporal boundaries of government social management, bringing innovation to government social management methods and mechanisms [1]. Weibo is a type of broadcast-style social media platform where brief messages posted by users can be forwarded, commented on, and liked by other users. The rise of Weibo has given birth to a new form of government media—government microblogs, where government agencies open accounts on various Weibo platforms to publish government information, conduct information exchange, and provide public services. According to the *2017 Government Index • Weibo Influence Report* [2], by the end of 2017, there were 173,569 verified government microblog accounts on the Sina Weibo platform. The central government has opened official microblog accounts on major platforms including Sina Weibo and People's Daily Weibo. The Zhejiang Provincial People's Government website features a "Weibo Channel" that aggregates important provincial government microblogs such as "Zhejiang Release," "Zhejiang Public Security," and "Zhejiang Law Popularization." An important category of government microblogs consists of city-level accounts like "Shanghai Release" and "Beijing Release." These microblogs typically serve as a city's portal on the Weibo network, usually operated by the municipal government's information office, publishing various types of information. Due to relatively high urban internet penetration rates, city government microblogs have attracted large numbers of followers—for instance, "Shanghai Release" had over 6.5 million followers as of September 2018.

While governments at all levels attach great importance to government microblog development and the number of accounts continues to rise year by year, the operation of government microblogs is often neglected. Research

shows that issues such as one-way information dissemination, lack of interactive communication, and delayed information release constrain the development of government microblogs [3-4]. Government microblogs serve the functions of timely information dissemination, opinion guidance, increased government-citizen interaction, and enhanced government image. Zheng Lei [4] explored the external motivations, challenges, and internal potentials in Chinese government agencies' use of government microblogs. The citizen-centered e-governance theory [5-6] emphasizes that the application of internet technologies transforms traditional government-centered public services into citizen-centered public services, thereby improving citizen satisfaction and participation levels. Netizen participation in government microblogs reflects the service quality and level of government-citizen interaction. City government microblogs have large followings, and studying the influencing factors of netizen participation in these accounts provides important reference value for the promotion and application of government microblogs at all levels. Using long-term data obtained from a coastal city portal microblog account, this study examines the influencing factors of netizen participation in city government microblogs from the perspective of content analysis, and proposes corresponding recommendations for their operation. The use of hashtags and emotional strategies in government microblog operations embodies the citizen-centered philosophy. Based on relevant research hotspots, this paper focuses on two questions: (1) Can the use of hashtags in government microblogs improve netizen participation? (2) Can the use of emotional expression in government microblogs improve netizen participation?

2 Literature Review

Government microblogs generally refer to microblogs verified and opened by government departments or their authorized agencies on Weibo platforms. Some studies or statistical reports also categorize verified microblogs of government employees as government microblogs. With the vigorous development of Weibo, government microblogs have been widely applied worldwide [7-9]. Kavanaugh et al. [10] conducted a large-scale survey on government officials' use of social media such as Twitter in Arlington, Virginia, focusing on the application of government social media in emergency management. Korean scholars analyzed the central government's use of Twitter in South Korea, arguing that government microblog applications facilitate the transformation from e-government to "social government" [11]. Cao Jinsong [12] studied the use of government microblogs, exploring the main factors influencing their communication effectiveness.

In the use of government microblogs, netizens participate in various interactive roles through online behaviors such as forwarding, commenting, and liking. Netizen participation levels can reflect the operational status and service level of government microblogs. An important perspective for studying netizen participation in government microblogs is content analysis of posted content. Zheng Lei et al. [13] used content analysis methods to analyze several representative

government microblog accounts in China, finding that most government microblogs focus more on self-promotion than service provision, with insufficient interaction between government and citizens. Their time-series analysis also revealed that the operational capabilities of government microblogs are continuously improving. Liu Xiaojuan et al. [14] analyzed the correlation between content characteristics, posting time, and source agency features of microblog posts and user forwarding behavior based on the top 100 government microblog accounts in China. Wang Guohua et al. [15] compared the content and format of microblog posts from public security government microblog accounts in three typical cities in eastern, central, and western China, and further analyzed participation levels based on forwarding, commenting, and liking metrics. N. DePaula et al. [16] categorized government social media content into four types: information provision, input seeking, online dialogue and offline interaction, and symbolic expression. DePaula et al. [17] further studied the impact of government microblog content types on netizen participation levels.

