Research on undergraduates' continuous using behaviors of WeChat: data from China

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ABSTRACT

The purpose of this research is to explore the continuous using behavior of WeChat. Based on the technology acceptance model (TAM) and network externality theory, this study constructs a theory model about factors that influence users' continuous using behavior. Taking college students as investigation objectsand collecting 222 valid questionnaires, by using the structural equation model, the study conducts an empirical research on the relationship among network externality, perceived usefulness, perceived ease of use, perceived entertainment and continuous using behavior. The empirical results show that the impact of network externality, perceived easeofuse and perceived entertainment on WeChat users' continuous using behavior is significant, but the positive influence ofperceived easeofuse on perceived usefulness and perceived usefulness on WeChat users' continuous using behavior are not significant. Finally, this research put forward some suggestions to mobile social networking provider and education department.

Keywords: Network Externality; Perceived Usefulness; Perceived Ease of Use; Perceived Entertainment; Continuous Using Behavior
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INTRODUCTION

WeChat is a mobile instant messaging software that Tencent launched on 21st January, 2011, through which the users can quickly send text, images and make multiplayer voice. The users can log in WeChat via the mobile phone, tablet or web, after landing, they can add buddy or concern the public platform through shaking, searching number or scanning QR code, and after adding buddy, they can send text, images, videos and voice, if they get a view at wonderful content, they can also share it with friends by sending it through communication session or directly delivering in the friends circle of WeChat [1].The product has been more competitive than similar products like WhatsApp and LINE abroad, and the number of its users is large and is growing at a staggering rate. Tencent released the latest data of WeChat in 2014, as it shows, the number of WeChat's users has reached 600 million, of which there is about 160 million for overseas users.Research on mobile social-networking products such as micro-blog or SNS are not few [2-5] in China, but the research on WeChat is inadequate. The existing research on WeChat in China are mainly focused on the WeChat transmission mechanism and commercial value development [6]. Research on users' behavior, especially on the continuous using behavior of users who are undergraduates in universities, it is relatively lack. Therefore, this study is based on technology acceptance model and network externality theory, establishing WeChat users' continuous using behavior model. Taking college students as investigation objects and collecting 222 valid questionnaires, by using the structural equation model, this research examines the relationship among network externalities, perceived usefulness, perceived ease of use, perceived entertainment and continuous using behavior. Finally, according to the result of empirical study, this paperprovides practical advice for further promotion of the WeChat providers andother mobile instant messaging tool. The results will be beneficial to the improvementof the comprehensive quality of college students in universities,and it can also be used as theoretical basis to strengthen college students' self-control ability and provide references for its decision-making.

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EXPERIMENTAL SECTION

Network externality theory

Network externality refers to with the increase ofthe number of the users using the product, the value obtained by the users of this product also increases. Empirical results from Katz and Shapiro [8] show that there exists influence of network externality on virtual community users' perceived usefulness. The study which uses mobile services as the research object conducted by Deng et al.[9] found that, when a new user perceives that the number of SMS users is large, it will be beneficial for him/her tolearn system function. At the same time, the more often exchanges of the new methods of application and experience between new users, the more helpful for new entrants to use short message service in positive way, because they think it is easy using short message service.

As a recreational information system, in addition to its entertainment function, WeChat's most important function is that it can help keep close contact and emotional communication with familiar friends and relatives, and it can also help users obtain the friend's state and information at any time, and share interesting pictures and textetc with friends. Therefore, the network externalitycan help to establish the mechanism of interaction and sharing between WeChat users, and users get more perceived usefulness, perceived ease of use, and thus enhances the WeChat users' continuous using intention. Thus, this study puts forward the following hypotheses:

H1a. There exists significantly positive impact of network externality on perceived usefulness
H1b. There exists significantly positive impact of network externality on perceived ease of use
H1c. There exists significantly positive impact of network externality on the continuous using behavior

Technology acceptance model (TAM)

