Abstract

Utilizing the Technology-Organization-Environment (TOE) theory and the literature on citizen engagement, this article examined the contextual antecedents of the activities of government agencies in government microblogs and explored the relationship between the activities of government agencies in government microblogs and citizen engagement, as well as analyzed the moderating role of satisfaction and citizen pressure on this relationship. Based on archival data from 284 cities in China, our results showed that some of TOE contextual factors had positive influences on the activities level of government agencies in government microblogs. Further, the activities of government agencies in government microblogs are positively associated with the extent of citizen engagement. Results also indicated that satisfaction and citizen pressure negatively moderated this relationship. Our findings provide indications to practice on enhancing citizen engagement in implementing relevant government microblogs initiatives.

Keywords

Technology-Organization-Environment, activities of government agencies, government microblogs, satisfaction, citizen pressure, citizen engagement.

Introduction

Social media are widely believed to be efficient and convenient tools for promoting transparency and interactions, as well as facilitating knowledge sharing (Kim et al. 2015). Recent years have witnessed a growing trend in the use of social media in the public sectors for better citizen engagement (Bonsón et al. 2015). Microblogs, as a subgroup of social media applications, have become the key information and communication channel for Chinese government during the last seven years. Since the inception in 2011, a large number of government administrative units such as public security, transportation, education, urban management have embarked on microblogs. Extant studies on the impact or role of social media usage in governments have highlighted the multifarious benefits vis-à-vis citizens and governments. Despite these promised benefits, significant challenges remain in the growth of microblogs in Chinese local governments. One ongoing challenge, for instance, is to increase the extent of citizen engagement in microblog services in local governments.

According to the Forty-first China Internet Development Statistics Report released on January 31, 2018 by China Internet Network Information Center (CNNIC), as of December 2017, the amount of Internet users in China reached 772 million, a 5.6 percent increase over the beginning of the year. And the Internet popularity rate reached 55.8%, exceeding the average level in Asia and the world. Although the number of Chinese netizens is huge, according to the Report on Government Microblogs for the third quarter of 2016 written by PDPOMO, the average score of index INTERACTION with the full score of 100 representing the extent of citizens’ likes, comments, and shares is smaller than fifty in Chinese local government microblogs. This indicates that the citizen engagement of government microblogs in China is low. In fact, government microblogs’ potential value is not fully achieved, and citizens’ acceptance of government microblogs is still an issue. The problem of underutilization hinders government microblogs from realizing their full potential
to achieve administrative transparency and democracy. This predicament mirrors a pressing need for exploring how to promote the utilization of government microblogs from the perspectives of government agencies and citizens, respectively. To address the existing challenges, the objective of this study is to reveal mechanisms associated with the formation of behaviors in terms of citizen engagement in government microblogs. Three general research questions drove this study: First, what contextual factors can significantly affect the activities of government agencies in government microblogs based on Technology-Organization-Environment (TOE) framework? Second, what is the relationship between the activities of government agencies in government microblogs and citizen engagement? Third, is this relationship dependent on situational conditions such as satisfaction and citizen pressure?

To extend this line of research, we draw on TOE theory (Tornatzky et al, 1990) in an effort to identify the contextual factors facilitating the activities of government agencies in government microblogs. Furthermore, by anchoring on the citizen engagement literature, we endeavor to investigate the effects of the activities of government agencies in government microblogs on citizen engagement, and the moderating effects of citizens’ satisfaction with government and citizen pressure on the relationships between the activities of government agencies in government microblogs and citizen engagement. In essence, the importance of this study lies in revealing mechanisms for improving citizen engagement in the government microblogs context. Public administrators and policy makers can make use of the conclusions drawn in this study to develop future strategies to foster citizen engagement. Specifically, we provide an insight into what contextual factors are associated with higher levels of activities of government agencies in government microblogs. The results can help public administrators and policy makers to decide which contextual factor should receive most attention and to create the circumstances that have most influence on the activities of government agencies in government microblogs.