Sentiment analysis primarily uses natural language processing and machine learning technologies to classify text information into several sentiment categories, commonly including positive, neutral, and negative sentiments. S. M. Zavattaro et al. [18] analyzed U.S. local government microblogs using sentiment analysis technology to study the relationship between microblog tone and citizen participation. Feng Xiaodong et al. [19] measured the degree of interest and sentiment matching between the public and government microblogs based on text mining methods, and further studied the influence of these two factors on public participation in government microblog dissemination. Xu Yuemei et al. [20] designed a prediction model for government microblog forwarding scale, improving model accuracy by introducing text content features.

A hashtag is a short text used to briefly summarize or label posted content on social media platforms such as Weibo. On domestic platforms like Sina Weibo, hashtags are marked by a pair of "#" symbols. Hashtags are also part of microblog content, and microblogs using the same or similar hashtags often have thematic relevance, facilitating user retrieval. Hashtags have potential application value in the dissemination of emergency event information [21]. K. A. Lachlan et al. [22] extracted microblogs related to a large-scale weather disaster on Twitter based on hashtags, comparing the roles of local and national hashtags. A. T. Chatfield et al. [6] compared emergency information dissemination based on government websites and hashtag usage during a volcanic eruption in Indonesia, pointing out that microblogs can serve as a multi-directional communication tool for governments to quickly and effectively disseminate risk perception and disaster information to the public.

Through reviewing relevant literature and combining the focus of this paper, we summarize the following findings: (1) Content analysis studies on government microblogs have paid little attention to the role of hashtags; (2) Comprehensive analysis based on the posted content of city government microblogs and other comprehensive government microblogs is relatively lacking; (3) The impact of

hashtag usage and emotional expression in the daily operation of city government microblogs on netizen participation needs further understanding. Based on this, this paper uses two years of posted microblog data from a city government microblog, focusing on hashtag usage and emotional expression to analyze netizen participation in the daily operation of city government microblogs, exploring ways to improve netizen participation, and providing suggestions and references for designing reasonable and standardized operation strategies for city government microblogs.

---

3 Research Methods and Approach

3.1 Conceptual Definitions

Citizen-centered e-governance theory [5-6] emphasizes that the application of new internet technologies such as social media enables ordinary citizens to participate in social governance processes. The Weibo platform features high interactivity and convenience, making it an important carrier for citizen-centered public services. In the operation of government microblogs, governments or authoritative institutions lead public opinion and interact with citizens through information release. Government microblog services rely on the Weibo platform, and citizens primarily participate in these services through various user functions provided by the platform. While the Weibo platform offers functions such as posting, forwarding, commenting, and liking, government microblog posting is mainly completed by governments or authoritative institutions, with ordinary citizens participating through forwarding, commenting, and liking. Therefore, this paper defines netizen participation in government microblogs as the level of dissemination behaviors such as forwarding, commenting, and liking that netizens engage in while participating in government microblog dissemination. For a specific government microblog post, netizen participation can be measured through quantitative indicators such as the number of forwards, comments, and likes.

3.2 Research Methods and Approach

The selection of city government microblog research samples needs to consider their development level, as well-developed samples have higher reference value in operation. The development level of city government microblogs depends on factors such as local e-government development level and local economic development. Considering these factors, “Hangzhou Release” was selected as the research sample. Hangzhou is located in the southeastern coastal region with relatively developed economy and good e-government infrastructure. As the official microblog of the Hangzhou Municipal Government Information Office, “Hangzhou Release” has registered and verified official accounts on mainstream platforms including Sina Weibo and People’s Daily Weibo. Taking the Sina Weibo “Hangzhou Release” as an example, since its launch in August 2014, it

has posted over 40,000 microblogs and has approximately 3.28 million followers (as of September 2018).

