Understanding Microblog Continuance Usage Intention: An Integrated Model

Abstract
Purpose - The purpose of this study is to explore factors affecting users' continuous microblog usage intention. In recent years, the number of microblog users has gradually declined. This research can reveal microblog users' needs and provide the improvement direction of microblog services.
Design/methodology/approach - By integrating Wixom and Todd's theoretical framework, the Uses and Gratifications Theory and the DeLone & McLean Information System (IS) Success Model, a conceptual model is proposed. In this model, gratification is defined as a kind of behavioral attitude, and satisfaction is viewed as an object-based attitude. The survey data was collected online and analyzed using the partial least squares method.
Findings - The results suggest that users' continuance intention (behavioral intention) is jointly determined by users' gratification (behavioral-based attitude) and their habitual microblog usage behavior. Likewise, gratification is positively affected by satisfaction (object-based attitude) which is a joint function of system quality and information quality (object-based beliefs).
Originality/value - In this research, Wixom and Todd's principle is applied as the basic theoretical framework, gratification is viewed as a behavior attitude and user satisfaction is identified as an object-based attitude. This research provides a new lens for continuance usage research.
Keywords social media; microblog; behavioral-based attitude; object-based attitude; continuance intention, partial least squares, information behaviour
Paper type Research paper

1 Introduction

Microblog services, also called mini-blogs or micro-blogs, have become an established category within the general group of social media. Their services provide a new platform for people to share and consume information and knowledge. Unlike other social media, microblogs allows users to publish 140-character messages. Microblog posts require less time and effort to write than "traditional" blog posts. Moreover, microblog users are allowed to choose who they want to follow without first requesting permission. In China there are many microblog services sponsored by different providers. By the end of 2012, according to the 33rd report of the CNNIC (China Internet Network Information Center), the number of microblog users was more than 3 billion (CNNIC, 2013). However, this number fell to 2.04 billion in 2015 (CNNIC, 2015). Is this an indicator of decline? Will microblog in China meet the same fate as RenRen, a social network site in China that customers are losing interest in? In order to avoid rejection by users, microblog providers in China have been taking proactive measures to keep users' interest up, such as updating new functions, redesigning interfaces and inviting popular stars to launch microblogs. However, there are still some problems that microblog providers need to resolve: How can microblog providers keep users' interest up more effectively? Which characteristics of microblog do users pay attention to? To answer these questions, this research proposed an integrated model to investigate the process of the microblog system and how information characteristics' impact continuance usage.

There have been a number of past studies that have paid attention to the continued usage of microblog services. Most of these studies are based on either the user satisfaction literature (Barnes and Böhringer, 2011, Zhao and Lu, 2012), or the technology acceptance literature (Liang et al., 2011, Agrifoglio et al., 2012). In the user satisfaction literatures, system and information characteristics are the core elements, and they are potentially useful for system design. However, the user satisfaction literature has limited ability to predict system usage. In contrast, the technology-based accepted literature predicts usage by linking behaviors to attitudes and beliefs (called behavioral beliefs and attitudes) (Wixom and Todd, 2005). To achieve accurate predictions, Wixom and Todd believed that the technology acceptance literature and the parallel user satisfaction stream should be integrated.

From this integration perspective, this research proposes a theoretical model by integrating the Uses and Gratifications (U&G) Theory and the Updated DeLone & McLean Information System Success (D&M) Model. The U&G theory has been used to explain continued usage of something already chosen (Stafford et al., 2004, Ku et al., 2013, Mäntymäki and Kai, 2014). This theory posits that media consumption is purposive, and that users actively seek to fulfill their needs via a variety of uses (Katz et al., 1974). In our research, gratification is defined as a kind of behavioral attitude that can directly influence continuance usage intention. Moreover, the D&M model provides a guideline to investigate system usage from a quality perspective (information quality and system quality). These qualities can

present the information and system characteristics. Integrating these two theories can enable us to better understand the impact of quality on continued usage of the microblog services.

The remainder of this paper is organized as follows: Section 2 presents the theoretical background. In Section 3, the research model and hypotheses are proposed. Section 4 discusses methodology and data collection, followed by analysis and results in Section 5. Discussion, contributions, limitations and future research are presented in Section 6.

2 Theoretical background

2.1 Wixom and Todd's model

Wixom and Todd (2005) proposed an integrated research model (see Figure 1). This model distinguished object-based belief and attitude from behavioral belief and attitude. Object-based belief is concerned with the characteristics of the target IS, such as system quality and information quality (Wixom and Todd, 2005, Chen et al., 2013, Xu et al., 2013). Object-based attitude is affective reaction to a system (or an object) in IS research streams, which is usually represented by user satisfaction (Chen et al., 2013, Xu et al., 2013, Zhang, 2013). Behavioral belief is defined as an individual's belief about the outcomes associated with performing a behavior. Behavioral attitude is defined as the attitude toward performing a behavior (Wixom and Todd, 2005).

Based on the user satisfaction literature, Wixom and Todd (2005) developed an integrated model that represented a causal chain from key characteristics of system to beliefs and expectation about usage. They asserted that object-based beliefs (information Quality and System Quality) shape object-based attitudes about information (system satisfaction), which in turn influence behavioral beliefs (perceived usefulness and perceived ease of use), and, consequently, behavioral attitude and usage intention. Nevertheless, the relationship among object-based belief, attitude and behavior still is an ongoing challenge in the attitude-behavior literature. Only a few studies have investigated this relationship (Kang and Lee, 2010). So, based on the Wixom and Todd' principle, this research integrates the U&G theory and the D&M model to represent the causal chain from object-based belief and attitude to behavior.

