International Journal of Advanced Computational Engineering and Networking, ISSN(p): 2320-2106, ISSN(e): 2321-2063
Volume-7, Issue-2, Feb.-2019, http://iraj.in

UNDERSTANDING THE DETERMINANTS ON THE USAGE INTENTION OF SINA WEIBO: PARTIAL LEAST SQUARE APPROACH

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Abstract- With the rapid development of Microblogging, more and more Internet companies have successively provided Microblogging services. In recent years, Microblogging has become one of the most important interactive platforms for many Internet users. People can use Microblogging to communicate with friends and share their own dynamic messages. The user's continuous intention is a key endogenous variable to assess a successful Information System (IS) can continue to survive. Therefore, this study applied Expectation-confirmation Model proposed by Lin et al. (2005) as a method to estimate the continuous intention of Sina-Weibo by Taiwan users. A total of 395 effective questionnaires were retrieved. The data were analyzed with descriptive statistics and structural equation model. It was found from the empirical results: (1) the degree of recognition by Sina-Weibo users has a positive impact on their perceived usefulness, perceived playfulness and satisfaction; (2) when the Sina-Weibo user's perceived usefulness and perceived playfulness for Microblogging is higher, the satisfaction is also positively influenced; (3) the perceived usefulness, perceived playfulness and satisfaction generated experiences by Sina-Weibo users when they are using it can also directly affect the user's continuous intention. Finally, based on the empirical results of this study, we proposed some suggestions of Microblogging practitioners on practices and business reference to related companies.

Keywords- Microblogging, Post Acceptance Model of IS Continuance, Perceived Playfulness, Expectation-Confirmation Model, Partial Least Square

I. INTRODUCTION

In recent years, Microblogging has become a popular interactive platform. It can be used to communicate with people, share information and even share photos, videos and links. The main feature of Microblogging is that it can be used to share people's views with everyone only through limited short texts (usually no more than 140 characters), as well as some trivial things that happen in everyday life. Several short and condensed words can make up a meaningful essay.

Compared to general blogs, Microblogging provide a faster communication model. By publishing shorter text messages, the time consumed by users to read contents can be reduced and the frequency of publishing contents is also higher. Even for professional bloggers, an article may be updated for a few days, while users of general Microblogging can usually publish many messages a day (Java, Song, Finin, & Tseng, 2007).

Sina-Weibo, a Microblogging service launched by Chinese Sina.com in August 2009 is now one of the popular Microblogging. As of October 2013, Sina-Weibo has more than 536 million registered users, and its users are mainly from the areas of Chinese Mainland, Hong Kong, Taiwan, Singapore and Malaysia (Wikipedia, 2013). The users can use WEB, WAP pages, mobile phone newsletters and various client forms to share instant messages on the Sina-Weibo platform with no more than 140 characters (280 bits) (Sina-Weibo website, 2013).

Sina Taiwan also introduced the use interface directly into Traditional Chinese to make it convenient for some Taiwanese who are not used to viewing simplified Chinese characters. In addition, Sina-Weibo users are mostly from the Chinese-speaking areas, and communication with friends is also relatively easy. At present, many celebrities and companies from Taiwan and even the whole world have joined the ranks using Sina-Weibo. In addition, Sina-Weibo's mobile client makes it even more convenient for users to publish graphic messages and track others' instant messages anywhere and anytime, with the increasing popularity of using smart phones and mobile networks. At present, the proportion of mobile client has accounted for 75% of the entire Sina-Weibo client (Sina.com, 2013/10).

In academic research, the number of articles on Facebook and Twitter at home and abroad has been numerous. In contrast, articles on Sina-Weibo are relatively rare. In the background that Sina-Weibo has gradually become common to many Taiwanese

users in Microblogging services, there are few companies in Taiwan that have access to relevant academic research. The rise of Microblogging has attracted many people to use it. The user's continuous intention is a key factor for a successful IS to continue to survive.

