Research on Degree of User Acceptance of Electronic Books on Smartphones

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ABSTRACT

Books are the vehicle for social civilization and the ladder of human progress. Due to the rapid development of computers and the Internet, electronic books (ebooks) have triggered a new round of the book revolution. With the emergence of smartphones, using mobile phones to read ebooks has become convenient, flexible, and a way to make full use of scattered bits of time. Therefore, the use of smartphones for such purposes has been pursued by young people. However, ebooks present various problems of their own, such as incompatibility with individual reading habits and the immaturity of the industrial chain. Thus, the focus of this study was to survey user behavioral models and affinity for ebooks to understand users views on and degree of acceptance of ebooks. This study used the Unified Theory of Acceptance and Use of Technology (UTAUT) to investigate the influence and predictive power of the following independent variables on usage intention and usage behavior: performance expectancy, effort expectancy, social influence, and facilitating conditions.

INTRODUCTION

For many centuries, books have been an essential and inevitable part of daily life, from childhood to adulthood. With the emergence of the Internet, the speed of information transmission has advanced in unprecedented ways, causing the rate of electronic file usage to increase rapidly.

From the 1990s, technical computation and media technology have been capable of processing and transmitting large amounts of information, adding to the vigorous development of communication networks and causing reduction in communication prices. Publishers can utilize many types of channels, such as Internet and compact discs (CDs), to disseminate information. As emergent methods of information transmission have diversified and become more convenient, the number of Internet users has also rapidly increased.

In 2007, ebooks began to take off. Amazon launched the ebook reader Kindle in 2007. Kindle does not require a computer to operate and its cash flow mechanism is relatively simple. These advantages helped Kindle to successfully catch the eye of consumers and the ebook reader was sold out in its initial sales period.

On the other hand, the mobile phone has become a necessity of modern life, presenting opportunities to boost interpersonal communication and making digital access more convenient to obtain. According to estimates of iSuppli, shipment of smartphones in 2009 could reach 192,300,000, an 11.1 % increase from 2008 and 17.4 % of the total shipment of all mobile phones.

Smartphones are a type of highly efficient mobile platform with characteristics of portability, high availability and popularity, convenient downloading from the Internet, and strong computation ability. These characteristics have caused smartphones to become a favorable option for an ebook platform, and

numerous companies are willing to invest in research and development (R&D) for smartphone ebook software.

In an environment where the mobile device and ebook industries are both growing, many businesses have begun to value the opportunities brought about by the integration of these sectors. Chunghua Telecom and the Taiwan Digital Publishing Forum have jointly announced cooperation to provide ebooks using the Chunghua Telecom platform. Although technological development is changing rapidly, mobile phones have the highest prevalence rate regarding mobile communication devices today. Among mobile phones, the growth rate of smartphones has been the most rapid, causing numerous companies to compete heatedly for entrance into the smart-phone based ebook market. Therefore, the intension and degree of user acceptance with regard to reading ebooks on smartphones is worth in-depth research and discussion.

Through discussion of research and references related to degree of technology acceptance, this study investigated, from the angle of smartphone ebooks, the views and acceptance level of users with regard to reading ebooks on smartphones. Researchers used the technology acceptance model as a theoretical basis and modified variable assignment and connotations related to usage context as appropriate, to genuinely reflect user views. Additionally, this study used empirical research methods to determine which elements attract users to use smartphones and to read ebooks, and which elements drive users to distance themselves from smartphone ebooks. The purpose was to provide recommendations to other scholars and corporations who will research and develop smartphones and ebooks in the future.

LITERATURE REVIEW

With the rapid development of science and technology in today's society, new technological products have sprung up like mushrooms. However, not every product is widely accepted and used by the general public, and much can be said similarly about ebooks. In the past 20 years, numerous theories have investigated the elements that influence decisions whether or not to use specific technological products. Such theories include the theory of reasoned action (TRA), theory of planned behavior (TPB), technology acceptance model (TAM), and Unified Theory of Acceptance and Use of Technology (UTAUT); the UTAUT was developed from review and consolidation of previous research related to degrees of technology acceptance. Therefore, this study used the UTAUT as its theoretical basis.
The UTAUT integrates the following eight models: the TRA, TPB, social cognitive theory (SCT), TAM, model of PC utilization (MPCU), motivation model (MM), innovation diffusion theory (IDT), and integrated model of TAM and TPB (C-TAM-TPB). The UTAUT also concretizes the TAM variables of perceived usefulness and perceived ease of use into four key constructs and four control variables. The four key constructs and four control variables are described below.