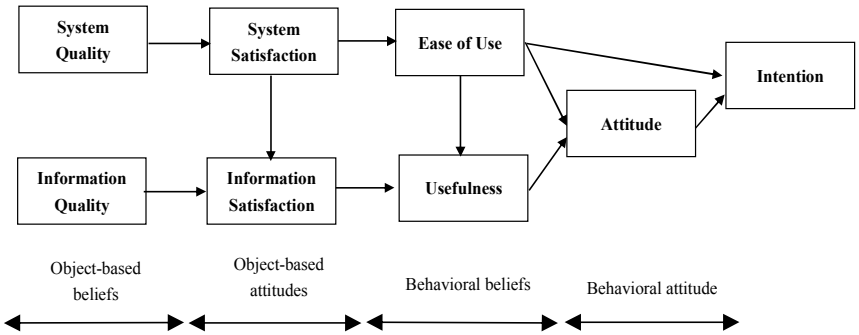

Figure 1 Wixom and Todd's model

2.2 The D&M Model

The D&M model is widely accepted for the evaluation of information systems. The model includes six dimensions of information system (IS) success: information quality, system quality, use, user satisfaction, individual impact, and organizational impact (Figure 2). The D&M model postulates information quality and system quality as the two key antecedents of user satisfaction. Information quality represents a characteristic of a product or service at the semantic level, and system quality represents technical level. Although consumers ultimately decide whether the qualities exists, organizations aspire to provide the features that their customers require. Therefore, improved qualities have become an essential ingredient for successful competition. In recent years, several studies have applied the D&M model to the evaluation of blog success. Hsieh et al. (2010) investigated the linkage between blog quality and blog-user satisfaction, and established nine key factors for user satisfaction. Wang et al. (2014) established a model for assessing blog-based learning systems success based on the D&M model. As microblog is a kind of blog, the D&M model also can support the relationship between microblog qualities and user satisfaction.

However, DeLone and McLean formulated the D&M model based on user satisfaction and technology acceptance literature (Delone and Mclean, 1992, McKinney et al., 2002). The user satisfaction literature provides a useful diagnosis for system design and implementation by explicitly enumerating information and system design features (e.g., information quality and system quality). The technology acceptance literature explains and predicts target behavior (system usage) by linking behavior to attitudes and beliefs that are consistent in target and action with the behavior of interest. However, user satisfaction research

has its limited ability to predict system usage (Davis, 1989, Delone and Mclean, 1992).

In order to overcome these limitations, Wixom and Todd (2005) proposed a model based on the correspondence principle. They recognized user satisfaction as an object-based attitude whereby it serves as an external variable with influences on intention and behavior that are fully mediated by behavior beliefs and attitudes. In other words, behavior beliefs and attitudes (attitudes and beliefs toward using the system) are the most proximal predictors of those behaviors (system usage), and object -based beliefs and attitudes (attitudes and beliefs toward the system) are antecedents to behavior beliefs and attitudes.

In our research, satisfaction is also regarded as an object-based attitude; information quality and system quality are recognized as object-based beliefs.

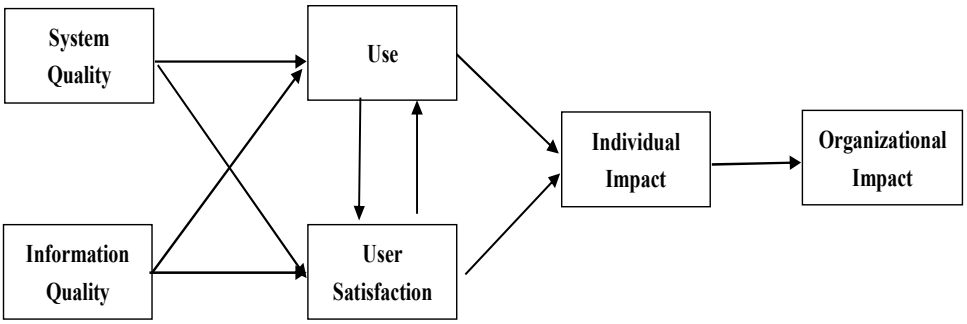

Figure 2 the D&M Model

2.3 The U&G Theory

As it originated from empirical mass communication research, the U&G theory explains the reason why people choose a specific medium over alternative communication media to elucidate their psychological needs (Cheung and Lee, 2009). It elaborates upon the individuals' decision making process from a goal-directed perspective (Jin et al., 2007). This theory places more emphasis on the consumer, or audience, instead of the actual message itself by asking, "What people do with media" rather than, "what media does to people." It assumes that audiences are goal-directed in their behavior and are aware of their needs.

The U&G theory has been applied to the usage of various media, including newspapers, radio, and television, email, social network sites and mobile services (Cheung and Lee, 2009). In recent years, the U&G theory was also integrated with other theories to study continuance usage of social media. For example, Cheung and Lee (2009) draw on the U&G theory to explain user intention to continue using a virtual community; Mäntymäki and Kai (2014) investigated the role of psychological gratifications and social influences in predicting teenagers' intentions to continue using social virtual worlds. Since microblog is also a form of social media, the U&G theory is appropriate for the current study.

However, these researches did not examine external variables, which are antecedents to or that moderate the influence of gratifications (Cheung and Lee, 2009, Ku et al., 2013, Mäntymäki and Kai, 2014). They provided only limited guidance about system design and implementation by explicitly enumerating information and system design features. Therefore, this paper integrated the D&M model and the U&G theory.

3 Research Model and Hypotheses

As we mentioned above user satisfaction theory is generally a weak predictor of behavior; meanwhile, the U&G theory cannot provide actionable feedback about important aspects of the IT artifact itself. Therefore, we proposed an integrated model (see Figure 3). In this model, system quality and information quality are recognized as object-based beliefs, user satisfaction can also be viewed as an object-based attitude based on Wixom and Todd's research, and gratification is defined as a behavior attitude. Our model is not only to generate a longer list of possible antecedents that affect microblog continuance intention, but also to build a theoretical logic that links beliefs about microblog to continuance usage.

Wixom and Todd's model built the bridge from system characteristics to the prediction of usage. They distinguished object-based beliefs and attitudes from behavioral beliefs and attitudes. Therefore, in order to answer our first research question, we took Wixom and Todd's principle as the basic framework of our model. The U&G theory has been applied to researches about continuance usage, and gratification can be viewed as a behavior attitude. Therefore, we develop the right side of our model based on the U&G theory. In the D&M model, system quality and information quality are identified as antecedents of user satisfaction which is an attitude towards the characteristics of system and information (an object-based attitude). In addition, the D&M model is proposed based on user satisfaction theory which is weak in

predicting costumers' behavior. Based on all above, the D&M model is integrated with the U&G theory as the left side of our model.