Bhattacherjee (2001)'s post acceptance model of IS continuance is often extended by many scholars as a discussion of users' continuous intentions on many different ISs (Kim, 2010; C. S. Lin et al., 2005; T.-C. Lin, Wu, Hsu, & Chou, 2012; Roca & Gagné, 2008). In the research of Microblogging, many scholars also quoted this model as a deduction of the research model and practical application (Barnes & Böhringer, 2011; Chang et al., 2012; Hoehlfe et al., 2012). In addition, many related researches have also confirmed that in the Internet experience, playfulness also plays an important role for users to continue to use it (Jin, 2013; Kang, Hong, & Lee, 2009; C. S. Lin et al., 2005; Moon & Kim, 2001). In terms of today's ever-growing internet community platforms, the lack of attractiveness that allows users to continue to use makes it difficult to maintain the platform resulting in the problem of ending business may be faced after several years' operation.

Therefore, this study aims to explore the Perceived Usefulness and Perceived Playfulness experienced by Sina-Weibo users and study the degree of impact of these components on users' Satisfaction, and finally validate whether the component is a key factor affecting Sina-Weibo users' continuous intentions through the integration of related literatures in the past, taking C. S. Lin et al. (2005)'s Expectation-confirmation Model as a research model. The findings can serve as a business reference to related companies in the future.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

A. Expect Confirmation Theory

Expect Confirmation Theory (ECT), also known as Expect Disconfirmation Theory (EDT), was evolved from Oliver (1980)'s perceived model of Satisfaction decision put forward from the purchase behaviors of consumers and was widely used in marketing. Churchill Jr and Surprenant (1982) arranged the framework of Oliver (1980)and other scholars in terms of Perceived Expectation, Perceived Performance, Dis-confirmation and Satisfaction, forming the prototype of ECT, and finally formed the present ECT plus the repurchase intentions proposed by many scholars.

In terms of consumers' purchase behaviors, the main framework of ECT is that the consumer may have an expected psychology for a particular product or service before purchasing, and this expected psychology is called an Expectation. Consumers may first collect and evaluate relevant information about the goods or services they wish to purchase at the time of first purchase and may also add their own past purchasing experience as a reference. When there is more information, the expectation on the goods or services is higher (Fornell, Johnson, Anderson, Cha, & Bryant, 1996). Venkatesh and Davis (2000)believed that the decision to purchase goods is based on indirect experience, which is different from the continuous experience after direct use, while this expected psychology may affect the consumer's attitude toward the product or service and the willingness to purchase.

ECT is widely used in researches that investigate customer Satisfaction and post-purchase behaviors (Anderson & Sullivan, 1993; Oliver, 1993; Patterson, Johnson, & Spreng, 1996; Spreng, MacKenzie, & Olshavsky, 1996; Tse & Wilton, 1988). Many researches validated the concept of repurchase intentions in ECT, such as repurchase of cars (Oliver, 1993), repurchase of video players (Spreng, MacKenzie, & Olshavsky, 1996) and repurchase of corporate professional services (Patterson, Johnson, & Spreng, 1996), repurchase of photographic products (Dabholkar, Shepherd, & Thorpe, 2000). In these researches, it was also proved that Satisfaction is an important key factor affecting repurchase intentions of the consumer.

B. Continuous use of IS

According to the Perceived Usefulness proposed by Davis (1989) in Technology Acceptance Model (TAM), the user's perceived belief in IS is a key factor mainly affecting whether the user may adopt information technology. Validation results of multiple services on U.S. online banking confirmed customer's Perceived Usefulness of online banking and service satisfaction may affect the customer's continuous use of online banking. Empirical results of Bhattacherjee (2001) also showed that Satisfaction is the key factor affecting the continuous intention of ISs. It is also the same as the repurchase intention affecting the consumer in the previous research of Oliver (1980)'s ECT. Satisfaction is a key factor directly affecting the reuse. Therefore, ECT applied it to IS and developed a set of theory of continuous intention pertaining to IS, known as "A Post-Acceptance Model of IS Continuance".

Barnes and Böhringer (2011) added the Model of IS Continuance to the user's habitual component as a research model and focused on the user's perceived key issues when using Twitter, and then discussed the continuous intentions of Twitter users. Chang and Zhu (2012) replaced Perceived Usefulness with perceived social capital and added flow experience to the Post-Acceptance Model of IS Continuance to explore the continuous intentions of the Chinese community

website. Jin (2013) combined the technology readiness acceptance model and social capital theory, and the results showed that Perceived Usefulness is most relevant to Facebook's continuous intention.