Performance Expectancy

With regard to using scientific and technological products, individual performance expectancy regarding use of the specific technology influences usage behavior.[8] defined expected efficacy as "significant rewards that can be obtained after using the system". Venkatesh et al. proposed that expected efficacy can be measured by perceived usefulness, extrinsic motivation, job fit, relative advantage, and output expectation. The research of Venkatesh et al. showed that male awareness of performance expectancy exceeds that of females.

Effort Expectancy

If the system cannot provide a high quality operational interface, or the user cannot easily learn the

system, such information technology will be difficult to accept and use. Venkatesh et al. (2003) indicated that effort expectancy is the "individual belief as to whether the system is easy to use". This indicates if the design of the information system facilitating usage is a key factor for accepting information technology. Elements that determine if a system is easy to use include: whether or not the functional operation is clear and easily understood, and whether or not users can easily begin using the system based on existing knowledge.Venkatesh et al. also indicated that effort expectancy can be measured by perceived ease of use, complexity, and ease of use. Additionally, Venkatesh et al. (2003) believed that individual effort expectancy regarding system usage differs according to gender and age, but that influence of these variables decreases as usage experience increases.

Social Influence

Venkatesh et al. (2003) defined social influence in this context as "the belief of others, perceived as important by the individual, regarding whether the individual should use this technological system". Venkatesh et al. (2003) believed that the relationship between social influence and intention to use is influenced by interfering variables such as gender, age, experience, and voluntary usage. Additionally, social influence significantly affects older workers. Using gender for differentiation purposes, researchers have found that female workers are easily influenced by the attitudes of high-level executives and colleagues. However, these influences occur only in the initial period of usage; after some time of usage, social influence does not significantly affect desire to use. Venkatesh et al. (2003) proposed that the following elements could be used to explain social influence: subjective norms, social factors, and image.

Facilitating Conditions

Venkatesh et al. (2003) defined facilitating conditions as "existing organization and technological framework that an individual believes can support use of the system". Facilitating conditions, therefore, indicate whether or not the organization and operating system can support use of the new information system, including hardware and software support, and explanation of the operating system[7] [8]. Experience and age are interfering elements in the relationship between facilitating conditions and behavior. In conclusion, Venkatesh et al. (2003) emphasized that in different circumstances, experience, gender, age, and user objective all influence implementation of IT into an organization. These interfering variables must be considered when appropriately modifying strategies for introducing new technology.

Seven years have passed since the development of the UTAUT, but its constructs and inter-construct relationships are complete and representative, having the strong capacity to explain individual behavioral intention and actual usage behavior. The UTAUT is the most integrated technology acceptance model today. Empirical research has shown that the ability of the UTAUT to explain technology usage behavior is higher than 70 %, which far exceeds the explanatory capacity of other models. Venkatesh et al. (2003) believed that the aim of the UTAUT is to provide managers with usage tools. According to local conditions, researchers can use the UTAUT to measure degrees of acceptance for introducing new technology, as well as predict and explain the behavior of users accepting information technology.

The main purpose of this study was to investigate user degree of acceptance of using smartphones and reading ebooks, as well as the user behavioral model regarding this information system (smartphone ebooks). Therefore, this study used the UTAUT as its theoretical basis.

RESEARCH METHODS

The aim of this research was to investigate the degree of user acceptance with regard to reading ebooks

on smartphones. This study investigated usage behavior regarding this information system; however, current studies on acceptance level of ebooks, particularly ebooks on smartphones, do not cover a wide range and are relatively few. Therefore, this study used the UTAUT with more variables involved as its theoretical basis, to make the research more complete. Figure 1 shows the UTAUT framework used by this study. The major difference with the original UTAUT research is the Voluntary Usage construct, the construct is removed due to the fact that the users read ebooks via free will, whereas the original UTAUT experiement was in a corporate or organization, therefore due to regulation or social influence, they will be compelled to use it despite they didn't want to.