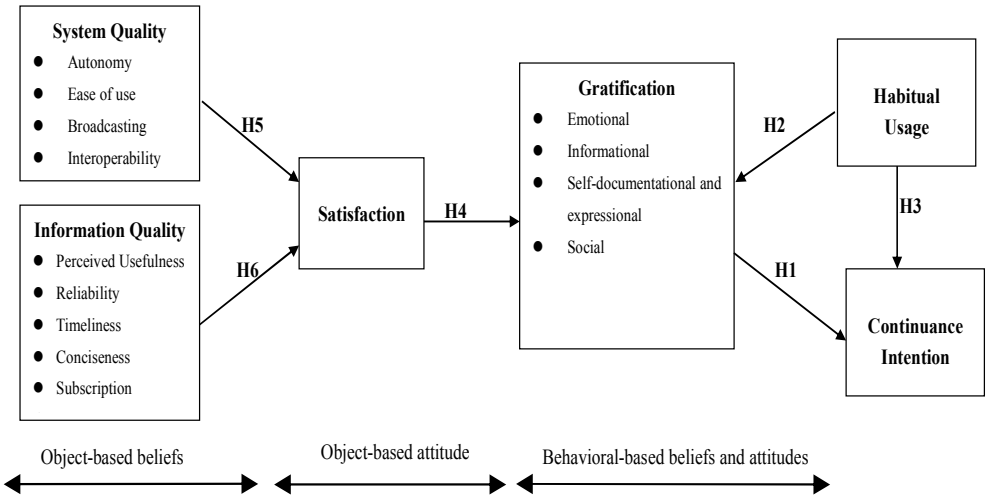

Figure 3 Integrated Model of Microblog Continuance Usage Intention

3.1 Behavioral attitude and intention

The U&G theory concentrates on media use and assumes that audiences are aware of their social and psychological needs and actively seek media outlets to fulfill them. (Palmgreen, 1984). These needs come from social and psychological situations; they also can cause motives that influence media usage (Katz et al., 1974, Pornsakulvanich et al., 2008). Previous literatures have explored a large number of motivations for blog usage which could be classified into five categories: emotional, self-expressional and self-documentational, informational and sociability motivation (Nardi et al., 2004, Trammell et al., 2006, Lee et al., 2008). Emotional motivation involves the desire to express emotion, create entertainment and affect other users. In microblog, users also can express their emotions. And compare to other social media (such as forum), users more easily to get response from their followers. Moreover, because of the subscription feature, users can easily find the information that they are interested in. Hence, checking microblog can help the time pass when users feel boring. From the above, Emotional motivation is an important aspect of microblog gratification. Self-expressional and self-documentational motivation means expressing thoughts, or archiving life's details. Many users like to show their selfies or travel photos or their pats videos in microblog. They can satisfy their vanities, and document their life's details at the same time. Hence, expressional and self-documentational motivation is also important for microblog. Informational motivation refers to sharing and seeking information. Sharing information is one of the microblog basic features. Because large number of users share their information, microblog has stored huge amount of data. People can get any information they want, although microblog is less professional than some websites like Wikipedia. Therefore, we consider informational motivation as a measure of microblog gratification. Sociability motivation is the social activities through microblog, such as managing existing relationships and making new friends. For microblog, it is easy to find someone with the same interest, viewpoint or personality. Hence, sociability motivation is important for microblog. Political motivation refer to political propaganda, bonding, and product introduction, etc. More and more government departments and enterprises register their official microblog. However, this research focus on discussing individual continuance usage intention, so political motivation is excluded from our analysis. In conclusion, we consider the motivations for using the microblog to include: emotional, self-expressional and self-documentational, informational and sociability motivation. These four categories shape gratification of the microblog into a second-order construct.

According to the U&G perspective, gratification is defined as what the audience perceives media usage to satisfy (Ku et al., 2013). It emphasizes the feeling of perceptive media usage, so it is an attitude of using the system or media. Thus, in the context of microblog usage, we believe that gratification is also an attitude towards the behavior of using the microblog and can be viewed as a behavior attitude.

According to the theory of reasoned action, the technology acceptance model, and the unified theory of acceptance and use of technology, behavior attitudes can be predictive of use or use intention. A number of IS researches suggest that gratification can also be used to explain the continued usage of IS. Wu et al. (2010) investigated players' multiple gratifications for playing an online game would affect their continuance motivation. Mäntymäki and Kai (2014)also investigate the role of psychological

gratifications and social influences in predicting teenagers' intentions to continue using Habbo Hotel. Based on the above reasoning, perceived gratification is one of the main factors used in determining an individual's continuance intention to use the microblog.

H1: Gratification positively affects users' continuance intention.

Habit refers to the extent to which behavior has become automatic as a result of prior learning (Limayem et al., 2007). Habitual IT usage behavior is conceptualized as repeated behavioral sequences automatically triggered by environmental cues. As one kind of IT application, individuals also have habitual behavior in the context of microblog usage. In some studies, habit moderates the impact of intentions on the guidance of IT usage (Limayem et al., 2003, Limayem et al., 2007); in others, habit influences future intentions to use IT (Gefen, 2003, Limayem and Hirt, 2003, Kim and Malhotra, 2005). This paper focuses on continuance intention to use the microblog, so we propose the following hypothesis:

H2: Users' habitual use of microblog positively affects users' continuance intention.

Habitual usage behavior also can influence an individual's perceived gratification. In prior researches, Young (1999) indicated that habitual usage behavior could gain positive feelings which would induce the pursuit of gratification experiences. Wang et al. (2015) also found that habitual usage patterns could elicit the gratification experience, which was is identified as a kind of maladaptive cognition. Hence, we also propose that there is a positive relationship between habitual usage and gratification.

H3: Users' habitual usage of microblog positively affects gratification.

3.2 Object-based attitude: satisfaction

Satisfaction in a given situation is measured by the individual's feelings or attitudes toward a variety of factors affecting that situation (Wixom and Todd, 2005). Within the technology acceptance literature, user satisfaction is typically viewed as the attitude that a user has toward an information system. Therefore, it represents an object-based attitude. In the current research, we defined satisfaction as a person's attitudes towards the microblog (object-based attitude).

Research in attitude theories have validated that object-based attitudes have an impact on behavior attitudes regarding a particular object (Zhang, 2013). McKinney et al. (2002) implied that website system satisfaction and its information satisfaction play a key role in forming behavior attitude within the context of e-retailing. Kang and Lee (2010) also found that object-based attitude positively related to customer's feelings about using Cyworld. Accordingly, we assume that users' satisfaction with the microblog is positively associated with the users' gratification of using the microblog.

H4: Satisfaction with microblog positively affects gratification.

3.3 Object-based belief: System Quality and Information Quality

System and information quality represent the system and information characteristics. They have been viewed as object-based beliefs, which have been found to positively influence attitudes towards the object itself (Junglas et al., 2013, Xu et al., 2013). According to the technology acceptance literature, system and information quality have been core elements in user satisfaction (Delone and Mclean, 1992). In this research, we recognize satisfaction as an object-based attitude, and assume that:

H5: System quality is positively related to satisfaction.

