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63. User Acceptance of E-Government Services

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Abstract

In order to provide more accessible, accurate, real-time information for citizens, government E-services, such as information kiosks, have been set up in many public places. Although the public sector has promoted this E-Government service for many years, its uses and achievements are few. Therefore, this paper explores the key factors of user acceptance through a research survey and by gathering empirical evidence based on the Unified Theory of Acceptance and the Use of Technology (UTAUT).

Data collected from 244 respondents was tested against the research model. The results lead us to make several recommendations for the public sector and policy-makers to use as guidelines for the future development of this service.

Keywords: kiosk systems, Government information systems, UTAUT, E-Government service, information kiosks

1. Introduction

This study investigates the determinants of kiosk usage intentions from the viewpoint of users, based on the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), Social Cognitive Theory, and Innovation Diffusion Theory. We determine the key factors that influence the usage of kiosks by the public, and provide several recommendations for the future development of the service.

Information kiosks are Internet-wired information systems that incorporate such functions as ticket selling, online shopping, and online payment of credit cards via ATMs (Automated Teller Machines). Customers can access real-time information and complete business transactions, including online shopping, tax filing and payments, booking tickets in advance, and downloading digital music, a software package, a film synopsis, or a movie advertisement. Kiosks provide text-based information with multimedia formatted animation, video, stills, graphics, diagrams, audio and text. Users can access text and multimedia information interactively via a touch screen monitor. Three of the most popular types of kiosk are information dissemination and advertising kiosks, interactive information kiosks, and online transaction kiosks.

1) Information dissemination and advertising kiosks usually provide real-time information, merchandise, and service advertisements for travelers at travel service centers, popular tourist spots, airports, metros and so on.

2) Interactive information kiosks enable users to collect and access information automatically in places like airports, shopping malls, mass-retail stores, and convention centers. People can input some personal data to retrieve information they need by using a touch screen or a wired

keyboard. The information available includes metro transportation schedules, weather forecasts, and route maps if the kiosk supports a printing service.

3) Online transaction kiosks are usually advanced systems because they facilitate more complicated transactions and information exchange. After a kiosk authenticates and identifies a user through the input of a password, the user can complete transactions, such as booking a ticket by credit card or by paying cash. Therefore, online transaction kiosks raise serious security and privacy issues.

This study investigates the determinants of users' kiosk system usage intentions and explores the determinants of user behavior based on the Unified Theory of Acceptance and Use of Technology (UTAUT).

The remainder of this paper is organized as follows. In the next section, we review UTAUT and use it as a theoretical framework for this study. It is followed by descriptions of the research model and method. We then present the results of the data analysis and hypotheses testing. Finally, we discuss the managerial implications of the results and future research directions.

2. Theoretical Background

Kiosk usage acceptance is of particular interest to this current study since it represents a fundamental challenge to the implementation and management of kiosk systems. A review of prior studies provides a theoretical foundation for our hypotheses. Based on eight well-known models in the field of IT acceptance research, Venkatesh et al. (2003) proposed a unified model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), which integrates elements across the eight models. The eight models are: the Theory of Reasoned Action (TRA)(Fishbein and Ajzen 1975), the Technology Acceptance Model (TAM)(Davis 1989), the Motivational Model (MM)(Davis et al. 1992), the Theory of Planned Behavior (TPB) (Ajzen 1991), the Combined TAM and TPB (C-TAM-TPB) (Taylor and Todd 1995a ; Taylor and Todd 1995b) , the Model of PC Utilization (MPCU) (Thompson et al. 1991; Triandis 1977), the Innovation Diffusion Theory (IDT) (Moore and Benbasat 1991; Rogers 1995), and the Social Cognitive Theory (SCT) (Bandura 1986; Compeau and Higgins 1995). Based on Venkatesh et al.'s (2003) study, we briefly review the core constructs in each of the eight models, which have been theorized as the determinants of IT usage intention and/or behavior.

1) TRA (Fishbein and Ajzen 1975) is considered to be one of the most fundamental and influential theories of human behavior. Attitudes toward behavior and subjective norm are the two core constructs in TRA.

2) TAM (Davis 1989) was originally developed to predict IT acceptance and usage on the job, and has been extensively applied to various types of technologies and users. Perceived usefulness and perceived ease of use are the two main constructs in TAM. More recently, Venkatesh and Davis (2000) presented TAM2 by adding subjective norm to TAM in the case of mandatory settings.

3) Davis et al. (1992) employed motivation theory to understand the acceptance and usage of new technologies. The primary constructs of motivation theory are extrinsic motivation and intrinsic motivation.