Sina Weibo is the largest Chinese microblog platform, and the "Hangzhou Release" account on this platform serves as the data source for this study. This paper implemented a Python web crawler based on a simulated login mechanism, using multiple accounts to log in to Weibo in rotation for data collection to reasonably circumvent the platform's access frequency limit per unit time. To comprehensively analyze the daily operation of "Hangzhou Release," this paper collected all microblog data posted by "Hangzhou Release" from November 1, 2015, to October 31, 2017, totaling 18,667 posts with a time span of two years. During this time window, the hashtag usage rate of "Hangzhou Release" gradually increased and eventually stabilized at over 95%. Therefore, this time window data is helpful for analyzing the role of hashtag usage in government microblogs.

The obtained dataset includes fields such as posting time, hashtags, text content, number of likes, number of forwards, number of comments, and number of images for each microblog. The data analysis methods used in the study include descriptive statistical analysis, word frequency analysis, correlation analysis, and sentiment analysis. Sentiment analysis employed the Baidu Natural Language Processing Service Platform, accessing its API interface through Python. The platform's sentiment tendency analysis algorithm is based on deep learning methods and can classify text sentiment polarity and provide classification confidence levels.

---

4 Data Analysis

4.1 Basic Analysis

During the selected time window, "Hangzhou Release" posted a total of 18,667 microblogs, with an average of 25.54 posts per day. In terms of posting frequency, "Hangzhou Release" demonstrated high activity and large information volume. Posts were generally published between 7 AM and 10 PM, consistent with netizens' daily Weibo usage patterns. The average number of forwards, comments, and likes for all microblogs were 39.26, 15.47, and 11.68, respectively. Among all microblogs, 15,843 used hashtags, while 2,824 did not. A microblog titled "If you could learn one Chinese national essence, what would you learn?" generated the maximum number of forwards (7,260) and comments (13,228) for a single post, with the hashtag Knowledge Boost. A microblog titled "Hangzhou Further Upgrades Real Estate Market Regulation Measures" generated the maximum number of likes (7,861) for a single post, with the hashtag Authoritative Release.

The number of forwards, comments, and likes for a microblog reflects its appeal to netizens; therefore, this paper selects these three indicators to measure neti-

zen participation. First, a correlation analysis was conducted on the forwards, comments, and likes of all microblogs. The Pearson correlation coefficients between each pair are shown in Table 1 . According to the coefficient levels, there is correlation between forwards, comments, and likes; among them, the correlation between forwards and comments, and between likes and comments, is relatively strong.

Table 1 Pearson Correlation Coefficients of Forwards, Comments, and Likes

4.2 Hashtag Analysis

Figure 1 [Figure 1: see original paper] shows a word cloud of all hashtags, generated using Python's word cloud library. Larger font sizes in the figure indicate higher usage frequency, allowing for intuitive identification of frequently used hashtags.

Figure 1 Hashtag Cloud

After deduplication, a total of 546 hashtags were obtained. Figure 2 [Figure 2: see original paper] further displays the top 10 hashtags by usage frequency. The most used hashtag was Hangzhou Life, with over 2,000 uses; Attention and Knowledge Boost ranked second and third, respectively. Notably, five of the top ten hashtags are directly related to Hangzhou. Statistical analysis of all hashtags revealed that over 50% were related to Hangzhou. Since hashtags roughly reflect the themes of microblog content, it is evident that "Hangzhou Release" primarily publishes local information about Hangzhou.

Figure 2 Top 10 Hashtags by Usage Frequency

Among all microblogs using hashtags, approximately 98.9% used only one hashtag, with only a very small number using multiple hashtags. Figure 3 [Figure 3: see original paper] shows the monthly statistics of hashtag usage. From December 2015 to March 2016, the hashtag usage rate of "Hangzhou Release" grew rapidly. Subsequently, the growth trend stabilized. By the end of the time window, the proportion of microblogs using hashtags had approached 100%. This time window data demonstrates the changes in hashtag usage in the operation of "Hangzhou Release," thereby raising the question of whether hashtag usage helps improve netizen participation.