H6: Information quality is positively related to satisfaction.

Information and system quality constituted second-order constructs with a few dimensions that were identified in many user satisfaction IS literatures (see Table 1). According to the functions and characteristics of the microblog in China, the dimensions that shape system quality constructs include interoperability, broadcasting, ease of use and autonomy. Interoperability is the microblog's compatibility with other technologies, which allows users to post through different platforms. Broadcasting is the public feature of the microblog. For example, one's posts would be "pushed" to those who choose to follow him (Zhao and Lu, 2010). Ease of use is the degree to which a person believes that using the microblog would be effortless (Davis, 1989, McKinney et al., 2002). Autonomy is the freedom of users to administrate their own microblog accounts. For example, users can choose to follow someone's microblog or not.

For information quality, the dimensions are timeliness, reliability, perceived usefulness, conciseness and subscription. Timeliness represents the currency of the information. Users can post real-time news to the microblog by mobile phone. Reliability represents the degree of accuracy, dependability, and consistency of the microblog information. Perceived usefulness represents the degree to which a person believes that using the microblog would be useful to him or her. Conciseness is one of the most distinctive characteristics. Microblogs are usually short and concise. Microbloggers don't need to write long and meaningful article with beautiful words to attract more readers. Actually, all the microblog websites in China has a limitation on the words of one microblog. Subscription also is a distinctive characteristic of information in microblog. If users want to gather some interesting and useful

information, they need to follow the microbloggers and subscript the message that they post. However, the factor of relevance is excluded from our analysis because of subscription. All the gathered messages are posted by the followed microbloggers, it means that most of gathered messages are relevant with users' needs. Therefore, subscription is better for microblog than relevance.

4: Research Methodology

An online questionnaire survey was employed to collect data and structure equation modelling was used to conduct data analysis.

4.1 Instrument development

In order to ensure the reliability of the scale, most of the items were adapted from previous researches. Operational definitions and item sources for the second-order constructs of system quality, information quality and service quality are presented in Table 1. And items for gratifications were derived from previous studies (Bhattacherjee, 2001, Nardi et al., 2004, Trammell et al., 2006, Limayem et al., 2007, Lee et al., 2008) .

To ensure the accuracy of the instrument, the forward-backward translation method is used. At first, items adapted from prior studies were translated into Chinese by one author, and then the instrument was translated back to English by another author. After that, discrepancies were discussed by the three authors and further work (forward translations, discussion, etc.) was iterated many times until a satisfactory version was reached.

After the instrument was initially developed, several IS faculty members and PhD candidates who have wide experience in survey method were invited to participate in the pretest. Based on their feedback, editing of some items was conducted to ensure the items were readable and appropriate. The online survey was then prepared.

Table 1 The components and sources for the second-order constructs of system and information quality

Construct	Components	Source	Construct	Components	Source
System quality	Accessibility	(Bailey and Pearson, 1983, McKinney et al., 2002)	Information quality	Relevance	(Bailey and Pearson, 1983, McKinney et al., 2002, Lee et al., 2009, Cheng, 2014)
	Interoperability	(Zhao and Lu, 2010)		Timeliness	
	Telepresence	(Kim and Biocca, 1997, Novak et al., 2000)		Reliability	
	Enjoyment	(Rafaeli and Sudweeks, 1997, McKinney et al., 2002)		Perceived usefulness	(Bailey and Pearson, 1983, Davis, 1989, McKinney et al., 2002)
	Ease of use	(Davis, 1989, McKinney et al., 2002)		Conciseness	(Bailey and Pearson, 1983, McKinney et al., 2002, Zhao and Rosson, 2009, Zhao and Lu, 2010)
	Broadcasting	(Zhao and Rosson, 2009, Zhao and Lu, 2010)		Subscription	
	Autonomy				

4.2 Data collection

The data was collected online: http://www.sojump.com/. The website is a professional and authoritative website of questionnaire surveys conducted in China. A hyperlink of our online questionnaire was posted on the researchers' and company's Sina microblog. In order to obtain the data as more as possible, the researchers and third-part company encouraged their followers to reposted this microblog. The method of data collection was appropriate for our study for three reasons. First, use of an online survey provides us with access to an enormous pool of microblog users in China (Liu et al., 2016). Second, the method of data collection can ensure that all respondents are microblog users, which will make our findings more generalizable to this population. Third, use of an electronic questionnaire can ensure that social

desirability bias is kept to a minimum and that anonymity is ensured. Finally there were totally 1016 participants, only 245 responses were valid, 771 participants did not complete the survey, and the response rate was 24.1% .The summary of the demographic characteristics is provided in Table 2.

Table 2 Demographic description of respondents

Item	Category	Frequency	Percent
Gender	Male	113	46.12
	Female	132	53.88
Age	18-	1	0.41
	18-25	119	48.57
	26-30	77	31.43
	31-35	31	12.65
	36-40	8	3.27
	41-50	6	2.45
	50+	3	1.22
Education background	Junior high school	1	0.41
	Senior high school	6	2.45
	Junior college	19	7.76
	Bachelor	90	36.73
	Master	118	48.16
	Doctor	11	4.49
Target IT experience	Less than 3 months	22	8.98
	3 to 6 months	55	22.45
	6 to 12 months	91	37.14
	1 to 2 years	61	24.9
	Over 2 years	16	6.53
Average usage time per day	Less than 30 minutes	51	20.82
	30 to below 60 minutes	82	33.47
	1 to 2 hours	40	16.33
	2 to 3 hours	25	10.2
	3 to 4 hours	16	6.53
	Over 4 hours	31	12.65

5 Results

The collected data were analysed using the partial least squares (PLS) method (Chin, 1998). The evaluation of the model fit was conducted in a two-phase approach, i.e. measurement model and structural model. The first step was to assess the reliability and the validity of the measurement model and test if the empirical data conformed to the presumed model. The structural relationships were then validated using a bootstrap analysis (Chin, 1998).

5.1 Measurement Model

The acceptability of the measurement model was assessed by reliabilities of the individual items and convergent and discriminant validity. Table 3 showed the cronbach alphas, average variance extracted (AVE) and square root of the AVE, as well as the correlations between the constructs. And Table 4 showed the factor loadings and significance for all constructs.