C. Perceived Playfulness

Playfulness is often viewed as an emotional factor of intrinsic motivation. Many studies are based primarily on Flow Theory proposed by psychologist (Csikszentmihalyi & Csikszentmihalyi, 1975), which is applied to various situations in which people indulge in feelings of pleasure (Atkinson & Kydd, 1997; Jin, 2013; Koufaris, 2002; Moon & Kim, 2001; Teo, 2001; Webster & Martocchio, 1992).

Moon and Kim (2001) used the concepts of Flow Theory and game design theory combined with Davis (1989)'s TAM and formulated the importance of acceptance of definition of Perceived Playfulness applied to the World Wide Web (WWW). The study mainly defined Perceived Playfulness as three components:

1) Focus: When the state of playfulness is experienced, the individual may focus on the current activities, and some unrelated thoughts or feelings may be filtered out.

2) Curiosity: In the process of experiencing playfulness, a person's perception or curiosity may be aroused. Taking the Web page as an example, it can stimulate the user's curiosity through the use of these technological features such as hypertext and multimedia effects.

3) Pleasure: When individuals are in a state of playfulness, they may behave and engage in activities due to their inner funs and pleasures, without being affected by external physical rewards.

Lin et al. (2005) added Perceived Playfulness in the Model of IS Continuance and explored its importance for the continuous intentions of web portals. The results confirmed that the degree of expectation-confirmation of web portal users is positively correlated with Perceived Playfulness, and Perceived Playfulness is also positively correlated with users' Satisfaction and continuous intention. Through empirical results of this study, it was proved again that Perceived Playfulness is an important factor in the continuous use of IS. In terms of Satisfaction, Perceived Usefulness is different from the original model of IS continuance, and both ones do not have significant significance.

Based on the relevant literature mentioned above and C. S. Lin et al. (2005)'s Expectation-confirmation Model, which were further modified to the model fitting Sina-Weibo's continuous use status, this study proposed H1-H8:

H1: The degree of expectation-confirmation of Weibo users has a positive and significant relationship with Perceived Usefulness

H2: The degree of expectation-confirmation of Weibo users has a positive and significant relationship with Satisfaction

H3: The Perceived Usefulness of Weibo users has a positive and significant relationship with Satisfaction

H4: The Perceived Usefulness of Weibo users has a positive and significant relationship with continuous intention

H5: Satisfaction of Weibo users has a positive and significant relationship with continuous intention

H6: The degree of expectation-confirmation of Weibo users has a positive and significant relationship with Perceived Playfulness

H7: Perceived Playfulness of Weibo users has a positive and significant relationship with Satisfaction

H8: Perceived Playfulness of Weibo users has a positive and significant relationship with continuous intention

III. RESEARCH METHOD

Based on the above research hypothesis, this study established the following research framework, and formulated questionnaire items, using online questionnaires to conduct questionnaire surveys. The IS created by Bhattacherjee (2001) is based on the Post-Acceptance Model of IS Continuance, plus the important sensory factor of Perceived Playfulness. The research on continuous intentions of Sina-Weibo users took the Expectation-confirmation Model of C. S. Lin et al. (2005) as Weibo's continuous research model.

A. Research variable and operational definition

The research variables to be measured in this study include "Confirmation", "Perceived Usefulness", "Perceived Playfulness", "Satisfaction" and "Continuous Use Intent". The definitions of various operational variables are as follows:

a) Confirmation: This study defined the confirmation as "the degree of difference of Weibo users between expected expectation before using Weibo and the effects experienced when they actually use Weibo", using the scale of components confirmed by Bhattacherjee (2001) as a measurement question.

b) Perceived Usefulness: This study defined Perceived Usefulness as "the degree to which Weibo users can achieve the benefits they need through information obtained on Weibo" and quoted questions from the scale of Davis (1989) and Moon and Kim (2001), which were then changed to become the questions fitting Weibo users.

*c) Perceived Playfulness: T*his study quoted the scale of Moon and Kim (2001) and defined Perceived Playfulness as "the degree to which users feel happy, interesting and indulged to them when using Weibo"

d) Satisfaction: This study defined Satisfaction as "users' Satisfaction status after using Weibo" and

made a modification referring to the Satisfaction questions of C. S. Lin et al. (2005).

e) Continuous intention: This study defined the continuous intention as "users' willing to continue to use Weibo" and modified it to the item fitting Weibo's continuous use referring to the scale item of Bhattacherjee (2001) on the research of online banking users.