Figure 3 Monthly Hashtag Usage Rate

Figure 4 [Figure 4: see original paper] compares the average number of forwards, comments, and likes for microblogs with and without hashtags, calculated semi-annually. The figure shows that except for forwards during November 2015 to April 2016, all other statistical indicators for microblogs with hashtags in the same time period exceeded those for microblogs without hashtags. This indicates that hashtag usage can increase the number of likes, comments, and forwards. Therefore, Figure 4 explains the phenomenon of increasing hashtag usage rates shown in Figure 3: the operation team of "Hangzhou Release" cor-

rectly grasped the strategy of hashtag usage, ensuring hashtags were used in virtually every microblog.

To further test the effect of hashtag usage, all microblogs were divided into two populations based on whether they used hashtags, and whether there were significant differences in forwards, comments, and likes was tested. During variance analysis, Levene's test indicated that these three types of data did not meet the homogeneity of variance assumption. Therefore, the non-parametric Mann-Whitney U test was selected for further analysis. At the 0.05 confidence level, the significance values for forwards, comments, and likes were all less than 0.001, indicating significant differences between microblogs with and without hashtags in terms of forwards, comments, and likes.

Figure 4 Comparison of Netizen Participation for Microblogs With and Without Hashtags (Semi-Annual Statistics)

4.3 Sentiment Analysis

The sentiment statistics for the 546 independent hashtags are shown in Figure 5 [Figure 5: see original paper], with positive sentiment hashtags accounting for the largest proportion. Further sentiment analysis was conducted on the text of 18,667 microblogs, with the proportions of the three sentiment categories shown in Figure 6 [Figure 6: see original paper]. Microblogs with positive sentiment reached 85.05%, indicating that "Hangzhou Release" primarily publishes content with positive sentiment.

Figure 5 Sentiment Statistics of Hashtags

Figure 6 Sentiment Statistics of Microblogs

All microblogs were divided into three populations based on sentiment, and significant difference tests were conducted on forwards, comments, and likes. Levene's test indicated that these three types of data did not meet the homogeneity of variance assumption, making ANOVA unsuitable. Considering the three populations divided by sentiment, the non-parametric Kruskal-Wallis test was used for further analysis. The results showed that the significance values for forwards, comments, and likes were all less than 0.001 (with 0.05 as the significance level). Therefore, there were significant differences in forwards, comments, and likes among microblogs with the three different sentiment types.

Figure 7 [Figure 7: see original paper] further displays the average forwards, comments, and likes for microblogs with the three different sentiment types. The average comments and likes for positive and neutral sentiment microblogs were significantly higher than those for negative sentiment microblogs. The average forwards for positive sentiment microblogs were higher than those for negative sentiment microblogs, while the average forwards for neutral sentiment microblogs were slightly lower than those for negative sentiment microblogs. Therefore, netizen participation in positive sentiment microblogs was higher than that in negative sentiment microblogs.

Figure 7 Microblog Sentiment and Netizen Participation

5 Discussion

This paper selected a representative time-series dataset from "Hangzhou Release," using the number of forwards, comments, and likes as indicators of netizen participation, analyzed the correlations between these indicators, examined the changes in hashtag usage over time and its impact on netizen participation, and investigated the relationship between microblog sentiment and netizen participation through sentiment analysis of microblog text content. The main findings are discussed below.

First, there is correlation among netizen participation indicators in government microblogs. Through big data analysis of 18,667 microblogs, we found that forwards, comments, and likes are correlated with each other. This correlation indicates that netizens' online behaviors of forwarding, commenting, and liking all reflect their willingness to participate in interaction. When designing performance evaluation indicator systems for government microblogs, these indicators should all be included while considering their intercorrelations. Additionally, we found that the correlation between comments and forwards, and between comments and likes, is relatively strong. This reflects, to some extent, the importance of comments in the interactive participation process of government microblogs. Through platforms such as government microblogs, netizens' comments not only enhance government-citizen interaction but also expand discussion and exchange among netizens themselves. This represents another public management value beyond the information service provision function of government microblogs: netizens participate in public deliberation through government new media such as government microblogs.