Theory and Hypotheses

Reviewing the literature suggests that the TOE framework may provide a useful theoretical underpinning for examining the activities of government agencies in government microblogs. Integrating the TOE framework and the citizen engagement literature, we developed a conceptual model in Figure 1. The left-hand side of the conceptual model shows the antecedents of the activities of government agencies in government microblogs. Among the wide range of factors that we found from literature review on IT adoption and use, this study focuses on government size, financial resources, higher-level pressure, competitive pressure and citizen pressure, which are the most prevailing antecedents in the pertaining studies (Ma, 2014; Wang et al, 2016; Lin, 2014; Yeh et al, 2015; Wu & Chen, 2014). In addition, we proposed four factors—information disclosure of government portal, interactivity of government portal, new technology application of government portal and efficiency of government affairs—that we consider to be particularly relevant to government microblogs. The right-hand side of the conceptual model shows how the activities of government agencies in government microblogs impact citizen engagement in government microblogs. Control variables should be taken into account in the conceptual model. We choose provincial capital cities as a control variable. And provincial capital city Dummy variable equals to 1 for provincial capital cities and 0 for other cities.

Technology Context

The technological context established in this study has its origins in the compatibility of innovation adoption theory (Rogers, 1983). Compatibility is the degree to which an innovation is perceived as consistent with existing values, past experience, and the needs of potential adopters (Rogers, 1983). Numerous studies have already pointed out that government microblogs promote information disclosure and increase the interactivity of the government (Kim et al, 2015; Hao et al, 2016; Mossberger et al, 2013). Departing from the innovation adoption theory (Rogers, 1983), the successful operation of government microblogs by government agencies should be well compatible with the original information systems or platforms in government agencies. Therefore, this paper identifies such indicators as “information disclosure of government portals” and “interactivity of government portals” to represent the technological ability of transparency and interactivity in government. In addition, government microblogs are associated with new information technology applications. As such, this paper selects “new technology application of government portal” to represent government agencies’ attitude and ability when facing new information
technology. In summary, Government microblogs are the use of information technology by government agencies with the aim of information disclosure and interaction with citizens. Further, Ma (2014) found that e-government performance, which is computed based on government portal scores, has significantly positive effects on the number of government microblogs. Accordingly, we formulated the following hypotheses:

**H1.** Governments with a higher level of information disclosure of government portal are more likely to achieve a greater level of activities of government agencies in government microblogs.

**H2.** Governments with a higher level of interactivity of government portal are more likely to achieve a greater level of activities of government agencies in government microblogs.

**H3.** Governments with a higher level of new technology application of government portal are more likely to achieve a greater level of activities of government agencies in government microblogs.

**Organization Context**

The organizational context established in this study focuses on government size, financial resources, and efficiency of government affairs.

**Government Size**

Organization size is commonly cited in innovation adoption and diffusion literature (Fu and Su, 2014; Wang et al., 2016; Bose & Luo, 2011). Some scholars emphasize that the adequacy of organizational resources correspond to the organization size. For this reason, they assume that organization size has a significant positive impact on the adoption or diffusion of innovation (Pan & Jang, 2008; Teo et al., 2009). In fact, a lot of e-government literatures have found size to be a significant predictor for e-government adoption. For
instance, Reddick (2005) suggested that size is a significant determinant of local government adoption of e-government. Similarly, Homburg & Dijkshoorn (2014) confirmed the relationship between size and the e-government adoption by Dutch municipalities. The possible reasons are that large government size may have greater needs for e-government and also be more likely to have fully developed capabilities (Norris & Kraemer, 1996). In this research, government size is defined as the ratio of the total number of urban government employees to the total urban population. Thus, the following hypothesis is proposed: **H4.** Governments with larger government size tends to achieve a greater extent of activities of government agencies in government microblogs.

**Financial Resources**

It is obvious that the construction and maintenance of government microblogs needs a lot of investment such as hardware, software, networks and government employees training. Sufficient financial resources help government agencies to operate suitable microblogs. That is to say, financial resources plays significant roles in pushing government agencies toward using microblogs. Thus, governments with greater financial resources are more likely to achieve a greater level of activities in government microblogs. Financial resources is considered to be another critical organizational factor that tends to affect government microblogs use. Financial resource is defined as the difference between public revenue and public expenditure to account for the proportion of public expenditure (Ma, 2014). Hence, we have the following hypothesis: **H5.** Governments with greater financial resources are more likely to achieve a greater level of activities of government agencies in government microblogs.