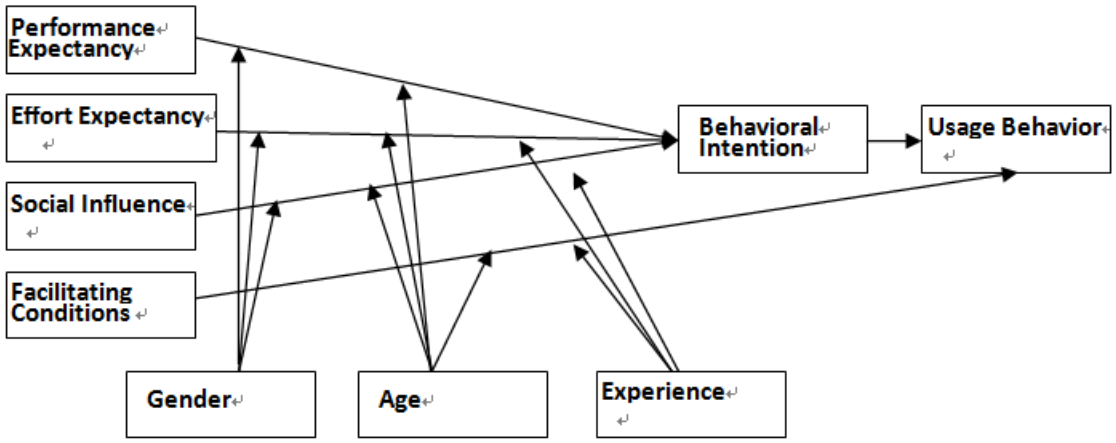

Figure 1. UTAUT Theoretical Framework Used by This Study

Sample Source and Sampling Method

Past research has indicated that usage experience can strengthen degree of acceptance of smart devices and effectively moderate anxiety and usage difficulty with regard to smart devices[4] [5]. To avoid problems with using mobile phones causing error in feelings about using smartphones to read ebooks, this study selected those who had already begun using smartphones as questionnaire distribution targets. Regarding sample selection, this study focused on people who had used smartphones to read ebooks. The questionnaires were disseminated through the Internet, mainly on bulletin board systems (BBS, Ptt) where young people gather and professional mobile phone forums (Sogi, mobile01), thereby taking both regular young people and smartphone enthusiasts into account. Researchers hoped that through coming into contact with these two groups, the sampling would produce appropriate target subjects for this study.

Reliability and Validity Analysis

For the "performance expectancy" scale, the overall Cronbach's value was 0.724, which met test criteria. The overall Cronbach's of "effort expectancy" scale was 0.844, indicating more favorable reliability. The scale for "social influence" also showed favorable reliability, with a Cronbach's value of 0.805. The scale for "facilitating conditions" showed an overall Cronbach's value of 0.608, meeting test criteria. These results showed that the reliability of the scales used in this study was in an acceptable range.

Regarding content validity, the scale used for the questionnaire in this study was mainly based on items compiled from the UTAUT model of Venkatesh et al. (2003). Therefore, this study have less problems related to content validity.

Regarding construct validity, factor analysis showed that the KMO value of the performance expectancy scale was .624>.5; the KMO value of the effort expectancy scale was .777>.5; the KMO value of the social influence scale was .753>.5, and the KMO value of the facilitating conditions scale was .567>.5. These scales were all suitable for factor analysis and the load of each factor was between 1.16 and 2.86,

showing higher levels of explained variance. These results show that the scales used in this study had a certain degree of construct validity.