Second, the rational use of hashtags helps improve netizen participation in government microblogs. In the selected time-series data, the usage rate of microblog hashtags continuously increased and eventually exceeded 95%. By comparing netizen participation indicators, microblogs with hashtags outperformed those without hashtags overall, explaining the motivation for "Hangzhou Release" to increase hashtag usage rates. Academic research has focused relatively more on hashtag usage in emergency events, while studies on hashtag usage in the daily operation of government microblogs are scarce; many government microblog accounts also tend to neglect this issue in actual operation. The conclusions of this study help supplement understanding of the role of hashtags in government microblogs. The analysis also revealed that "Hangzhou Release" hashtags have localized characteristics, indicating that city government microblogs exhibit strong regional features in their posted content.

Third, positive sentiment microblogs generate higher netizen participation than negative sentiment microblogs. The data analysis in this paper shows that positive emotional expression occupies an absolute advantage in the proportion of

government microblog posts. Through comparative analysis, netizen participation in positive sentiment microblogs was significantly higher than that in negative sentiment microblogs. This conclusion is similar to the findings of S. M. Zavattaro et al. [18], both indicating that positive emotional expression in government microblogs can enhance netizen participation. Compared to the study by S. M. Zavattaro et al. [18], the dataset in this paper is more than three times larger, and the analysis indicators are more comprehensive. The results also show that neutral sentiment microblogs exceeded positive sentiment microblogs in average comments and likes. Considering the small proportion of neutral sentiment microblogs (only about 2.64%) and the influence of the sentiment analysis algorithm, this result warrants further in-depth research combined with microblog topic analysis in future studies.

---

6 Implications and Limitations

6.1 Management Implications

(1) Government departments should attach importance to hashtag usage in operating government microblogs and explore specific operational strategies to improve netizen participation through hashtag usage. Through analysis of two years of data from "Hangzhou Release," we found that hashtag usage helps increase netizens' online behaviors such as forwarding, commenting, and liking, and hashtags exhibit localized characteristics. Government microblog services are a "lightweight" public service, and although many government microblog accounts have been launched, their operation and management lack human and financial resources. Therefore, lightweight operational strategies such as hashtag usage are worth promoting and learning from. Operators of government microblogs can spend a small amount of time considering appropriate hashtags when posting, aiming to increase netizen participation. City government microblogs and other regional accounts can consider designing a set of hashtag systems based on local characteristics, while other types of government microblogs can also consider reflecting corresponding features in their hashtags.

(2) Government microblog content should primarily convey positive sentiment, delivering positive energy to netizens and avoiding negative emotional orientation. Based on the analysis of Chinese government microblogs in this paper and foreign literature on government microblogs in other countries, positive sentiment government microblogs generate higher netizen participation than negative sentiment microblogs. As the government's mouthpiece, government microblogs aim to deliver authoritative, accurate, and timely information to the public. Under this premise, government microblogs at all levels should rationally use positive emotional expression. Attention should be paid not only to text content but also to the emotional conveyance in multimedia content such as images and

videos posted by microblog operators. Additionally, the emotional expression of netizens in comments should be valued by government microblog operators. Through positive responses and reasonable guidance, negative emotions can be dispelled, creating a positive atmosphere for government-citizen interaction on government microblogs.

(3) Performance evaluation of government microblogs should comprehensively consider indicators such as netizen participation, and management departments should strengthen training on daily operational strategies for government microblogs. This study used netizen participation indicators such as forwards, comments, and likes, which have reference value for theoretical research and practical operation of government microblog performance evaluation. The central government attaches great importance to the issue of "lazy governance" in the e-government field and has conducted multiple rounds of national government website spot checks. With the penetration and development of government microblogs, assessment and evaluation of government microblogs at all levels is imperative. Given the interactive nature of the Weibo platform, performance evaluation of government microblogs should include netizen interaction as an important assessment criterion. Management departments of government microblogs at all levels should strengthen training and guidance for operators, enabling them to master daily operational strategies including hashtag usage and emotional expression.

