

An empirical study on continuance intention of mobile reading*

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Abstract

Purpose: This study aims to explore factors affecting continuance intention of mobile reading.

Design/methodology/approach: Drawing on the unified theory of acceptance and use of technology (UTAUT), and integrating perceived enjoyment, we put forward a theoretical research model of factors affecting continuance intention of mobile reading. Using 186 valid data collected through a questionnaire survey, we conducted data analysis with the partial least squares structural equation modeling (PLS-SEM).

Findings: The results show that performance expectancy, effort expectancy, social influence and perceived enjoyment all have positive impacts on continuance intention. Among them, perceived enjoyment has the most significant effect on continuance intention, followed by performance expectancy. In addition, effort expectancy significantly influences perceived enjoyment. Contrary to our expectation, facilitating conditions have no impact on continuance intention.

Practical implications: This study could help mobile data service providers to foster users' continuous usage of mobile reading.

Research limitations: This study focused only on the effect of perceived enjoyment as an internal motivation on continuance intention of mobile reading, and other possible factors were not considered. Also, continuance intention may be different from the actual behavior. Furthermore, data of student users was collected from one university in China, and was cross-sectional, while working samples were not considered.

Originality value: This study considers the effects of both external and internal motivation on continuance intention of mobile reading. The results highlight the role of perceived enjoyment in building users' continuance intention of mobile reading.

Keywords Mobile reading; Unified theory of acceptance and use of technology (UTAUT); Perceived enjoyment; Continuance intention; Mobile services; User behavior

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1 Introduction

With the development and popularization of mobile information technology, mobile reading has become increasingly popular and aroused the attention of researchers and practitioners. Mobile reading refers to a new type of reading service with mobile devices as end terminals, which can be used to access, receive and download the needed information through wireless network or mobile communication network^[1]. According to a report released by Chinese Academy of Press and Publication, 51.8% of adults in China read by mobile phones and they spend more and more time reading with mobile devices, with about 34 minutes spent on mobile reading every day on average^[2].

Compared with the traditional way of reading, the main advantage of mobile reading lies in its convenience and flexibility. In other words, users can read without temporal and spatial limitations, which may improve the perceived utility of the mobile reading system and foster users' adoption of it. However, the limitations of mobile devices as end terminals, such as small screens, incompatible data formats and slow responses^[3], may have negative impacts on users' mobile reading experience, thus affecting their continuance usage. As Bhattacharjee argues, promoting the initial adoption and the usage of information systems (IS) and acquiring users is only the first step in achieving IS success, and retaining those users is most vital for IS success^[4]. Therefore, it is meaningful to study how to retain mobile reading users and to facilitate their continuance usage of mobile reading.

Researchers have conducted studies of mobile reading on such topics as the effects of mobile devices on mobile reading^[5-7], the current status of mobile reading^[1], and factors affecting the adoption of mobile reading^[8,9]. However, relatively few studies investigated factors influencing continuance intention of mobile reading. Moreover, extant research has employed different IS theories to examine continuance behavior of mobile users, such as the technology acceptance model (TAM)^[10], the theory of reasoned action (TRA)^[11], and the theory of planned behavior (TPB)^[12]. Factors such as perceived ease of use, subjective norm and mobility are considered to significantly affect continuance behavior of mobile users. However, all these factors represent extrinsic motivations, and are related to instrumental beliefs^[13]. User behavior may also be influenced by intrinsic motivations, such as enjoyment. Especially, the constraints of mobile devices such as small screens make users become fatigued easily and may impede their continuance usage. This highlights the important role of user experience in the adoption and continuous usage of mobile reading^[14,15]. In other words, unpleasant experience may affect users' intention to read on mobile devices continuously. Thus, it is necessary to consider user experience when examining continuance behavior of mobile reading users.



This study adopts one of the popularly cited IS theories, unified theory of acceptance and use of technology (UTAUT)^[16], as the theoretical basis. Though UTAUT studies initially focused on IS adoption and usage in the working context, in recent years researchers have attempted to use this model to explain continuance intention in the contexts of mobile services and Internet applications, such as online learning^[17,18] and mobile Internet^[13]. Mobile reading is a kind of user behavior in the mobile Internet context, and thus it is feasible to adopt UTAUT as the theoretical basis. In the meanwhile, perceived enjoyment is incorporated into the research model as the experience of using mobile reading may also influence users' continuance intention. Prior studies have confirmed the effect of perceived enjoyment on continuance intention of IS users^[19,20], and we are interested in examining its impact in the context of mobile reading. Using UTAUT as the theoretical basis, this study examines factors influencing continuance intention of mobile reading from perspectives of both extrinsic and intrinsic motivation.