REGRESSION ANALYSIS

In Regression Analysis, we did Regression on Behavioral Intention and Usage Behavior, both in two Model, Model one with the main constructs, and Model two which add in all the Interactions between the main constructs and all moderators. In the regression analysis, we found that three main construct: Performance Expectancy, Effort Expectancy, Facilitating Conditions had significant influence to user behavior. Gender had moderating effect in Performance Expectancy and Social Influence , whereas Age had moderating effect to Effort Expectancy and Social Influence, Experience had no moderating effect to any construct. The Revised Framework is as below

Table1&2, The influence of various factors on Behavioral Intention and Usage Behavior

As To Behavioral Intention	Model1	Model2
Performance Expectancy	.373***	1.425***
Effort Expectancy	.442***	-.621*
Social Influence	9.438×10^{-5}	-.043
Performance Expectancy×Gender		-.447*
Effort Expectancy×Gender		.086
Social Influence×Gender		.385*
Performance Expectancy×Age		-.184
Effort Expectancy×Age		.410***
Social Influence×Age		-.259*
Effort Expectancy×Experience		-.024
Social Influence×Experience		.054
R square	.449	.522
Adj R square	.442	.498

As To Usage Behavior	Model1	Model2
Behavioral Intention	.783***	.642***
Facilitating Conditions		.291**
Facilitating Conditions×Age		.012
Facilitating Conditions×xperience		.002
R square	.497	.527
Adj R square	.495	.519

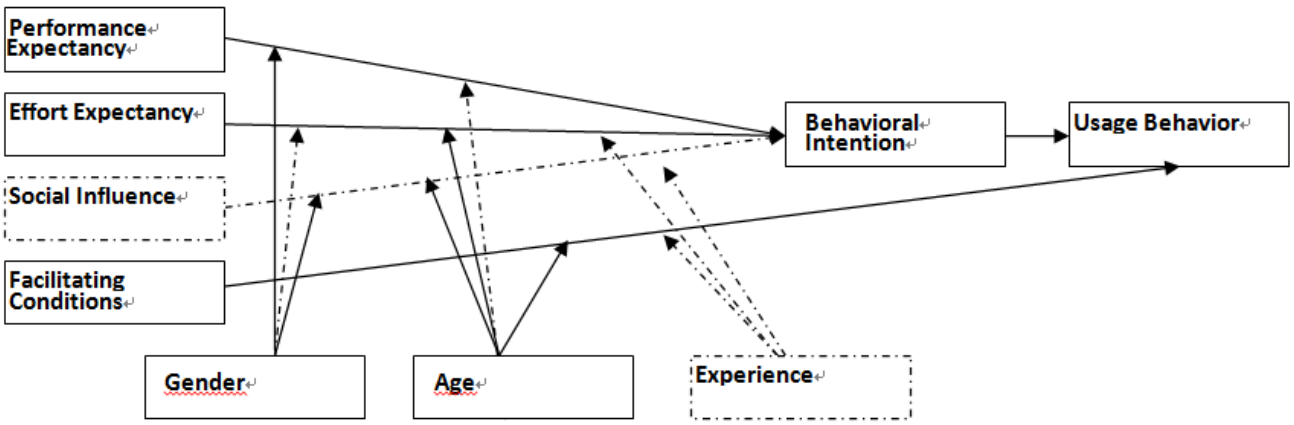

Figure 2, Revised Research Framework

(The factors that are not significant is presented in dotted line)

CONCLUSION AND RECOMMENDATIONS

The result of this research is very intriguing, we found that users value the performance and value provided by an ebook on smartphone; the less effort to use will drive them toward using the system; facilitating support is also a plus for increasing user adaption. But we also found Social influence construct and the moderator Experience is not significant to user behavior.

The implication of this result implies that users are not significantly influenced by social influence like others opinion, this may have be the result of the growing popularity of smartphones in general public. Smartphones, once only been held by businessman and tech people, is becoming a de facto standard of mobile phones, as a result of widespread adaption, carrying an smartphone and read ebooks on it no longer requires an social reason, but perhaps is more about the value gained by reading ebooks via smartphone.

Another interesting finding is Experience has no or minor impact on the user behavior, this maybe indicating that the use of ebook on smartphone doesn't necessary derive from past habit of using ebooks, but perhaps the value provide by reading ebooks on smartphone is the pulling factor on the adaption of ebooks on smartphones.

In conclusion, we will recommend ebook developers focus on making better performing ebooks, which are enhanced with more features and more efficiency, at the same time lower the learning curve of the ebook system on smartphones. Furthermore, developers should customize ebooks for different ages and genders to maximize adaption .

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