6.2 Research Limitations

The main contribution of this study lies in discovering, through big data analysis and other methods, the enhancing effects of hashtag usage and positive sentiment expression in government microblogs on netizen participation. However, this study also has several limitations, which are summarized below along with directions for future research improvement.

(1) The data sample in this study comes from a single city government microblog account, which results in insufficient sample representativeness. Future research could consider using stratified sampling methods to obtain samples from government microblog accounts at different levels. The dataset in this study spans two years, which was the original intention—to identify changes in government microblog operational strategies and summarize patterns for improving netizen participation. However, the sampling method using data from the same account also caused insufficient sample representativeness. By obtaining data from government microblog accounts at various levels through stratified sampling and conducting analysis from a cross-sectional perspective, future research could help understand differences in operational strategies caused by factors such as administrative level and region, and their further impact on netizen participation.

(2) The measurement of netizen participation could consider more indicators, such as the quality and sentiment of netizen participation based on text analysis. Using forwards, comments, and likes to measure netizen participation in a microblog is convenient for calculation but not comprehensive enough. By analyzing the textual content of netizen participation in comments, the quality and sentiment of participation could be further measured, thereby facilitating in-depth exploration of the public value of netizen participation. Incorporating this factor involves the algorithmic design of netizen participation quality and would bring larger data volumes and computational loads, which future research could consider expanding toward.

(3) This study directly used the sentiment analysis module from the Baidu Natural Language Processing framework for text sentiment analysis. Due to the limitation of interface calls, the algorithm itself could not be improved. The algorithm uses the latest deep learning technology, and its advantages and disadvantages compared to traditional lexicon-based sentiment analysis algorithms still require testing in more studies. Additionally, the algorithm can further provide sentiment classification confidence levels and positive/negative probabilities, which were not involved in this analysis but could be utilized in future research.

References

[1] MERGEL I. A framework for interpreting social media interactions in the public sector[J]. Government information quarterly, 2013, 30(4): 327-334.
[2] People's Daily Online Public Opinion Data Center. 2017 Government Index • Weibo Influence Report[R/OL]. [2018-09-10]. http://yuqing.people.com.cn/n1/2018/0122/c364056-29779600.html.
[3] Zheng Lei, Ren Yali. Research on the Current Status of Chinese Government Agency Microblogs[J]. Library and Information Service, 2012, 56(3):13-17.
[4] ZHENG L. Social media in Chinese government: drivers, challenges and capabilities[J]. Government information quarterly, 2013, 30(4): 369-376.
[5] REDDICK C G, CHATFIELD A T, OJO A. A social media text analytics framework for double-loop learning for citizen-centric public services: a case study of a local government Facebook use[J]. Government information quarterly, 2017, 34(1): 110-125.
[6] CHATFIELD A T, REDDICK C G. Understanding risk communication gaps through e-government website and Twitter hashtag content analyses: the case of Indonesia's Mt. Sinabung Eruption[J]. Journal of homeland security and emergency management, 2015, 12(2): 351-385.
[7] BUNDIN M, MARTYNOV A. Use of social media by the federal government in Russia[C]//Proceedings of the 9th international conference on theory and practice of electronic governance. New York, United States: ACM, 2016: 394-395.