**Efficiency of Government Affairs**

Government efficiency refers to efficiency of government in terms of regulation burdens, government wastefulness, regulation transparency, and efficiency of legal frameworks (Schwab & Sala-i-Martin, 2015). In China, to our knowledge, there is no existing archival data on government efficiency of prefecture level cities based on the above definition. Accordingly, we introduced efficiency of government affairs which is measured by Yearbook of China City Competitiveness (Gui, 2016) into our model. This variable of efficiency of government affairs focuses on the amount of government affairs operated and the time lag of each affairs. Government microblogs are also influenced by efficiency of government affairs because efficiency of government affairs may constrain or facilitate the implementation and usage of government microblogs. Generally, government agencies can communicate with citizens by government microblogs with high efficiency. However, the high efficiency of government microblogs is based on the efficiency of the internal operation of the government affairs. In other words, information technology is only a tool, and the operation of the government microblogs is mainly dependent on the subjective behavior of the government staffs. Therefore, the government employees’ inherent attitude, habits, rules of work, process and so on, which could determine efficiency of government affairs, will affect their usage of government microblogs. Therefore, efficiency of government affairs can be considered as one of the important factors that are associated with government microblogs usage in government agencies and thus included in the organizational context of the TOE framework for further investigation. Therefore, the hypothesis is postulated as follows: **H6.** Governments with a higher level of efficiency of government affairs are more likely to achieve a greater level of activities of government agencies in government microblogs.

**Environment Context**

As noted by Krishnan et al, (2004), the institutional theory concerns firms’ responses to institutional pressures within their operating environments. They posit that firms will conform to institutional demands or requirements in order to achieve increased legitimacy, stability, reduced uncertainty, and strengthened survival capabilities. This analysis can be extended to government microblogs. This study employs three predicting variables including higher-level government pressure, competitive pressure, and citizen pressure.
Higher-level Government Pressure

According to Berry and Berry (2007), higher level governments play a significant role in shaping a government’s propensity to adopt specific policies and practices. That is to say, higher level pressure can force government agencies to pursue specific behaviors. Generally, higher level governments can impose the formal pressure on lower level governments through documents, standards, policies, and regulations. And lower level governments tend to follow the requirements and satisfy higher level governments. In China, the central government can pressure the local government to launch new activities and influence the behaviors of government departments. The government microblogs practice of government agencies experience pressure from higher level governments. We posit that the mandatory requirements from higher level government are very helpful to the improvement of local government microblogs. Thus, higher level pressure is expected to affect the activities of government agencies in government microblogs. Generally speaking, higher level governments will perform well when they require lower level governments to follow their order. Accordingly, in line with Ma (2014), we use the data of last year on activities from province in which the city is located as the pressure of higher level government. Hence, we have the following hypothesis:

**H7.** Governments with a higher level of higher-level pressure are more likely to achieve a greater level of activities of government agencies in government microblogs.

Competitive Pressure

Competitive pressure refers to peer pressure on using a new technology (Gatignon & Robertson, 1989). In fact, competitive pressure has long been recognized in IS literature as an important antecedent for information technology system adoption and implementation. Using 282 prefecture-level cities in China, Ma (2014) found that competition pressure is significantly and positively associated with the assimilation of government microblogging. As what Ma (2014) contended, government agencies seek to promote prestige by imitating those competitors who develop microblogs successfully. Moreover, if neighboring government agencies within a specific geographical region have practiced excellent microblogs, government agencies may tend to enhance their microblogs in order to achieve more competitive advantages. Hence, we posit that competitive pressure will exert positive effect on the level of activities of government agencies in government microblogs. In our study, according to Ma (2014), competitive pressure is defined as the average value of all the adjacent cities on activities of government agencies in government microblogs last year. Hence, we propose the following hypothesis:

**H8.** Governments with a higher level of competitive pressure are more likely to achieve a greater level of activities of government agencies in government microblogs.

Citizen Pressure

Several studies have focused on citizen pressure to study technology innovations diffusion (Popp et al, 2011; Lee et al, 2011; Ma 2014). With the increasing number of microblogs users in China, the demand for electronic interactions between the public and the government will become progressively stronger, which is bound to cause certain pressure on the development of microblogs. Accordingly, drawing on the institutional theory, we believe that government agencies will conform to citizen demands so as to achieve increased legitimacy and stability. Thus, citizen pressure plays a key role in pushing government agencies toward using microblogs. Consistent with Lee et al. (2011) and Ma (2014), we posit that Internet penetration rate and human capital are two of the key components of citizen pressure. And we use the average of Internet penetration rate and human capital as citizen pressure. Internet penetration rate is measured by the number of households with Internet access divided by the total population, and human capital is defined as the percentage of highly educated municipal citizens. Accordingly, we propose the following hypothesis:

**H9.** Governments with a higher level of citizen pressure are more likely to achieve a greater level of activities of government agencies in government microblogs.