Technology acceptance model (TAM) is a model to explore the adoption of users on information system according to the rational behavior theory proposed by Davis [10] in his research. And perceived usefulness and perceived ease of use are the two main determinants in the model: (1) perceived usefulness refers to the user perceives his personal performance will be enhanced if he use an information system; (2) perceived ease of use refers to in the use of an information system, its more ease that the user perceives.The empirical study from Yin and Yang [11] found that perceived usefulness has a direct and positive influence on the intention of users' continuous using. According to the theory of TRA and EDT, Bhattacherjee[12] found that there exists a direct impact of perceived usefulness on the user intention of continuous usingafter using a system.When conducting an empirical study about the using behavior of instant messaging service, Lu and Xu [13] found that perceived ease of use of instant messaging services is crucial to perceived usefulness. If users feel difficult in the use of instant messaging, the user may think it is not useful, which may lead to giving up instant messaging. Zeng and Zheng [14] take mobile instant messaging services as an example to do empirical research, the result showed that the positive influence of perceived ease of use on perceived usefulness is significant, and positive influence of perceived ease of use on continuous using intention is significant. Therefore, this study puts forward the following hypotheses:

H2. Perceived ease of use will be positively related to the perceived usefulness
H3a. Perceived usefulness will be positively related to continuous using behavior
H3b. Perceived ease of use will be positively related to continuous using behavior

Perceived entertainment

Perceived entertainment refers to the user perceives emotional happiness valence in the process of using a product [15]. Moon and Kim put perceived entertainment into the technology acceptance model to explore the model's explanatory power, the result shows that compared with the original technology acceptance model, the model including perceived entertainment explains better [15]. The empirical study of Chen and Shao showed that perceived entertainment has asignificantly positive impact on continuous using intention [4]. Empirical study on mobile Internet conducted by Lin et al. [16] concluded that perceived entertainment has a significantly positive impact on the intention of users continuous using. Therefore, this study puts forward the hypothesis:

H3c. Perceived entrainment will be positively related to continuous using behavior of WeChat users
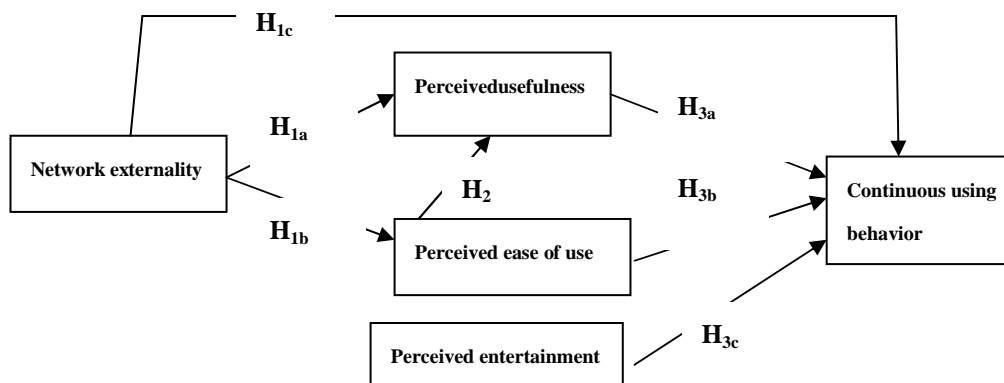Based on the analysis of the above, this study puts forward a theoretical model, as shown in Fig.1.

Figure-1 Theoretical Model and Hypothese

Variable design and questionnaire collection

This study adopts questionnaire method. The principal part of the questionnaire includes measurements of all variables in the empirical model. Using Liker7 point scale to measure, numbers " 1 to 7 " are set to represents the degree from " deeply disagree " to " deeply agree ". All the variables are measured by more than one item and adopted from existing literature, so content validity is guaranteed. Questionnaireswere given out between 29th January and 9th March in 2014, with a total of 237 questionnaires given out, and 222 valid questionnaires were recovered, and recovery rate of effective questionnaire is 93.67%.