The cronbach alphas values all exceeded the widely recommended minimum value of 0.7, indicating adequate internal consistency (Fornell and Larcker, 1981). Based on the suggestions by Fornell and Larcker (1981), all factor loadings were significant and above the 0.5 guideline, and the AVE values exceeded 0.5, as well as the composite reliability exceeded 0.7. Therefore, the convergent validity criterion was also satisfied. The correlation matrix, shown in Table1, presented that the lowest square root of AVE was 0.74, which was higher than the minimum of the correlation coefficients. From Table 4, it can be seen that each within-construct loading exceeds the cross loadings by at least 0.10. These suggested that the discriminant validity was supported.

Table 3 Composite reliability, AVE, square root of AVE, and correlations

	A	AVE	CI	GE	GI	GSE	GSO	HU	IQC	IQP	IQR	IQS	IQT	SA	SQA	SQB	SQE	SQI
CI	0.90	0.70	**0.83**															

GE	0.82	0.60	0.47	**0.77**															
GI	0.85	0.66	0.53	0.49	**0.81**														
GSE	0.84	0.64	0.48	0.41	0.51	**0.80**													
GSO	0.84	0.57	0.58	0.53	0.59	0.57	**0.75**												
HU	0.95	0.86	0.62	0.45	0.46	0.45	0.46	**0.93**											
IQC	0.87	0.69	0.42	0.32	0.36	0.28	0.38	0.31	**0.83**										
IQP	0.89	0.81	0.47	0.37	0.51	0.29	0.48	0.45	0.27	**0.90**									
IQR	0.91	0.76	0.41	0.37	0.41	0.28	0.47	0.33	0.39	0.52	**0.87**								
IQS	0.84	0.57	0.36	0.32	0.34	0.35	0.34	0.31	0.54	0.31	0.32	**0.76**							
IQT	0.87	0.70	0.40	0.43	0.49	0.46	0.41	0.43	0.45	0.33	0.28	0.45	**0.83**						
SA	0.89	0.67	0.73	0.46	0.55	0.51	0.60	0.47	0.42	0.45	0.40	0.34	0.44	**0.82**					
SQA	0.86	0.68	0.38	0.27	0.25	0.30	0.27	0.27	0.45	0.18	0.17	0.48	0.35	0.36	**0.82**				
SQB	0.83	0.54	0.30	0.21	0.28	0.26	0.36	0.28	0.30	0.22	0.26	0.35	0.42	0.34	0.32	**0.74**			
SQE	0.91	0.71	0.43	0.22	0.27	0.27	0.33	0.31	0.49	0.17	0.25	0.33	0.28	0.42	0.42	0.35	**0.84**		
SQI	0.87	0.62	0.44	0.31	0.35	0.38	0.43	0.33	0.47	0.23	0.23	0.45	0.51	0.46	0.51	0.54	0.40	**0.79**	

Notes: A= cronbach alphas; AVE= average variance extracted; CI= continuance intention; GE= emotional gratification; GI= informational gratification; GSE= self-documentational and expressional gratification; GSO= social gratification; HU= habitual usage; IQC= conciseness; IQP= perceived usefulness; IQR= reliability; IQS=subscription; IQT=timeliness; SA=satisfaction; SQA=autonomy; SQB=broadcasting; SQE= ease of use; SQI= interoperability.

Table 4 Factor loadings

	CI	GE	GI	GSE	GSO	HU	IQC	IQP	IQR	IQS	IQT	Sat	SQA	SQB	SQE	SQI
CI1	**0.85**	0.39	0.48	0.43	0.50	0.48	0.35	0.34	0.26	0.36	0.40	0.64	0.36	0.29	0.35	0.37
CI2	**0.89**	0.43	0.51	0.41	0.51	0.59	0.32	0.45	0.33	0.34	0.40	0.66	0.37	0.31	0.34	0.40
CI3	**0.79**	0.38	0.36	0.34	0.44	0.48	0.32	0.41	0.41	0.27	0.30	0.55	0.29	0.17	0.36	0.31
CI4	**0.80**	0.39	0.44	0.45	0.50	0.52	0.41	0.35	0.34	0.25	0.29	0.61	0.30	0.26	0.38	0.36
GE1	0.37	**0.77**	0.34	0.42	0.46	0.33	0.27	0.26	0.30	0.25	0.30	0.38	0.22	0.17	0.20	0.26
GE2	0.35	**0.81**	0.39	0.28	0.43	0.38	0.24	0.33	0.32	0.22	0.36	0.35	0.17	0.12	0.11	0.18
GE3	0.40	**0.74**	0.45	0.25	0.35	0.35	0.24	0.26	0.23	0.27	0.36	0.37	0.24	0.20	0.23	0.29
GI1	0.39	0.42	**0.79**	0.39	0.39	0.38	0.24	0.34	0.23	0.26	0.48	0.42	0.26	0.21	0.19	0.32
GI2	0.46	0.41	**0.86**	0.49	0.47	0.32	0.38	0.33	0.29	0.35	0.46	0.49	0.29	0.30	0.24	0.37
GI3	0.45	0.38	**0.78**	0.37	0.55	0.42	0.27	0.52	0.44	0.26	0.29	0.43	0.12	0.16	0.22	0.20
GSE1	0.40	0.39	0.39	**0.82**	0.45	0.36	0.30	0.20	0.24	0.26	0.41	0.43	0.25	0.16	0.23	0.36
GSE2	0.36	0.35	0.41	**0.85**	0.46	0.31	0.19	0.20	0.19	0.29	0.39	0.39	0.27	0.21	0.15	0.29
GSE3	0.40	0.24	0.45	**0.74**	0.46	0.41	0.18	0.30	0.24	0.28	0.33	0.41	0.22	0.24	0.26	0.28
GSO 1	0.46	0.46	0.47	0.47	**0.76**	0.42	0.24	0.33	0.35	0.27	0.40	0.47	0.23	0.36	0.30	0.39
GSO 2	0.40	0.33	0.38	0.44	**0.69**	0.21	0.36	0.24	0.28	0.26	0.29	0.45	0.25	0.33	0.30	0.37
GSO 3	0.45	0.41	0.44	0.38	**0.78**	0.39	0.32	0.40	0.39	0.26	0.33	0.45	0.17	0.25	0.23	0.31
GSO 4	0.46	0.40	0.46	0.43	**0.78**	0.36	0.22	0.45	0.41	0.23	0.24	0.44	0.16	0.17	0.18	0.22
HU1	0.61	0.46	0.45	0.44	0.46	**0.92**	0.29	0.50	0.33	0.32	0.46	0.50	0.27	0.30	0.34	0.33
HU2	0.54	0.39	0.39	0.39	0.38	**0.92**	0.27	0.37	0.31	0.26	0.36	0.40	0.24	0.24	0.25	0.26
HU3	0.57	0.41	0.42	0.42	0.45	**0.93**	0.30	0.38	0.29	0.29	0.40	0.42	0.29	0.23	0.29	0.32
IQC1	0.33	0.24	0.30	0.23	0.29	0.25	**0.87**	0.24	0.32	0.41	0.40	0.38	0.36	0.24	0.46	0.42
IQC2	0.33	0.27	0.28	0.22	0.33	0.19	**0.82**	0.17	0.28	0.46	0.36	0.33	0.34	0.23	0.34	0.37
IQC3	0.39	0.29	0.34	0.25	0.31	0.32	**0.79**	0.26	0.37	0.47	0.38	0.33	0.43	0.27	0.41	0.37
IQP1	0.45	0.32	0.47	0.29	0.47	0.46	0.27	**0.91**	0.49	0.31	0.32	0.41	0.17	0.23	0.19	0.22
IQP2	0.38	0.34	0.41	0.22	0.38	0.35	0.22	**0.88**	0.44	0.23	0.28	0.40	0.15	0.15	0.11	0.19
IQR1	0.31	0.29	0.35	0.26	0.37	0.22	0.34	0.44	**0.84**	0.26	0.21	0.31	0.16	0.19	0.18	0.21
IQR2	0.38	0.33	0.38	0.26	0.46	0.35	0.35	0.49	**0.90**	0.30	0.30	0.41	0.16	0.27	0.22	0.23
IQR3	0.35	0.33	0.32	0.20	0.41	0.30	0.34	0.43	**0.88**	0.27	0.24	0.32	0.13	0.23	0.24	0.17