**Linkage from the Activities of Government Agencies in Government Microblogs to Citizen Engagement**

Some studies computed social media activity in terms of the number of messages published (posted/tweeted) by government agency in a given period. For example, Haro-de-Rosario et al (2016)
computed the activity of social media by government as “mean number of posts (posts/tweets) per day during 1 month”. It is worth noting that their “activity” only refers to publishing the information rather than interactive behaviors. In this paper, we contend that government activities in social media should include several kinds of behavior including publishing information by posts, replying to the comments of citizens actively, and sending private messages to citizens and replying to @ (the People’s Daily Public Opinion Monitoring Office, 2016). It is obvious that we also incorporate the interactive behaviors of the government agencies into the scope of the activity.

In line with the extant literature (Agostino & Arnaboldi, 2016; Haro-de-Rosario et al, 2016), citizen engagement in this paper refers to citizens’ behavior of giving likes, comments and shares on governments’ posts in government microblogs. In general, a government posts a message on government microblogs to the citizens, who then would respond or give feedback through comments, likes, or shares. The extent of citizen engagement shows how many people give feedback or respond to government posts. Some scholars have paid attention to the relationship between government activity in social media and citizen engagement. For example, Bonsón et al (2015) found significant differences on engagement levels by citizens among media and content types and in different institutional contexts. Further, using data on 75 local governments in 15 countries, Bonsón et al (2017) found no relationship between the level of government activity in social media and citizen engagement and suggested that an increase in the number of government posts in channels such as Facebook and Twitter do not necessarily produce higher levels of citizen engagement. In fact, recent studies have emphasized the fact that government should use social media as a means of enabling two-way communication to increase citizen engagement, rather than one-way information supply (Mergel, 2013; Hofmann et al., 2013; Bonsón et al., 2014; Zheng and Zheng, 2014; Zavattaro and Sementelli, 2014). As such, we assume that activities of government agencies in government microblogs play a key role in driving citizens to giving likes, comments to the posts in government microblogs, or share the posts with others. Thus, we formulate the following hypothesis.

**H10.** The level of activities of government agencies in government microblogs is positively associated with the extent of citizen engagement.

### The Moderating Effect of Citizens’ Satisfaction with Government and Citizen Pressure

Oliver (1997) defined satisfaction as consumer’s fulfillment response, hence satisfaction involves a minimum of two stimuli—an outcome and a comparison referent. In the e-government context, in situation of high satisfaction with government, citizens will be more likely to pay attention to the government microblogs and read the posts, give likes, make comments on the posts, or share the posts with others. Therefore, it is logical to assume that for citizens with high satisfaction, activities of government agencies in government microblogs will have little effect on their engagement. This paper uses the measurement of satisfaction from Yearbook of China City Competitiveness (Gui, 2016).

As noted by Krishnan and Teo (2012), although the concept of resource complementarities was originally proposed to study a firm-level phenomenon, scholars have extended its core arguments to different levels and established its usefulness in different empirical settings. According to the concept of resource complementarities, while the presence of enough activities of government agencies in government microblogs is a major enabler for increasing the level of citizen engagement, it may have greater impact on the presence of certain other “enabling factors”. In this paper, we assume that citizen pressure is the complementary resource to the activities of government agencies in government microblogs. Citizen pressure focuses on the Internet penetration rate and the level of human capital which have been discussed before. According to Schultz (1961), human capital plays a critical role in the growth and development of individuals and nations. Given that “educated and IT-literate citizens are in a better position not only to use, but also can be involved in the implementation of e-government projects by providing useful feedback and suggestions (Srivastava and Teo, 2008),” we posit that the effect of activities of government agencies in government microblog on the increasing of citizen engagement would be further strengthened by the complementary role of netizens and human capital. In sum, we propose the following hypotheses.

**H11.** Satisfaction negatively moderates the relationship between activities of government agencies in government microblogs and citizen engagement.

**H12.** Citizen pressure positively moderates the relationship between activities of government agencies in government microblogs and citizen engagement.
Sample and Data

There are 284 prefecture-level city government microblogs from 22 provinces and 5 autonomous regions as research sample used in this paper. To test the formulated hypotheses, we gathered archival data of Chinese prefecture level cities. The data on independent variables of information disclosure of government portal, interactivity of government portal, and new technology application of government portal are derived from the 2013 Government Website Performance Report edited by China Software Testing Center with a range of 0 to 100. The data of government size, efficiency of government affairs, and human capital is from Yearbook of China City Competitiveness 2016 (Gui, 2016). The relevant data of financial resource and Internet penetration rate are from China City Statistical Yearbook compiled by NBSC (National Bureau of Statistics of China, 2016). The relevant data of activities of government agencies in government microblogs is from Report on Government Microblogs for the first half of 2016. The data of citizen engagement is from Report on Government Microblogs for the third quarter of 2016. The value of higher-level government pressure, competitive pressure and provincial capital city is dependent on author’s computation.