B. Questionnaire design and data collection

(1) Questionnaire design: The questionnaire is divided into 2 parts. Part 1 is the question of research of Weibo's continuous intention. Part 2 is the user's basic information and Weibo user's use experience.

Part 1: the question of research of Weibo's continuous intention was adapted to suit Weibo's actual use based on the scale of empirical literature exploration. The first draft of the questionnaire was filled in by 5 users who had experience using Weibo for over 1 year, and then the doubtful questions were repeatedly modified so that other Weibo users can more clearly answer.

The scales are all based on Likert five-point scale, which is divided into "Strongly disagree", "Disagree", "Fair", "Agree" and "Strongly agree", given 1 to 5 marks, respectively.

(2) Questionnaire issuance objects and methods: In this study, the Taiwanese users using Sina-Weibo were taken as the main objects. A method of online questionnaire was used to place the questionnaire links on the questionnaire version of Sina-Weibo and social BBS-PTT with a large number of users. With the method of snowball sampling, Taiwan users' questionnaires were searched for through everyone's forwarding and private letter.

IV. DATA ANALYSIS

This study analyzed relevant data and models for the recovered samples, which were mainly divided into two parts:

A. Sample structure

In this study, a total of 421 questionnaires were retrieved from Weibo users. After eliminating invalid samples with duplicate contact modes, there were 395 valid samples, with a valid return rate of 93.8%. The data were analyzed as follows:

1) *Gender:* In the proportion of gender, there are 128 males (32.4%) and 267 females (67.6%). The samples collected were mostly from females.
2) *Age:* The age at which Weibo is used in Taiwan is mainly between the ages of 16 and 25, with the largest number of people aged between 16 and 20 (35.9%), followed by those aged 21 to 25 (35.2%). The difference is very small.
3) *Educational level:* mainly university/college (62.78%), followed by high school/vocational education (17.7%) and research institute (15.4%).
4) Occupation: Most of the sample collection users are students (64.3%), and the rest occupations are relatively scattered.
5) *Living areas:* Most of the population is from northern Taiwan (49.9%), followed by the central and southern regions accounting for 22.8%, respectively.
6) *Experience using Weibo:* In the experience of using Sina-Weibo, 1 to 2 years (22.8%) is the most, followed by 6 months to 1 year (21.5%). The rest are 3 to 6 months (20.5%), less than 3 months (17.2%), 2 to 3 years (13.7%) and less than 3 years (4.3%) in turn. The use experience is relatively average, with the exception of Weibo senior users who have used Weibo for more than 3 years (4.3%).
7) *Average time spent:* Each person spends an average of 1 to 3 hours (41.3%) per day on Weibo, followed by less than 1 hour (34.9%), 3 to 6 hours (16.5%) and more than 6 hours (7.3%).
8) *The most commonly used type of posting:* The most frequently used type of posting is the article forwarding (43.5%), followed by browsing message only on Weibo (43.0%). Overall, there are relatively few users (13.4%) who issue articles on it by themselves, which means that many Taiwan users mostly rely on Weibo to accept messages.

B. Reliability analysis and convergent validity

The results of this study validation are shown in Table I, indicating that all components have good reliability.

Table I. Reliability Analysis Of Questionnaires In This Research

Dimension	Cronbach's α	Composite reliability (CR)	Average Variable Extraction (AVE)
Confirmation	0.821	0.893	0.736
Perceived Usefulness	0.888	0.923	0.751
Perceived Playfulness	0.806	0.868	0.572
Satisfaction	0.840	0.906	0.762
Continuous intention	0.864	0.918	0.788

The convergence validity of this study is verified as follows(Table I and Table II):

1) *Reliability of individual projects:* The factor loads of all variables in this study are all greater than 0.5.
2) *The composite reliability of latent variables:* The composite reliability values of latent variables in this study are all greater than 0.7,

indicating that the components of this study have good internal consistency.

3) *The average variation extraction of latent variables:* The average variation extraction (AVE) of each component in this study is above 0.5, indicating that each component has convergent efficiency.