2 Theoretical model and research hypotheses

2.1 UTAUT constructs

TAM^[10] posited that perceived usefulness and perceived ease of use are the two major factors to determine user acceptance and use of information systems. Venkatesh & Davis^[21] extended the model to explain perceived usefulness and usage intention in terms of social influence and cognitive instrumental processes. The unified theory of acceptance and use of technology (UTAUT) proposed by Venkatesh et al.^[16] was based on studies of eight competing models in IS adoption research, including TAM, innovation diffusion theory (IDT)^[22], TRA, TPB, and the model of PC utilization and social cognitive theory (SCT)^[23]. UTAUT argues that, there are four core variables affecting IS adoption, that is, performance expectancy, effort expectancy, social influence and facilitating conditions^[16].

This study is based on the UTAUT model, and the variables of the UTAUT model are included in the research model of this study. Table 1 shows the related variables in the research model and their definitions.

Table 1 Related constructs and their definitions

Variables	Definitions
Performance expectancy	The perceived utility of mobile reading
Effort expectancy	The perceived difficulty associated with mobile reading
Social influence	The effect of others' opinions on users' mobile reading behavior
Facilitating conditions	The necessary devices, resources, knowledge and ability for mobile reading
Perceived enjoyment	The pleasure and enjoyment related to mobile reading
Continuance intention	The extent to which users are willing to continue using the mobile reading service



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Performance expectancy is the extent to which a user believes that a system enhances his or her performance. It is similar to perceived usefulness in TAM^[24]. In the context of our study, the feature of good portability of mobile devices, such as smart mobile phones and tablets, enables users to read at any time and in any places. Users can improve themselves by reading study- or work-related materials, or communicate instantly and share ideas with others with their mobile devices. When users perceive the usefulness of mobile reading, they may continue to read on their mobile devices. Prior studies have confirmed the effect of performance expectancy on continuance behavior. For instance, Chiu & Wang^[17] found that performance expectancy positively affects continuance intention to use the Internet-based learning. Zhou^[13] revealed that performance expectancy has a positive effect on continuance intention of mobile Internet users. Thus, we propose:

H1: Performance expectancy positively affects continuance intention of mobile reading.

Effort expectancy is the degree to which a user believes that using a system is free of effort. It is similar to perceived ease of use in TAM^[25]. In our study, we assume that a system that is easy to use will be more likely to trigger behavior intention. The current mobile devices usually contain popular software for mobile reading so that users can read any interesting books with one-click. In the meanwhile, users can conveniently download free software from the Internet for reading, install and use them easily. In addition, the software provides human-oriented operation interface. All these features enable users to read easily and conveniently. The effect of effort expectancy on continuance intention has been verified in previous studies^[16]. Therefore, we propose:

H2: Effort expectancy positively affects continuance intention of mobile reading.

Social influence refers to the degree to which a user perceives that important others believe he or she should use a particular information system. According to the social influence theory, users tend to comply with other important referees' opinions^[26]. When deciding whether to use an emerging mobile service such as mobile reading service, they tend to be affected by attitudes or opinions of others who are important to them. Thus, when important others recommend them to use mobile devices for reading, they may adopt their suggestions. Zhou^[13] found that social influence positively affects continuance usage of mobile Internet. Hong et al.^[27] revealed that social influence has a significant effect on continuance intention of mobile data services. Thus, we propose:

H3: Social influence positively affects continuance intention of mobile reading.

Facilitating conditions mean that users have the resources and knowledge necessary to support their activities. In the context of our study, with the increasing popularization of mobile devices, more and more users have started to read on



mobile devices. The rapid development of the third generation (3G) or the fourth generation (4G) mobile communication technology and the spread of wireless networks enable users to quickly download whatever electronic resources or read online resources. This may foster users' continuous mobile reading behavior. Prior studies have found the effect of facilitating conditions on IS continuance behavior^[28]. Therefore, we propose:

H4: Facilitating conditions positively affect continuance intention of mobile reading.

2.2 Perceived enjoyment

Perceived enjoyment represents the pleasure and enjoyment users can perceive during the process of using an IS^[29]. As an intrinsic motivation, perceived enjoyment highlights the process of using the technology^[29,30]. When users use their mobile devices for reading, they expect an enjoyable experience. In other words, they may discontinue the use of mobile devices for reading due to unpleasant experience; for example, their private information has been collected without being informed during the process of using the IS^[31]. Extant studies have confirmed the effect of perceived enjoyment on continuance behavior. For instance, Li et al.^[19] found that perceived enjoyment has a significant influence on continuance intention of mobile game users. Thus, we propose:

H5: Perceived enjoyment positively affects continuance intention of mobile reading.