Analysis and Results

Descriptive Statistics and Correlations

All of correlations were significant at p<0.05. We followed up with the collinearity tests that measure variance inflation factor (VIF). The results revealed that our VIFs ranged from 1.381 to 2.727 (all tolerance levels above 0.367). Thus, the concern in our model appeared to be minimal.

Hypotheses Testing

First, we examine the hypotheses H1 to H9 by Least square regression. The results in Table 1 show that Interactivity of government portal, financial resources, efficiency of government affairs and higher-level government pressure have significant effect on the activities of government agencies in government microblogs. Therefore, H2 (β= .097, p < 0.05), H5 (β= .196, p < .01), H6 (β= .173, p < .01) and H7 (β= .346, p < .01) are all supported.

We conducted a hierarchical regression analysis to test the research hypotheses H10 to H12. Table 1 presents the results of the hierarchical regression analysis. We used the centering procedure suggested by Aiken, L. S. et al (1991) for regression analysis using interaction terms. We followed up with the collinearity tests that measure variance inflation factor (VIF). The results revealed that our VIFs ranged from 1.452 to 1.908 (all tolerance levels above 0.524). Thus, the concern in Model 5 is minimal.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
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<tbody>
<tr>
<td>Step 1: Independent Variable</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Activities of government agencies in government microblogs</td>
<td>.864***</td>
<td>.783***</td>
<td>.800***</td>
</tr>
<tr>
<td>Step 2: Moderating Variables</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Satisfaction</td>
<td>.117***</td>
<td>.195***</td>
<td></td>
</tr>
<tr>
<td>Citizen pressure</td>
<td>.040</td>
<td>.057</td>
<td></td>
</tr>
<tr>
<td>Step 3: Interaction Terms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities of government agencies in government microblogs × Satisfaction</td>
<td></td>
<td>-.100***</td>
<td></td>
</tr>
<tr>
<td>Activities of government agencies in government microblogs × Citizen pressure</td>
<td></td>
<td></td>
<td>-.074**</td>
</tr>
<tr>
<td>R²</td>
<td>.747</td>
<td>.762</td>
<td>.767</td>
</tr>
</tbody>
</table>
Government microblogs enhance citizen engagement

Table 1 Results of Hierarchical Regression Analysis

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>832.519***</th>
<th>298.347***</th>
<th>307.184***</th>
</tr>
</thead>
<tbody>
<tr>
<td>*** Significant at 0.01 level of significance. ** Significant at 0.1 level of significance.</td>
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</table>

As shown in Model 1, activities level of government agencies in government microblogs is positively associated with the extent of citizen engagement. Hence, H10 ($\beta= .864, p < .01$) is supported. Further, Model 2 shows that the moderating variable of satisfaction ($\beta=.117, p<.01$) is significant and citizen pressure is insignificant ($\beta=.040, n.s.$). From Model 3 We find that the interaction term of satisfaction with activities of government agencies in government microblogs is significant in a negative direction ($\beta=-.100, p <.01$). That is, satisfaction negatively moderates the relationship between the activities of government agencies in government microblogs and citizen engagement. Hence, hypothesis 11 is supported. we find that the interaction term of citizen pressure with activities of government agencies in government microblogs ($\beta=-0.074, p <.1$) is significantly related to citizen engagement in a negative direction. Hence, hypothesis 12 is not supported.

Conclusion

Drawing on the Technology-Organization-Environment (TOE) theory and the literature of citizen engagement, this article has theoretically developed and empirically evaluated an integrative research model incorporating technological, organizational, and environmental factors, the activities of government agencies in government microblogs, and citizen engagement, as well as the moderating roles of satisfaction with government and citizen pressure at the local government level. The empirical analysis demonstrated several major findings.

Within the TOE framework, interactivity of government portal, financial resources, efficiency of government affairs and higher-level government pressure are found to have significant influence on the level of activities of government agencies in government microblogs. Among these, higher-level government pressure appears to be the strongest factor. The linkage from the activities of government agencies in government microblogs to citizen engagement is found to be significant. Satisfaction and citizen pressure negatively moderate the relationship between activities of government agencies in government microblogs and citizen engagement.

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REFERENCES


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