[8] MOSSBERGER K, WU Y, CRAWFORD J. Connecting citizens and local governments? Social media and interactivity in major US cities[J]. Government information quarterly, 2013, 30(4): 351-358.
[9] Chen Jing, Yuan Qinjian. Review of Research on Government Microblogs at Home and Abroad[J]. Information Science, 2014, 32(6):156-161.
[10] KAVANAUGH A L, FOX E A, SHEETZ S D, et al. Social media use by government: from the routine to the critical[J]. Government information quarterly, 2012, 29(4): 480-491.
[11] YOON H Y, KIM J, KHAN G F, et al. From e-government to social government: Twitter use by Korea's central government[J]. Online information review, 2014, 38(1): 87-108.
[12] Cao Jinsong. Government Agency Microblogs and Innovation in Government-Citizen Communication[J]. Modern Communication: Journal of Communication University of China, 2011(5):59-63.
[13] ZHENG L, ZHENG T. Innovation through social media in the public sector: information and interactions[J]. Government information quarterly, 2014, 31(Supplement 1): S106-S117.
[14] Liu Xiaojuan, Wang Haoxian, Xiao Xue, et al. Research on Influencing Factors of Government Microblogs Based on Weibo Characteristics[J]. Journal of Intelligence, 2013, 32(12):35-41.
[15] Wang Guohua, Dong Li, Chen Yi, et al. Comparative Study on the Operation Status of Public Security Government Microblogs in Typical Cities in Eastern, Central, and Western China[J]. Journal of Intelligence, 2015, 34(12):106-111.
[16] DePAULA N, DINCELLI E, HARRISON T M. Toward a typology of government social media communication: democratic goals, symbolic acts and self-presentation[J]. Government information quarterly, 2018, 35(1): 98-108.
[17] DePAULA N, DINCELLI E. Information strategies and affective reactions: how citizens interact with government social media content[J]. First Monday, 2018, 23(4)[2019-12-30]. https://doi.org/10.5210/fm.v23i4.8414
[18] ZAVATTARO S M, FRENCH P E, MOHANTY S D. A sentiment analysis of US local government tweets: the connection between tone and citizen involvement[J]. Government information quarterly, 2015, 32(3): 333-341.
[19] Feng Xiaodong, Ma Jie, Jiang Guoyin. Social Trust, Rational Behavior and Government Microblog Dissemination: An Empirical Study Based on Text Mining[J]. Journal of the China Society for Scientific and Technical Information, 2019, 38(9): 954-965.
[20] Xu Yuemei, Liu Yunwen, Cai Lianqiao. Prediction Model for Government Microblog Forwarding Scale Based on Deep Fusion Features[J/OL]. Data Analysis and Knowledge Discovery, [2019-12-24]. http://kns.cnki.net/kcms/detail/10.1478.g2.20190918.1659.008.html.
[21] POTTS L, SEITZINGER J, JONES D, et al. Tweeting disaster: hashtag constructions and collisions[C]//Proceedings of the 29th ACM international conference on Design of communication. New York, United States: ACM, 2011: 235-240.
[22] LACHLAN K A, SPENCE P R, LIN X, et al. Twitter use during a

weather event: comparing content associated with localized and nonlocalized hashtags[J]. Communication studies, 2014, 65(5): 519-534.

Author Contributions

Li Yixiao: Proposed research ideas, designed research plan, wrote the paper;
Luo Chunhua: Collected and cleaned data;
Lin Jiaying: Conducted experiments and analyzed data.

The Influence of Hashtag and Sentiment of Government Microblog on Netizen Participation

Li Yixiao[1], Luo Chunhua[2], Lin Jiaying[1]
[1]School of Information Management and Engineering, Zhejiang University of Finance & Economics, Hangzhou 310018
[2]School of Data Sciences, Zhejiang University of Finance & Economics, Hangzhou 310018

Abstract: [Purpose/significance] This study explores influencing factors of government microblog users' participation, which provides suggestions for operations of government microblogs. [Method/process] Based on data collected from a government microblog account, which spanned from Nov. 2015 to Oct. 2017, the relationship between hashtag usage and netizen' participation was analyzed, and the effect of microblog posts' sentiment on netizens' participation was investigated. [Result/conclusion] Hashtags of government microblog posts were localized and hashtag usage increased netizens' participation; microblog posts' sentiment influenced netizens' participation, and positive sentiment resulted in a higher level of netizens' participation than negative sentiment did. The findings of this study could provide useful insight into increasing government microblog users' participation levels.

Keywords: government microblog; sentiment analysis; hashtag; netizen participation

Note: Figure translations are in progress. See original paper for figures.