In summary, the research results of this study have reached their standard values, which means that all the observed variables of this study have convergent validities corresponding to their latent variables.

Table II. The Factor Loadings and Cross Loadings

	Confir-mation	Perceived Usefulness	Perceived Playfulness	Satisfaction	Continuous intention
C1	0.875	0.664	0.568	0.644	0.664
C2	0.842	0.519	0.455	0.584	0.518
C3	0.857	0.539	0.559	0.690	0.613
PU1	0.595	0.887	0.510	0.580	0.635
PU2	0.543	0.853	0.459	0.542	0.580
PU3	0.567	0.867	0.493	0.572	0.599
PU4	0.620	0.858	0.561	0.642	0.641
PP1	0.383	0.411	0.716	0.408	0.463
PP2	0.246	0.245	0.585	0.247	0.309
PP3	0.559	0.496	0.842	0.633	0.607
PP4	0.586	0.557	0.874	0.683	0.613
PP5	0.461	0.428	0.730	0.516	0.475
S1	0.649	0.559	0.589	0.870	0.614
S2	0.653	0.586	0.663	0.907	0.665
S3	0.655	0.622	0.565	0.840	0.694
CI1	0.631	0.682	0.580	0.683	0.889
CI2	0.640	0.610	0.574	0.670	0.906
CI3	0.598	0.595	0.640	0.657	0.867

Note: C = Confirmation; PU = Perceived Usefulness; PP = Perceived Playfulness;
S =Satisfaction; CI =Continuous Intention

C. Discriminant validity

According to the verification results, the factor loads of observed variables of the same latent component are all higher than those of the cross-load, as shown in Table III. The square roots of AVE of correlation coefficient matrix diagonal among the components are all larger than the correlation coefficient between this component and other component, as shown in Table III, indicating that the measurement model of this study has discriminant validity.

Table III. The Correlation Coefficient Matrixes among Latent Components

	Confirmation	*Perceived Usefulness*	*Perceived Playfulness*	*Satisfaction*	*Continuous intention*
Confirmation	0.858				
Perceived Usefulness	0.672	0.866			
Perceived Playfulness	0.618	0.586	0.757		
Satisfaction	0.747	0.676	0.695	0.873	
Continuous intention	0.702	0.709	0.674	0.755	0.888

D. Structural model analysis and hypothesis validation

According to the test results of the study, as shown in Table IV, it can be seen that the hypothesis H1~H8 of the model in this study is true.

Table IV. Empirical Analysis Results of Hypothesis

Research Hypothesis	*Path Coefficient β*	*t-value*	*Result*
H1	0.672***	22.029	Supported
H2	0.404***	8.302	Supported
H3	0.218***	5.254	Supported
H4	0.320***	7.154	Supported
H5	0.388***	7.739	Supported
H6	0.618***	18.835	Supported
H7	0.317***	7.402	Supported
H8:	0.216***	5.083	Supported
Note: ***p-value<0.001 (t-value>3.29)			

CONCLUSION AND SUGGESTIONS

This study took Sina-Weibo users in Taiwan as an example. The research showed that: when the user's expectation before using Weibo is more consistent with the actual use situation, it may directly affect the user's Perceived Usefulness, Perceived Playfulness and Satisfaction. Therefore, this study believed that Weibo practitioners should strengthen their own service levels and various functions. They must not falsely advertise to prevent the decreased Perceived Usefulness, Perceived Playfulness and Satisfaction of users, causing them not to have a willingness to continue to use. In addition, Weibo practitioners should also teach users how to effectively use Weibo so that users can fully understand Weibo's features of practicability and playfulness, thus maximizing users' degree of confirmation (Bhattacherjee, 2001; Kang et al., 2009).

The results of this study showed that Perceived Usefulness has a positive and significant relationship with Satisfaction, unlike the research of C. S. Lin et al. (2005). However, various related researches have shown that Perceived Usefulness has significant relationship with Satisfaction (Barnes & Böhringer, 2011; Bhattacherjee, 2001; Hong, Thong, & Tam, 2006).