IQS1	0.25	0.18	0.23	0.24	0.17	0.22	0.42	0.21	0.25	**0.77**	0.38	0.25	0.41	0.25	0.24	0.38
IQS2	0.30	0.21	0.32	0.34	0.28	0.26	0.33	0.29	0.26	**0.76**	0.33	0.27	0.28	0.34	0.22	0.32
IQS3	0.33	0.27	0.36	0.23	0.33	0.27	0.46	0.23	0.23	**0.80**	0.35	0.36	0.46	0.22	0.33	0.35
IQS4	0.23	0.31	0.16	0.23	0.24	0.20	0.44	0.20	0.23	**0.70**	0.32	0.18	0.36	0.24	0.21	0.30
IQT1	0.32	0.30	0.46	0.37	0.29	0.36	0.38	0.36	0.28	0.37	**0.81**	0.35	0.28	0.31	0.24	0.39
IQT2	0.30	0.38	0.37	0.37	0.36	0.32	0.35	0.21	0.20	0.34	**0.83**	0.32	0.24	0.32	0.22	0.41
IQT3	0.42	0.41	0.43	0.43	0.41	0.42	0.42	0.26	0.23	0.43	**0.85**	0.44	0.39	0.42	0.25	0.49
SA1	0.61	0.36	0.46	0.47	0.51	0.39	0.35	0.40	0.33	0.25	0.34	**0.83**	0.24	0.23	0.36	0.34
SA2	0.59	0.47	0.47	0.44	0.52	0.37	0.37	0.38	0.37	0.29	0.40	**0.85**	0.31	0.30	0.40	0.42
SA3	0.65	0.42	0.47	0.42	0.51	0.46	0.34	0.35	0.29	0.32	0.34	**0.84**	0.35	0.26	0.33	0.35
SA4	0.57	0.28	0.40	0.32	0.40	0.34	0.31	0.35	0.30	0.28	0.36	**0.75**	0.29	0.31	0.30	0.36
SQA 1	0.26	0.26	0.25	0.25	0.18	0.22	0.41	0.11	0.14	0.42	0.28	0.22	**0.86**	0.20	0.36	0.39
SQA 2	0.32	0.24	0.12	0.22	0.25	0.17	0.34	0.14	0.14	0.34	0.29	0.30	**0.77**	0.27	0.31	0.36
SQA 3	0.39	0.18	0.29	0.30	0.23	0.32	0.37	0.19	0.15	0.47	0.34	0.37	**0.84**	0.33	0.37	0.55
SQB1	0.27	0.12	0.14	0.18	0.27	0.19	0.21	0.11	0.15	0.27	0.26	0.28	0.22	**0.70**	0.31	0.37
SQB2	0.13	0.11	0.17	0.16	0.20	0.14	0.18	0.14	0.13	0.24	0.22	0.20	0.26	**0.76**	0.22	0.40
SQB3	0.26	0.15	0.23	0.20	0.33	0.23	0.24	0.21	0.25	0.25	0.42	0.25	0.26	**0.80**	0.28	0.42
SQB4	0.25	0.24	0.29	0.21	0.27	0.26	0.26	0.16	0.23	0.26	0.33	0.27	0.22	**0.69**	0.23	0.40
SQE1	0.36	0.17	0.26	0.21	0.27	0.29	0.38	0.18	0.19	0.27	0.28	0.36	0.35	0.28	**0.82**	0.31
SQE2	0.35	0.24	0.21	0.24	0.29	0.27	0.40	0.11	0.27	0.27	0.27	0.34	0.34	0.31	**0.79**	0.38
SQE3	0.36	0.22	0.21	0.22	0.27	0.22	0.46	0.12	0.18	0.31	0.20	0.35	0.39	0.25	**0.86**	0.32
SQE4	0.36	0.15	0.23	0.22	0.29	0.29	0.41	0.16	0.19	0.27	0.22	0.39	0.34	0.35	**0.90**	0.32
SQI1	0.28	0.16	0.22	0.27	0.29	0.17	0.32	0.13	0.10	0.33	0.28	0.31	0.42	0.29	0.30	**0.76**
SQI2	0.28	0.22	0.27	0.32	0.28	0.20	0.34	0.09	0.10	0.30	0.37	0.30	0.42	0.41	0.27	**0.82**
SQI3	0.36	0.27	0.37	0.30	0.36	0.33	0.39	0.24	0.26	0.36	0.50	0.36	0.42	0.52	0.33	**0.83**
SQI4	0.44	0.33	0.28	0.32	0.41	0.32	0.42	0.26	0.26	0.41	0.46	0.45	0.43	0.45	0.33	**0.74**

Notes: CI= continuance intention; GE= emotional gratification; GI= informational gratification; GSE= self-documentational and expressional gratification; GSO= social gratification; HU= habitual usage; IQC= conciseness; IQP= perceived usefulness; IQR= reliability; IQS=subscription; IQT=timeliness; SA=satisfaction; SQA=autonomy; SQB=broadcasting; SQE= ease of use; SQI= interoperability.