4) TPB (Ajzen 1991) extended TRA (Fishbein and Ajzen 1975) by including the construct of perceived behavioral control, and has been successfully applied to the understanding of individual acceptance and the usage of various technologies (Harrison et al. 1997; Mathieson 1991; Taylor and Todd 1995b).

5) C-TAM-TPB (Taylor and Todd 1995a; Taylor and Todd 1995b) is a hybrid model combining the predictors of TPB with perceived usefulness from TAM.

6) Based on Triandis' (1977) theory of human behavior, Thompson et al. (1991) presented the MPCU and used this model to predict PC utilization. MPCU consists of six constructs: job-fit, complexity, long-term consequences, affect towards use, social factors, and facilitating conditions.

7) Moore and Benbasat (1995) adapted the properties of innovations posited by IDT and refined a set of constructs that could be used to explore individual technology acceptance. The constructs are: relative advantage, ease of use, image, visibility, compatibility, results demonstrability, voluntariness of use.

8) Compeau and Higgins (1995) applied and extended SCT to the context of computer utilization (see also Compeau et al. 1999). Their model consists of five core constructs: outcome expectations–performance, outcome expectations–personal, self-efficacy, affect, and anxiety.

Venkatesh et al. (2003) conducted an empirical study to compare the eight competing models, and then proposed a unified model called UTAUT, which contains four core determinants of intention and usage, and up to four moderators of key relationships. UTAUT posits that performance expectancy, effort expectancy, social influence, and facilitating conditions are the determinants of behavioral intention or use behavior; and that gender, age, experience, and voluntariness of use have moderating effects on the acceptance of IT. Sun and Zhang (2006) also suggest that it is necessary to examine the potential moderating effects of user technology acceptance.

3. Research Model and Hypotheses

In e-government services, people use kiosk systems to surf for and access information about activities, making the information kiosk system an IT phenomenon that lends itself to the UTAUT model. Venkatesh et al. (2003) provided empirical evidence to demonstrate that IT use behavior can be explained by UTAUT, and encouraged other researchers to continue revalidating and testing their model. The UTAUT model can also be applied to the challenges of implementing an information kiosk system. Accordingly, we adopt Venkatesh et al.'s UTAUT (2003) as a primary theoretical framework to examine users' acceptance of information kiosks.

However, since the information kiosk context departs from the traditional IT context, UTAUT's fundamental constructs do not fully reflect the specific influences of information kiosks context factors that may alter user acceptance. In fact, few people have actually used information kiosks since kiosk systems are still in their infancy. For this reason, the constructs in UTAUT, user behavior, gender, age and experience, were not considered in this study. We investigated the acceptance of information kiosks in a quasi-voluntary setting without the mandatory demand for the study of user acceptance of kiosks; thus, the moderator of voluntary use in UTAUT was not considered either.

Fig. 1 shows the research model tested in this study. In the model, performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) were hypothesized to be the determinants of behavioral intention (BI) to use information kiosks. The proposed constructs and hypotheses are supported by the literature. In the following sections, we elaborate on the theory base and derive the hypotheses.

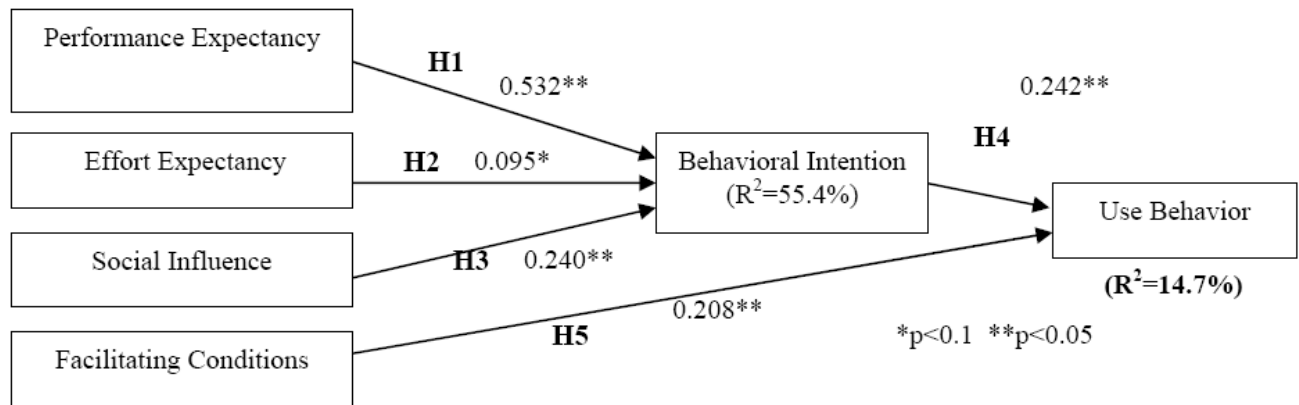


Figure 1. The research model tested in this study.