Among 222 effective questionnaires, women samples were slightly more than men samples. The number of male samples was 93, accounting for 41.89%, and the total number of female samples was 129, accounting for 58.11%. Users with using time less than six months accounted for 16.22%, those who were more than six months and less than one year accounted for 16.22%, and those who were more than one and less than 2 years accounted for 48.65% and users with using time more than 2 years accounted for 18.92%. More than half of the research objects have been using WeChat more than a year, showing that the WeChat's popularization rate is relatively high.Users with the number of friends smaller than 30 accounted for 13.51%, and users with the number of friends larger than 31 and smaller than 50 accounted for 24.32%, users with the number of friends larger than 51 and smaller than 100 accounting for 29.73%, users with more than 101 friends accounted for 32.43%. There are mainly four fuctions considered to be relatively valuable by users, which are group chat (74.32%), friends circle (85.14%), the public platform (37.84%) and RichScan (44.59%).

RESULTS

Analysis of reliability and validity

In this study, Cronbach's alpha is to test the reliability of the variables.Cronbach's alpha values are between 0 and 1. If Cronbach's alpha is greater than 0.8, the internal consistency of the scale is good. According to Table -1,Cronbach's alpha of each factor is greater than 0.8, indicating that reliability levels of scale is relatively high. And the reliability and stability of data attained through the survey are high.

In order to make further test on the reliability and validity of scale, this study use AMOS 21.00 software to conduct confirmatory analysis to measure this model. The results are shown in Table-1 and Table-2. In Table-1, all the factors standard loading are greater than 0.7. In Table-2., average variance extracted (AVE) of each factor is greater than 0.50, indicating that convergent validity of measurement items is good, and the Composite Reliability of all factors are greater than 0.80, showing that the internal consistency of measurement items is good.

When square root of each factor's AVE is greater than its correlation coefficient with other factors, discriminant validity of the measurement model is relatively good. From Table-2, in this scale, square root of each factor's AVE is greater than its correlation coefficient with other factors, so the measurement model has good discriminant validity.

Structural equation testing

In this study, AMOS 21.00 software is used to test hypotheses of the proposed structural model. Table-3is a fitting model index and judgment criterion, after comparsion, it can be known that the model has good fitting degree. Figure-2shows that the standardization path coefficient and p values of the hypotheses relationship among the variables. Therefore, except H2 and H3a ,all the other hypotheses are supported.

DISCUSSION

(1) Network externality has positive influence on perceived usefulness, perceived ease of use and continuous using intention, and the path coefficients are respectively 0.358, 0.726, 0.528. Network externality is aninfluencing factor quite commonly used in the studies of user behaviors on social networking tool in recent years, for a mobile social-network tool, its core competence lies in its user scale and stickiness.

(2) The results show that the positive influence of perceived ease of use on the continuous using behavior is significant (ß = 0.243, p < 0.001), but the positive influence of perceived ease of use on perceived usefulness is not significant (ß= 0.038, p > 0.05), which does not match the research conclusion of the original technology acceptance model (TAM). The reason why there exists the difference may be that the speed of technological progress and knowledge development are faster and technology suppliers attach great importance to the users experience, carrying out more perfect optimum processing on the user interface and the corresponding functions, which is helpful for users to operate and use more easily. Also WeChat's using groups are college students, who have high level of knowledge, when learning how to useWeChat, they meet fewer obstacles.