5.2 Structural Model

As proposed in our research methodology, the measurement of the structural model was estimated using the PLS approach to structural equation modelling. The results of the model estimation are presented in Figure 4 and Table 5. All hypotheses were supported (See Figure 4). All of the paths were found to be positive and significant. Moreover, while the R^2 value of 0.521 indicated that gratification (H1) and habitual usage (H2) explain a good amount of the variance in microblog continuance intention, the gratification variance (R2) for using microblog explained by the satisfaction (H4) and habitual usage (H3) was 0.532. Meanwhile, the R^2 value of 0.373 suggested that system quality (H5) and information quality (H6) explain a number of the satisfaction variances.

In addition, as information quality and system quality were the second-order constructs, we tested further the weight of contribution of each sub-dimension to satisfaction. The weight of the first-order constructs on system quality ranged from 0.2 to 0.008. The biggest contribution was ease of use followed by interoperability and lastly by autonomy and broadcasting. The weight of the first-order constructs on information quality ranged from 0.25 to 0.01. Gratification is also a second-construct, and the weight of the sub-dimension on continuance intention ranged from 0.25 to 0.07.

Table 5 Hypotheses tests

Hyp. no.	Hypotheses	Path coefficient	*T*-value	Significance	Supported?
H1	GA→CI	0.446***	7.644	$p<0.001$	Yes
H2	HU→CI	0.368***	6.088	$p<0.001$	Yes
H3	HU→GA	0.323***	6.019	$p<0.001$	Yes
H4	SA→GA	0.518***	10.332	$p<0.001$	Yes
H5	SQ→SA	0.284***	3.793	$p<0.001$	Yes
H6	IQ→SA	0.391***	5.237	$p<0.001$	Yes

Notes: *SA=Satisfaction; CI=Continuance Intention; GA=Gratification; SQ=System Quality; IQ=Information Quality; HU=Habitual Usage.*

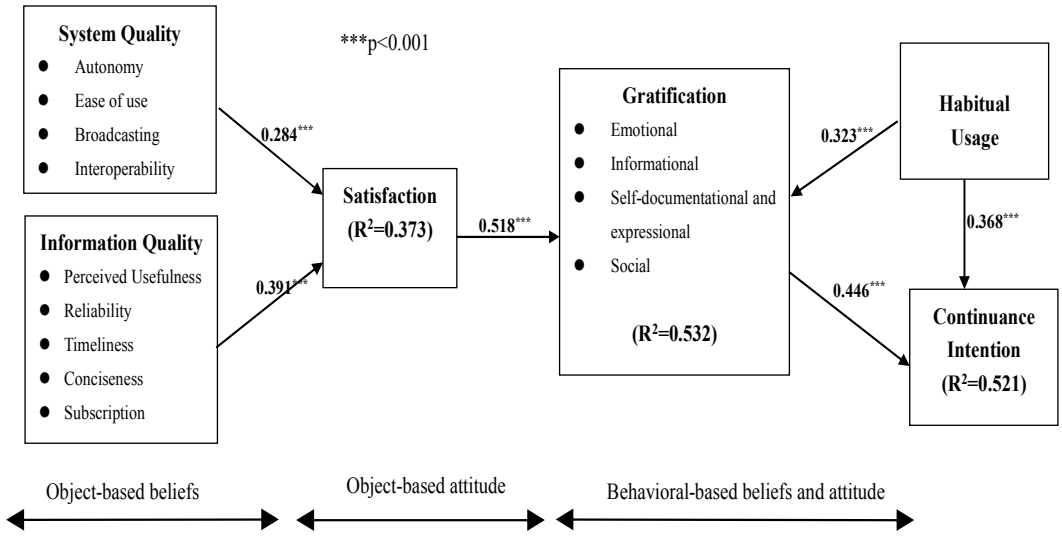

Figure 4 Results of PLS Structural Model Analysis

6: Discussion

6.1 Summary of results

This research identified the impact of system quality, information quality, satisfaction, gratification and habitual usage on microblog continuance usage intention, and the associated relationships among them.

Firstly, our paper found that continuance usage intention is directly determined by gratification and habitual usage. When using microblog, users can get gratifications from it. And the stronger the gratifications become, users will be more likely to use microblog again. According to the results, the gratification of microblog depends on four factors: emotional, self-expressional and self-documentational, informational and Social. Users can express mood on their microblog or read some microblog with the same mood to meet their emotion needs. Users also can use microblog as an electronic notebook to documenting ideas or thoughts. Users can find timelier and more accurate information to satisfy their informational needs. Moreover, Users can connect each other and make friends. These four kinds of gratification together attract people to use microblog continuously and avoid being replaced by other services. In addition, the result indicated that when using microblog becomes a habit, users will choose to login their microblog automatically.

Secondly, our finding showed that gratification is impacted by satisfaction and habitual usage. When users feel more satisfaction with functions of microblog, they will get stronger gratification from using it. This result confirmed the relationship between object-based attitude and behavioral attitude. Moreover, once using microblog become a habit, users will be more and more familiar with microblog and easy to get gratifications from microblog.

Thirdly, our results verified that system quality and information quality directly affect the satisfaction of microblog. Well designed and managed system function can effectively meet users' needs. Since microblog is a platform of social media, we measured system quality using four sub-dimensions of autonomy, broadcasting, interoperability and ease of use. The result revealed enhancing autonomy, broadcasting, interoperability and ease of use can improve customers' satisfaction with microblog. In addition, high-quality user-generated content enables customers to find more useful information, increases the efficiency of the information broadcasting and is more suitable for users' needs. Information that is reliable, timely, concise, subscribed and useful enable to satisfy users' needs.

6.2 Theoretical implications

This research contributes to the literature in a number of ways. Firstly, we identified gratification as a behavior attitude. Prior researches have largely confirmed that gratification is an important antecedence of continuance use (Stafford et al., 2004, Ku et al., 2013, Mäntymäki and Kai, 2014), but there are few scholars to explore the role of gratification during the cognitive progress about using system. Because the U&G theory emphasizes the use of media, this research viewed gratification as a behavior attitude,

instead of object-based attitude. This finding extends the U&G theory, and can help to investigate antecedents of gratification more accurately. Furthermore, in this research, the definition of gratification is similar to an individual's satisfaction of using a microblog, while satisfaction in this research focuses on the attitude associated with the microblog's characteristics. Kang and Lee (2010)classified satisfaction into two types: customer satisfaction and website satisfaction, which were identified as behavior attitude and object-based attitude, respectively. However, this classification caused trouble for the measurement and understanding of model constructs. Our finding can help to avoid the above problem.