3.1 Performance Expectancy

Venkatesh et al. (2003) define performance expectancy as the extent to which an individual believes that using an information system will help him/her improve job performance. They also suggest the following five constructs, taken from the eight models they studied, capture the concept of performance expectancy: perceived usefulness (TAM/TAM2 and C-TAM-TAB), extrinsic motivation (MM), job-fit (MPCU), relative advantage (IDT), and outcome expectations (SCT). In addition, Venkatesh et al. (2003) have demonstrated that performance expectancy is the strongest predictor of behavioral intention to use IT. Adapting performance expectancy to an information kiosk context suggests that users think an information kiosks system is useful because it enables them to surf for information and perform other tasks quickly and flexibly, or access services effectively. Thus, we put forward the following hypothesis:

Hypothesis. 1. Performance expectancy has a positive effect on behavioral intention to use information kiosks.

3.2 Effort Expectancy

Effort expectancy is defined as the degree of ease users feel with respect to the use of an information system (Venkatesh et al. 2003). The three constructs that relate to effort expectancy are perceived ease of use (TAM/TAM2), complexity (MPCU), and ease of use (IDT) (Venkatesh et al. 2003). Based on UTAUT, we believe individual acceptance of information kiosks depends on whether the information kiosks system is easy to use. Thus, we posit the following hypothesis:

Hypothesis. 2. Effort expectancy has a positive effect on behavioral intention to use information kiosks.

3.3 Social Influence

Social influence is defined as the extent to which a person perceives that significant others believe he or she should use a new information system (Venkatesh et al. 2003). Three constructs capture the concept of social influence, namely, subjective norm (TRA, TAM2, TPB and C-TAM-TPB), social factors (MPCU), and image (IDT) (Venkatesh et al. 2003). Prior studies suggest that social influence is significant in shaping an individual's intention to use new technology (Venkatesh and Davis 2000; Harrison et al. 1997; Moore and Benbasat 1995; Mathieson 1991; Thompson et al. 1991). Based on UTAUT, we consider that social influence is a significant determinant of behavioral intention to use information kiosks. Therefore, we test the following hypothesis:

Hypothesis. 3. Social influence has a positive effect on behavioral intention to use information kiosks.

3.4 Behavioral intention

Behavioral intentions relate to the way(s) individuals intend to use information kiosks. In the UTAUT model, three factors affect a user's behavioral intentions: Performance Expectancy, Effort Expectancy, and Social Influence. The main concept of this model (see Figure 1) is that the three factors affect behavioral intentions, which in turn influence behavior with facilitating conditions.

Therefore, we propose the following hypothesis:

Hypothesis. 4. Behavioral intentions have a positive effect on users' behavior when they use information kiosks.

3.5 Facilitating conditions

Thompson et al (1991) stated that providing support for PC users may be one type of facilitating condition that influences system utilization. By training users and assisting them when they encounter difficulties, some of the potential barriers to use can be alleviated or eliminated.

According to Taylor and Todd (1995b), an individual's perceived facilitating resources, including time and money, will influence his/her perception of control over the application of information technologies. Facilitating conditions are defined as "the support that individuals believe an organization or a technological infrastructure can provide or the usage of a new system" (Taylor and Todd 1995b).

Thus, we consider the following hypothesis:

Hypothesis. 5. Facilitating conditions have a positive effect on behavioral intention to use information kiosks.

4. Research Methodology

4.1 Subjects

The data used to test the research model was gathered from (1) questionnaires returned by users at kiosks; and (2) questionnaires returned from web pages on the Internet. To ensure that users clearly understood objectives of the research survey, the concepts, functions, and characteristics of kiosk systems were explained before completion of the survey.

The period of research was from Jan. 24, 2006 to March 05, 2006. A sample of 233 usable responses was obtained from a total of 244 responses from kiosk-users with different types

and levels of kiosk experience. The total validity rate of responses was 96.3% (including hard-copy and web questionnaires). There were 168 hard-copy respondents, of which 160 were effective respondents. The effective rate of hard-copy respondents was 95.2%. There were 74 web-page respondents, of which 73 were effective respondents. The effective rate of web-page respondents was 98.6%. According to the survey results for usage experience of public information kiosks, only 27.5% of respondents had used information kiosks previously; thus, none of the 72.5% of respondents had ever used information kiosks.

4.2 Measures

To ensure the content validity of a scale, the items selected must represent the concept about which generalizations are to be made. Therefore, validated instruments adapted from prior studies were used to measure performance expectancy, effort expectancy, social influence, perceived playfulness, and behavioral intention. The items used to measure performance expectancy, effort expectancy, social influence, facilitating conditions, and behavioral intention were adapted from Venkatesh et al. (2003). The items for the behavioral intention and user behavior constructs were adapted from Moon and Kim (2001). We use the items to each construct. All the items have been modified to make them relevant to the information kiosk context.