In addition, effort expectancy may be related to perceived enjoyment. Effort expectancy indicates the convenience and easiness of using the mobile reading system. When users find it convenient and easy to use mobile devices for reading with such features as the humanized operation interface, they may enjoy the mobile reading process gradually. Previous studies have revealed the effect of perceived ease of use on perceived enjoyment^[32,33]. Therefore, we propose:

H6: Effort expectancy positively affects perceived enjoyment of mobile reading.

Figure 1 presents the research model.

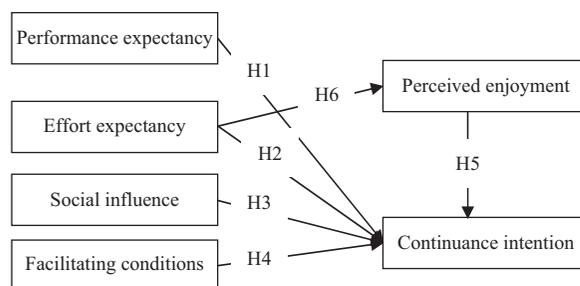


Fig. 1 Research model of continuance intention of mobile reading.



3 Research design

3.1 Measurement development

All the measurement items were adapted from existing studies to ensure validity and reliability, and were modified to fit the mobile reading context. Considering that the items were originally created in English, a back-to-back translation procedure was conducted to ensure the validity of translation. After the initial questionnaire was developed, we invited 10 experienced users of mobile reading for a pilot study. The wording of the questionnaire was modified based on their comments. All items were measured with a seven-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). Table 2 shows the final items and the sources of the constructs.

Table 2 Items and their sources of constructs

Con-structs	Items	Sources
Performance expectancy (PE)	1 Mobile reading helps me acquire the necessary information quickly.	Venkatesh et al. ^[16]
	2 Mobile reading is helpful to my job or learning.	
	3 Mobile reading allows me to quickly accomplish my tasks.	
Effort expectancy (EE)	1 Learning to use the mobile reading system is easy for me.	Venkatesh et al. ^[16]
	2 I think it is easy to use the mobile reading software.	
	3 I think the mobile device is easy to use.	
Social influence (SI)	1 People who influence me think that I should use the mobile reading service.	Venkatesh et al. ^[16]
	2 People who are important to me think that I should use the mobile reading service.	
Facilitating conditions (FC)	1 I have the necessary resources for mobile reading.	Venkatesh et al. ^[16]
	2 Rich resources attract me to use the mobile reading service.	
	3 I can turn to somebody for help when there are difficulties during the mobile reading process.	
Perceived enjoyment (PEJ)	1 I think that the mobile reading process is full of fun.	van der Heijden ^[29] , Wang & Gan ^[34]
	2 I think that mobile reading is enjoyable.	
Continuance intention (CI)	1 I intend to continue to read on mobile devices.	Bhattacharjee ^[4] , Wang & Gan ^[34]
	2 I will continue mobile reading, as what I do now.	
	3 In the future, I will do my best to continue reading on my mobile devices.	

3.2 Data collection

Empirical data was collected by sending out paper questionnaires in the Library of Sun Yat-sen University in China. We invited those students with mobile reading experience to volunteer to take part in the survey. 220 questionnaires were handed out, and 204 were returned. We scrutinized all 204 responses and dropped those with the same values for all questions (10 responses) and incomplete ones (8 responses). As a result, we obtained 186 valid responses. Table 3 displays the demographic information of the respondents.



Table 3 Demographic information of respondents

Measure	Items	Frequency	Percentage (%)
Gender	Male	95	51.1
	Female	91	48.9
Age	Under 18 years old	11	6.0
	18–23 years old	174	93.5
	24–29 years old	1	0.5
Experience of mobile reading	Less than 3 months	21	11.3
	3–6 months	12	6.5
	6–12 months	17	9.1
	More than 1 year	136	73.1

4 Data analysis

This study employs partial least squares (PLS) to evaluate the proposed research model. We followed the general two-step approach: First, the measurement model is assessed to ensure reliability and validity, and second, the structural model is assessed to test the research hypotheses.