Table-1Analysis of Reliability and Validity of Each Factor

Factor	Items	Factor Load	Cronbach's alpha
Network externality(adapted from Wang et al.[17], Zhang and Wang[18])			
	The user believes that there are quite a number of people are users ofWeChat	0.928	
	The user believes that most people often communicate and share through using WeChat	0.889	
	The user believes that there still can be a lot of people joining the ranks of the WeChat	0.788	0.927
Network externality	The user believes that a lot of his/her relatives and friends are in use ofWeChat	0.816	
	The user believes that most of his/her friends and relatives are often use WeChat to communicate and share	0.725	
	The user expects that a lot of his/her friends and relatives will useWeChat in the future	0.819	
Pecieved usefulness (adapted from Davis[10], Bhattacherjee[12])			
	Many functions of WeChat can help the user communicate, exchange and share information and so on	0.935	
Pecieved usefulness	In WeChat, User can make use of many functions (like Voice to text, My bank card and the public platform)	0.737	0.902
	Using WeChat allows the user to have many more chances to take part in large number of social activities	0.725	
	WeChat makes the user more convenient to search his/her friends	0.696	
	Using WeChat increase frequency of association with users'friends and family	0.788	
Perceived ease of use (adapted from Davis[10])			
	The user believes that it is very to learn how to use WeChat	0.954	
Perceived ease of use	The user can become skilled in using WeChat as quickly as possible	0.926	0.948
	The user believes that it is quite easy to instruct other people to learn how to use WeChat	0.902	
Perceived entertainment (adapted from Moon and Kim[15])			
	Using WeChat makes the user happy and relaxed	0.789	
Perceived entertainment	The user believes that most of WeChat's functions are interesting	0.787	0.893
	The user believes that WeChat is a tool that provides entertainment well	0.794	
Continuous using behavior (adapted from Moon and Kim[15], Bhattacherjee[12])			
	The user plans to use WeChat in the future	0.947	
Continuous using behavior	The user will recommend it to his/her more friends to use	0.933	0.944

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Table -2 Analysis of convergent validity and discriminant validity

	AVE	CR	Network externality	Pecieved usefulness	Perceivedease of use	Perceived entertainment	Continuous using behavior
Network externality	0.930	0.689	**0.830**				
Pecieved usefulness	0.900	0.602	0.387	**0.776**			
Perceived ease ofuse	0.949	0.860	0.726	0.300	**0.928**		
Perceived entertainment	0.833	0.624	0.559	0.452	0.607	**0.790**	
Continuous using behavior	0.938	0.884	0.769	0.423	0.701	0.622	**0.940**

Note: Diagonal values represent the AVE
Non-diagonal values represent the values of the square of the correlation coefficient
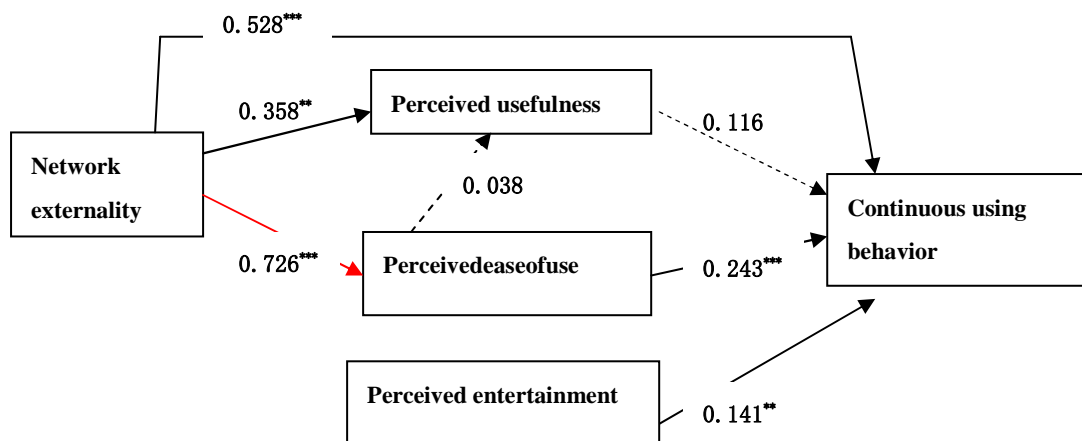
Note:***p<0.001,**p<0.01