Pre-testing of the measures was conducted by selected kiosk users as well as by experts in the area of kiosk research. Accordingly, the items were further adjusted to ensure that their wording was precise as possible. Likert scales (1~7), with anchors ranging from “strongly disagree” to “strongly agree,” were used for all construct items. The questionnaire also contained demographic questions.

5. Data Analysis and Results

This study processes the regression model with SPSS. The results of the analysis are shown in Figure.1. Hypothesis H1, H2, and H3 test the effect of performance expectancy on behavioral intention to use information kiosks, the effect of effort expectancy on behavioral intention to use information kiosks, and the effect of social influence on behavioral intention to use information kiosks, respectively. Our findings support these three hypotheses H1, H2, and H3. As expected, performance expectancy and social influence were found to be stronger predictors of behavioral intention.

According to our results, Performance expectancy was found to be the strongest predictor of behavioral intention ($\beta=0.532$, $t\text{-value}=9.161$, $p<0.05$), and social influence positively influenced behavioral intention ($\beta=0.240$, $t\text{-value}=4.408$, $p<0.05$). Effort expectancy was found to have the partial significant effect on behavioral intention ($\beta=0.095$, $t\text{-value}=1.938$, $p<0.1$).

Hypothesis H4 and H5 test the effect of behavioral intentions on users' behavior when using information kiosks, and the effect of facilitating conditions on users' behavior of information kiosks, respectively. Facilitating conditions and behavioral intentions both have a positive effect on behavioral intention to use information kiosks ($\beta=0.208$, $t\text{-value}=3.571$, $p<0.05$ and $\beta=0.242$, $t\text{-value}=3.067$, $p<0.05$, respectively).

6. Discussion and Implications

Based on UTAUT and prior studies, we propose a revised UTAUT model that explores the factors affecting users' acceptance of kiosk systems. This is a pioneering effort that applies UTAUT to the emerging phenomenon of kiosk systems. The results indicate that

performance expectancy, effort expectancy, social influence, and facilitating conditions are all significant determinants of behavioral intention to use kiosk systems. Our findings support the appropriateness of using the revised UTAUT model to understand users' intentions in relation to information kiosks. The results have several important implications for information kiosk research and practices.

Consistent with Venkatesh et al. (2003), the four constructs (i.e., performance expectancy, effort expectancy, facilitating conditions, and social influence) derived from UTAUT have a significant positive influence on behavioral intentions to use information kiosks. First, the results show that performance expectancy is the strongest predictor of users' intentions to use information kiosks. Therefore, we believe that an individual with high performance expectancy is more likely to use information kiosks than an individual with low performance expectancy.

To promote the use of information kiosks, designers should focus on the development of useful functions and information content required by potential users. Second, the results indicate that effort expectancy has a significant influence on individual intention to use information kiosks, which means that the majority of users think information kiosks systems should be easy to use. These might make it difficult for users to understand how to use information kiosks systems. Thus, to attract more users, providers should make information kiosks more user-friendly. Third, we found that social influence has a significant effect on users' intentions in relation to information kiosks. Thus, providers should be aware of the importance of social influences.

7. Conclusion and LIMITATION

This research validates the applicability of the UTAUT model to different contexts of IT. We revised and extended the theory to explain and predict user intentions in relation to information kiosks.

The results support our belief that the revised UTAUT model can be generalized to the information kiosks context. The validated model provides a useful framework for practitioners to assess the possibility of successful implementation of information kiosk systems. Furthermore, it contributes to the understanding of the determinants of acceptance so that kiosk-providers can pro-actively design programs that target potential users.

Even though a rigorous research procedure was used, our work has some limitations that will be addressed in future studies. First, investigation of information kiosk acceptance is a relatively new endeavor for governments and IT researchers. The findings and the implications discussed in this work are based on a single study that examined a particular technology and targeted a specific user group in Taiwan. Thus, cross-cultural validation using another larger sample gathered elsewhere is required in order to further validate our findings. Second, we did not incorporate actual usage behavior into the proposed model.

However, this is not a serious limitation, as there is substantial empirical support for the causal link between intention and behavior (Venkatesh and Davis 2000; Venkatesh and Morris 2000). Third, the relatively low R-square reported by the current research represents another limitation. Hence, it may be necessary to identify additional variables that would improve our ability to predict usage intentions more accurately. Finally, the study was conducted with a snapshot research approach. Additional research efforts are needed to evaluate the validity of the investigated models and our findings. Longitudinal evidence

might enhance our understanding of the causality of the variables and their interrelationships, which are important to the acceptance of information kiosks by the public.

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