Secondly, based on Wixom and Todd's theoretical framework, this study integrates the D&M model and the U&G theory. Compared to Wixom and Todd's model, our model is more appropriate for investigating antecedents of microblog continuance intention. Meanwhile, behavior attitude in our model is more intuitive and operable, since gratification is more understandable than the attitude in Wixom and Todd's model. Furthermore, to the best of our knowledge, our research is the first to apply Wixom and Todd's theoretical framework in a microblog context.

Thirdly, our research demonstrates the effect microblog satisfaction has on user gratification. Our model asserted that microblog information quality and microblog system quality shape object-based attitude about microblog satisfaction, which influence behavior attitude (user's gratification), and, consequently, continuance intention. This finding is better for understanding the relationship between satisfaction and gratification; it also presents a new perspective for the researches of user satisfaction. Some prior studies have suggested that gratification affects user satisfaction (Sangwan, 2005, Cheung and Lee, 2009). However, the definition of satisfaction in those studies was different from ours. Their definition was that users were satisfied with the usage experience (Cheung and Lee, 2009). In our research, microblog satisfaction is recognized as a feeling about the characteristics of the microblog itself. According to the above-mentioned analysis and our research result, we believe that different classifications of satisfaction play different roles.

6.3 Practical Implications

The results of this research offer a number of important implications for practitioners. Firstly, this research provides a mechanism for understanding the influence of information and system characteristics. Based on our findings, these system characteristics are more important for maintaining microblog users' interest, including: broadcasting, autonomy, ease of use and interoperability. Microblog providers, especially in China, should increase their efforts in these aspects. For example, users' autonomy as a popular microblog characteristic can make users feel more in control of their microblog and privacy. Therefore, more functions should be developed to enhance this feeling. Besides the existing functions of microblog, providers can let users decide which photo in their microblog can be downloaded by followers. Moreover, microblog users are fond of subscribed, useful, timely, concise and reliable information. Hence, microblog providers in China can collect reliable news based on the content of microblog every day, and provide that information to target users.

Secondly, while usage habits were found to influence users' gratification, these two constructs together significantly affect users' continuance motivation for microblog usage. This result suggests that usage habits play an important role in microblog continuance intention. Providers should collect the habits of using microblog uninterruptedly, and make timely adjustments for keeping customers using the system. According to users' usage habits, microblog interface design and function design should fulfill users' needs (gratification). For example, in order to meet users' social needs, the microblog can recommend that users follow some micro bloggers that they may be interested in, pin some blogs that users may like, and highlight some online activities that users may participate in.

Thirdly, our research model has diagnostic value at any stage of the microblog continuance usage process. Providers and investors usually don't expect that the microblog is a flash-in-the-pan like RenRen; rather, they hope it will continue to evolve over time. Currently, microblog providers have been adding new functions, redesigning interfaces, improving microblog response efficiency and making new regulations that enhance information quality. Therefore, understanding system characteristics, information characteristics and their ultimate effects on continuance usage can help providers improve microblog for better targeting and effectiveness.

7 Conclusion and Limitations

This research proposed an integrated model which represented a causal chain from key characteristics of microblog to continuance usage based on Wixom and Todd's theoretical framework, the U&G theory and IS success model. Our results indicated that gratification of microblog could be viewed as behavioral attitudes and had a significant influence on users' continuance intention. Meanwhile, our research results also demonstrated that satisfaction could be classified into objected-based attitude and was an antecedent of gratification. Ultimately, our research identified that microblog users were satisfied with these system

characteristics (i.e. autonomy, ease of use, broadcasting and interoperability) and information characteristics (i.e. perceived usefulness, reliability, timeliness, conciseness and subscription).

Although this study provides some interesting findings, there are still several limitations that should be noted. Firstly, most respondents originated from the Sina microblog. This is partly because we posted the online questionnaire hyperlink on the Sina microblog. In the future, the hyperlink of our online questionnaire will be posted in other microblog websites in China (such as QQ microblog, Wangyi microblog and Tweet) in order to further validate our results. Secondly, this paper didn't not pay much attention on the contribution of each sub-dimensions of system quality and information quality. The future research will investigate more sub-dimensions of system quality and information quality, and measure their effectiveness for microblog. Thirdly, our result might be too narrowly specific to the context of China due to the data source. The authors believe that deriving more generalized results would likely require applying the same model but in other countries. In the future, we will send the questionnaire to the microblog users in other countries, if possible.

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Appendix. Parts of Survey instrument

1.1. System Quality

Autonomy

I can follow any blogger any time.
I can unfollow anyone although he already followed my microblog.
I can blacklist any blogger that I don't like.

Broadcasting

My microblog can be read by anyone like a television show.
My microblog can reposted by anyone.
My microblogs are usually commented by some strangers.
Microblog can make more people know my thoughts.

Interoperability

When I post a message on microblog, it can simultaneously be reposted on other social media website (such as QQ, RenRen).
My microblog account can login other applications or websites.
I can repost messages from other websites to microblog.
I can post hyperlinks of other websites.

Ease of use

Microblog is ease to use.
Learning how to use microblog is ease for me.
When I use microblog first time, I didn't have any problems.
Microblog has a simple layout for its contents

1.2. Information Quality

Reliability

Overall information on microblog is trustworthy.
Information on microblog is accurate.
Information on microblog is credible.

Timeliness

Information on microblog is current.
Information on microblog is continuously updated.
Information on microblog can be accessed in a timely manner

Conciseness

Microblogs are usually short.
I spend very short time reading one message on microblog.
I can understand the general mind of a microblog in a short time.

Subscription

I can subscribe some interesting microbloggers.
I can subscribe microbloggers whose blogs are useful for my work.
I can gain useful information from microbloggers that I subscribe.
Subscription can help me filter the cacophony of information on microblog.

Perceived usefulness
Information on microblog is useful for work or learning.
Information on microblog is valuable for me.
Information on microblog can satisfy with my needs.

1.3. Gratification
Emotional
Using microblog can help to abreact my emotion.
Using microblog can entertain me.
Using microblog can help me out of trouble temporarily.
Informational
I can gain the most current information from microblog.
I can share some valuable information on my microblog.
There is a lot of useful information on microblog.

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