This study argued that for Weibo users, Weibo is not just a platform for sharing messages and expressing emotions. Through the mechanism of attention, Weibo users can receive various messages on Weibo and browse many of the latest and hottest topics or events. They can also follow their own interests paying attention to their favorite users. When becoming a Weibo member, the "Keywords" feature can also be used to get rid of some of the messages not wanted to be seen.

This study also showed that the most frequent posting type of Weibo of many Taiwanese users is "forwarding articles" and there are also some users

who only browse messages. It also explained "Perceived Usefulness" experienced by Weibo users in their use has a positive relationship with "Satisfaction" after using Weibo. The higher the Perceived Usefulness, the higher the Satisfaction.

The empirical results of this study showed that Weibo users' Perceived Playfulness has a positive and significant relationship with Satisfaction, indicating that the higher the level of playfulness experienced by Weibo users on Weibo, the higher the Satisfaction will be. In addition to being the same with the results of Lin et al. (2005) taking the users of web portals as a sample, the result is also consistent with the result of Hong et al. (2006) on the continuous intention of mobile network and the result of Day (2010) on the research of user satisfaction assessment mode of social network. When we use Weibo, we can experience the playfulness through interacting with friends, browsing messages, initiating or following popular topics, or paying attention to celebrities and participating in activities. While in the process of experiencing pleasure or feeling interesting, it may cause us to indulge in it. Weibo users may feel more playful and more satisfied with their use of Weibo. Through the promotion of Satisfaction, the user's willingness to continue using Weibo can be increased.
In addition to directly affecting the Satisfaction, Perceived Playfulness and Perceived Usefulness can also be directly reflected in the user's continuous intention. The results of this study proved that both Perceived Playfulness and Perceived Usefulness have a positive and significant relationship with the continuous intention, and all of them are the same as those of Jin (2013) taking Facebook as an example. Through the validation results of this study, it was found that Perceived Usefulness has a more significant relationship with continuous intention than that of Perceived Playfulness. Perhaps for Weibo users in Taiwan, the information available on it and the usefulness of Weibo is a major key factor for users continuing to use Weibo again.
This study also divided users into heavy users and light users, and then went through a structural model. The results showed that the heavy user's Perceived Playfulness does not have a significant impact on the continuous intention. It is understandable that Perceived Playfulness has a weak influence on the continuous intention of Weibo users. However, Perceived Playfulness is less significant than Perceived Usefulness, and it may be that AVE of the entire component is less significant than that of Perceived Usefulness and continuous intention. Among which the questions "I don't mind the passage of time when using Weibo" and "I often forget about other tasks that need to be done when using Weibo" are also less significant compared with factor loads of other observation variables, indicating that for some Weibo users, Weibo is not attractive enough.

Based on the above results, there are three suggestions for operators in this study:

- Weibo operators can increase Weibo's usefulness and playfulness through the way companies and celebrities join Weibo.
- Weibo operators can build Weibo accounts for different categories, such as special movie specials, daily constellation analysis, travel recommendations, to increase Weibo's usefulness and playfulness and to attract Weibo users' attentions.
- Weibo operators can also increase the playfulness of Weibo users by interacting with users through organizing events from time to time, or jointly organizing exclusive promotions with other companies, to make users pleasant, fun and immersed in the fun of using Weibo.

Suggestions for investigators in researching related issues in the future:

a) *Expanding the model of continuous intention:* The research model of this study only summarized the characteristics of Perceived Usefulness and Perceived Playfulness which can be subdivided into different components, or sociality, privacy and other factors that may affect the continuous intention of Weibo users are added.
b) *Choosing different research cases:* The research sample of this study is only based on Sina-Weibo users in Taiwan, and Sina-Weibo users all over the world or microblogging users of similar nature such as Facebook, Plurk, Twitter and Tumblr may be sampled in the future to explore the comparison of their continuous intentions according to different Microblogging features, and also to explore the different Microblogging habitually used in different countries and the influencing factors, which are waited for further comparison.
c) *Different directions of Weibo research:* Weibo has just started recently and is currently continuing to develop. Therefore, there are still many topics that can be researched and discussed, such as: researching the motivational factors of users using Weibo, the communication ability of Weibo, and how companies use Weibo to achieve marketing effects, how Weibo makes the system operate more perfect to maximize user Satisfaction, etc., for which the management models of various ISs can be used for discussion and improvement to provide Weibo operators more proposals with practical values.

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