Figure-2 Results of Hypothesis Testing

Table-3Model Fitting Index

Fit Index	Judging Criteria	Actual Fitting Values
Absolute fitting index		
χ^2/df	The ratio of chi-square value to the degrees of freedom need to be between 1.0 to 5.0	4.050
GFI	The closer GFI is to 1, the better, and if GFI > 0.9, it is thought to be fit well, if GFI > 0.7, it can be accepted	0.812
RMSEA	The closer RMSEA is to 0, the better fit it is thought to be, it is usually adopted "RMSEA<0.05" and RMSEA can not be greater than 0.1	0.092
Value-added fitting index		
NFI	The closer NFI is to 1, the better, and if NFI > 0.9, it is thought to be fit well, if NFI >0.8, it can be accepted	0.856
CFI	The closer CFI is to 1, the better, and if CFI > 0.9, it is thought to be fit well, if CFI >0.8, it can be accepted	0.887
IFI	The closer IFI is to 1, the better, and if IFI > 0.9, it is thought to be fit well, if IFI >0.8, it can be accepted	0.888

(3) In this study, perceived entertainment is a newly introduced factor according to the characteristics of the mobile social-networking tools. The empirical results show that its effect on continuous using behavior is far more than the perceived usefulness in the model ECM-ISC. WeChat is atypical information system of entertainment, it has many entertainment functions which are derived from the basic function ofconducting conversation with friends. Whether as tothe open function of friends circle from the start, or a new game function, or grabbing a red packet which was hot for a while during the Spring Festival of 2014, these functions can bring entertainment effect to the users. In this era of the whole people catholically with great pressure, WeChat'sfun and entertainment are undoubtedly most able to attract and retain theusers. The more entertainment that users feel when using WeChat, the more their willness to continue using WeChat is.

(4) According to the results, positive influence of perceived usefulness on continuous using behavior was not significant (ß = 0.116, p > 0.05). The research conclusion is inconsistent with the one of the original technology acceptance model (TAM). The reason why this happens may be because the information systems that scholars previously researchedare mainly functional information systems, such as mobile commerce and mobile search, but WeChat is a kind of recreational information system.When using recreational information system,users get stronger perception of leisure entertainment than perception of usefulness,and this leads to the effect of perceived usefulness less obvious.

Suggestions

(1) WeChat providers could make further improvement on core social service function to allow the users to get more efficient and interesting social experience to enhance the user's perceived ease of use and perceived entertainment, and then to promote the continuous usingbehavior of the users. For example, on the chat function, WeChat can add the function of images optimization and shotting filter, which is convenient for users to directly process photo in WeChat and saves the steps that users have to use and saves timespent on other pictures processing software.At the same time, the content of intelligent identification of key words can be enriched, for example, when Korean dramas " you are the one who comes from the stars" is in hot beginning show, WeChat could cater to the hot topic. A lot of snow will drop down in the chat when "Fried chicken and beer" is sent.This joining the humanized entertainment elements can not only increase the fun of users, but also will encourage users' word-of-mouth spreading, bringing diffusion effects.

(2) WeChat providers should make it clear about their own advantages, closely centring on the research and development of core social function, in order to make full use of social relationship chain value to increase user stickiness. For example, in terms of game function, some kinds of fighting game can be added into WeChat, and thus users can directly compete with friends in the game, and further enhancementof game interactivitybetween users and their close friends will be achieved.

CONCLUSION

Based on technology acceptance model (TAM) and network externality theory, this study constructs a theory model of the WeChat users' continuous using behavior. Taking college students whose WeChat popularization rate is relatively high as the research objects and collecting 222 valid questionnaires, this study conducts an empirical research on the relationship among network externality, perceived usefulness, perceived ease of use, perceived entertainment and the continuous using behavior by using statistics software SPSS 21.0 and AMOS 21.00. According to the results, the impact of network externality, perceived ease of use and perceived entertainment on WeChat users' continuous using behavior is significant, and the positive influence of the perceived usefulness on WeChat users continuous using behavior is not significant. This conclusion provides WeChat providers and other mobile instant messaging suggestionsfor further promotion, in addition,it also provides the Chinese education department references for improvementof college students' self-control ability and decrease of the negative impact of mobile Internet on college students.

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