4.1 Reliability and validity of instruments

To evaluate the measurement model, we conducted convergent and discriminant validity tests. Convergent validity measures whether items can effectively reflect their corresponding factor. As shown in Table 4, all factor loadings are higher than 0.7, and all the values of average variance extracted (AVE) are over 0.5, indicating good convergent validity of the measurement model^[35,36]. Also, the values of composite reliability (CR) and α exceed 0.7, confirming good reliability^[35,36].

Table 4 Tests of convergent validity and reliability

Constructs	Items	Factor loadings	AVE	CR	α
Continuance intention (CI)	CI1	0.919	0.794	0.920	0.869
	CI2	0.915			
	CI3	0.836			
Effort expectancy (EE)	EE1	0.911	0.869	0.952	0.925
	EE2	0.946			
	EE3	0.940			
Facilitating conditions (FC)	FC1	0.856	0.666	0.856	0.754
	FC2	0.874			
	FC3	0.708			
Performance expectancy (PE)	PE1	0.839	0.745	0.897	0.828
	PE2	0.873			
	PE3	0.876			
Perceived enjoyment (PEJ)	PEJ1	0.967	0.936	0.967	0.931
	PEJ2	0.968			
Social influence (SI)	SI1	0.965	0.939	0.969	0.936
	SI2	0.974			



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Discriminant validity measures whether two factors are statistically different. The evaluation criterion for discriminant validity is that the square root of each construct's AVE should be larger than the correlation of the construct with other latent variables^[36]. As presented in Table 5, for each construct, the square root of the AVE (all diagonal values in bold) is significantly greater than its correlations with other variables, verifying good discriminant validity of the measurement model.

Table 5 Test of discriminant validity

Constructs	CI	EE	FC	PE	PEJ	SI
CI	0.891					
EE	0.553	0.932				
FC	0.437	0.493	0.816			
PE	0.446	0.457	0.395	0.863		
PEJ	0.593	0.625	0.450	0.293	0.967	
SI	0.214	0.070	0.163	0.122	0.160	0.969

In addition, cross-loadings of all the items in Table 6 reveal that each within-construct item loading is higher on the measured construct than the cross-loadings on the other items, indicating good discriminant validity of the measurement model.

Table 6 Factor loadings and cross-loadings

Constructs	CI	EE	FC	PE	PEJ	SI
CI1	0.919	0.501	0.429	0.374	0.543	0.195
CI2	0.915	0.517	0.362	0.401	0.540	0.151
CI3	0.836	0.460	0.376	0.419	0.502	0.227
EE1	0.498	0.911	0.459	0.457	0.506	0.109
EE2	0.541	0.946	0.449	0.402	0.613	0.077
EE3	0.507	0.940	0.471	0.422	0.624	0.012
FC1	0.415	0.424	0.856	0.313	0.356	0.118
FC2	0.382	0.438	0.874	0.374	0.427	0.174
FC3	0.236	0.333	0.708	0.277	0.314	0.103
PE1	0.364	0.418	0.400	0.839	0.296	0.103
PE2	0.399	0.378	0.326	0.873	0.220	0.088
PE3	0.391	0.387	0.296	0.876	0.242	0.126
PEJ1	0.575	0.600	0.419	0.274	0.967	0.158
PEJ2	0.573	0.609	0.451	0.293	0.968	0.151
SI1	0.192	0.041	0.123	0.126	0.123	0.965
SI2	0.221	0.091	0.189	0.112	0.182	0.974

4.2 Hypotheses testing

A bootstrapping resampling procedure (1,000 samples) was conducted in SmartPLS 2.0 to test the explanatory power of the model and the path coefficients^[37]. Figure 2 depicts the results of the path coefficients and the corresponding levels of significance. The explained variance (R^2) of continuance intention and perceived



enjoyment is 47% and 39.2%, respectively. Continuance intention is significantly affected by performance expectancy, effort expectancy, social influence and perceived enjoyment, while effort expectancy positively influences perceived enjoyment. Thus, H1, H2, H3, H5 and H6 are all supported. In addition, facilitating conditions are found not to have an impact on continuance intention, and thus H4 is not supported.

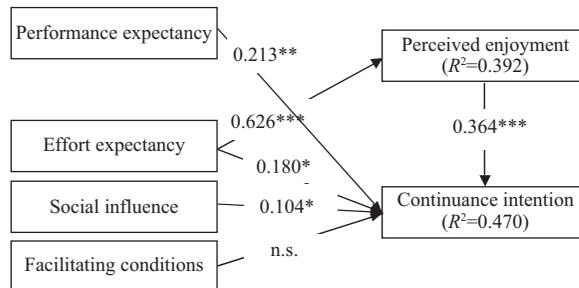


Fig. 2 The path coefficients and the corresponding levels of significance.

Note: ***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$; n.s.: not significant.

5 Discussion

This study aims to identify the factors affecting continuance intention of mobile reading from perspectives of both extrinsic and intrinsic motivation. The results show that performance expectancy, effort expectancy, social influence and perceived enjoyment all have significant impacts on continuance intention, and the effect of perceived enjoyment is the largest, followed by performance expectancy. These results are consistent with findings of Zhou^[13], Li et al.^[19], Chiu & Wang^[17], and Hong et al.^[27]. Perceived enjoyment reflects users' inner experience. When users find mobile reading interesting and enjoyable, they will continue reading on mobile devices. This indicates that service providers of mobile reading should pay attention to users' experience, and attempt to improve their enjoyable experience. For example, they can take social factors into account when promoting mobile reading, focusing on information sharing during the reading process and strengthening user interaction through such functions as adding tags, forwarding messages and making comments.

Performance expectancy reflects the perceived utility of the mobile reading system. When users find mobile reading useful for their work or learning, they intend to continue using the service. Thus, service providers of mobile reading should fully investigate user needs, and try their best to provide the needed services to satisfy users' expectations. For example, when providing service for university



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users, service providers may offer more academic resources in addition to materials for leisure reading.

Effort expectancy reflects the perceived difficulty of mobile reading. When users perceive the easiness of using the mobile reading system, they are more likely to continue reading on mobile devices. So service providers should design easily-operated and human-oriented software to familiarize users with mobile reading system operation. Moreover, they could consider providing integrated resources and offer personalized services. For example, the mobile reading platform ZAKER^① aggregates different forms of information from such sources as microblogs, blogs, papers, magazines, and Internet news, and provides personalized recommendation based on users' needs.

Social influence reflects the impacts of important others on user behavior. When deciding whether to continue to use such an emerging service as mobile reading, users are inclined to listen to those people who are important to them. This indicates that service providers could utilize the power of word-of-mouth in building users' continuance intention. For example, for student users in universities, service providers may consider the important role of teachers. They can first promote their service to teachers, and then ask them to incorporate mobile reading into their teaching process, thus influencing students' continuous use of mobile reading.

However, in contrast to our expectation, facilitating conditions have no significant effect on continuance intention. To further investigate the reasons and better interpret the result, we conducted a post-hoc analysis. We excluded perceived enjoyment from the research model and re-tested the model. The results indicate that, facilitating conditions significantly affect continuance intention ($\beta=0.149$, $p<0.05$), and the explained variance (R^2) of continuance intention is 39.4%. This suggests that the impact of perceived enjoyment on continuance intention has weakened the effect of facilitating conditions, which also highlights the vital role of perceived enjoyment in building users' continuance intention of mobile reading. Thus, service providers should focus their attention more on users' experience and feelings about mobile reading.

In addition, effort expectancy is found to have a significant impact on perceived enjoyment, which is consistent with the result of Lee et al.'s study^[33]. When users read on mobile devices with less effort, they have an enjoyable experience. Service providers should enable users to read conveniently with such ways as providing well-designed user interface and human-oriented software.



^① It is a popular mobile reading platform in China (<http://www.myzaker.com/index.html>).

6 Conclusion

The purpose of this study is to identify factors affecting continuance intention of mobile reading. On the basis of the UTAUT model, we put forward the research model by integrating perceived enjoyment. The empirical study results show that performance expectancy, effort expectancy, social influence and perceived enjoyment all significantly affect continuance intention. Among them, perceived enjoyment has the most significant impact, followed by performance expectancy. Also, effort expectancy positively influences perceived enjoyment. In addition, facilitating conditions do not significantly affect continuance intention.

When interpreting the results of this study, attention should be paid to the following limitations. First, this study only explored the effect of perceived enjoyment as an intrinsic motivation on continuance intention and did not consider other possible factors, such as satisfaction and flow^[34]. Second, this study focused on continuance intention and the data collected was cross-sectional. Further study could consider collecting longitudinal data and attempt to investigate the actual continuance behavior. Third, this study collected data from student users in one Chinese university, and did not consider working users. Further study could investigate those working users of mobile reading and compare whether the reading behavior is different between the two different groups of users.

Author contributions

C.M. Gan (ganchm3@mail.sysu.edu.cn, corresponding author) designed the study, analyzed data, wrote and revised the paper. D.Y. Xiao (killua513152965@qq.com) collected the data and conducted the initial data analysis. Both authors took an active part in questionnaire design and research question discussions.

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