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Factors driving the adoption of m-learning: An empirical study

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ABSTRACT

Even if m-learning is spreading rapidly in many regions of the world, research addressing the driving factors of m-learning adoption is in short supply. Built on the Technology Acceptance Model, this paper proposes a hypothesized model of m-learning adoption. Employing structural equation modeling technology, the model was assessed based on the data collected from 230 participants using a survey questionnaire. Results indicate that perceived near-term/long-term usefulness and personal innovativeness have significant influence on m-learning adoption intention, while perceived long-term usefulness significantly affects the perceived near-term usefulness. Personal innovativeness is a predictor of both the perceived ease of use and perceived long-term usefulness as well. Of all variables, the perceived long-term usefulness contributes to the most influential predictor of m-learning adoption. The model accounts for approximately 60.8% of the variance of behavioural intention. The results indicted that offing high-quality contents complying with students' future targets is key to the success of m-learning in China. Both theoretical and practical implications are discussed.

1. Introduction

The tipping point for the m-learning industry has probably been reached (Adkins, 2008). Despite the current economic recession, the m-learning industry is growing rapidly in many regions of the world, typically so in the US and China. According to a report from Ambient Insight (Adkins, 2008), the m-learning market in the US reached $538 million in 2007, and it will continue to develop at a five-year compound annual growth rate (CAGR) of 21.7%. In China, offering m-learning services appears to be a new marketing strategy for mobile manufacturers to attract customers and to generate new revenue. Currently, m-learning is increasingly used in museums, workplaces and classrooms for learners inside or outside the formal education systems, such as dropouts and the unemployed, enabling a wide spectrum of educational possibilities (e.g. Attewell, 2005).

Despite the fast development of the m-learning industry, there is a lack of understanding on the factors driving m-learning adoption. Note that, other than educational institutions, business communities, such as Nokia, start to play a central role in offering m-learning devices and services in many regions, such as in China. This is expected to bring some new features to m-learning industry development in China. In this context, a survey was conducted of undergraduate students in a Chinese university to investigate learners' intention to use m-learning. In the paper, an adoption model for m-learning was proposed and then evaluated, which adds two additional ingredients to the Technology Acceptance Model (TAM)—perceived long-term usefulness and personal innovativeness.

An important theoretical undertaking endeavour of the present paper is to validate TAM in the contexts of m-learning. TAM is one of the most widely used theories in studying the adoption of IT innovations and new information systems (Davis, 1989). However, studies show that TAM excels regarding productivity-oriented (or utilitarian) systems, but the motivators to system usage may vary greatly depending on the nature of system use (van der Heijden, 2004). For instance, when TAM is applied to the adoption of pleasure-oriented (or hedonic) systems, perceived usefulness is found to lose its dominant predictive power in favour of perceived enjoyment (van der Heijden, 2004). Similarly, in the context of knowledge-acquisition-oriented (or educational) systems, there is some concern as to whether the structure of TAM would remain robust.

As a result the paper sought to answer two key research questions. (i) Given that mobile manufacturers are leading m-learning development in China, what are the key factors motivating students' intention to use m-learning? (ii) Will TAM remain robust in the context

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of m-learning in comparison with two additional structures? An investigation into the two research questions in the current study would help to identify the most influential factor of m-learning adoption, and probably of educational information systems adoption.

This paper is organized as follows. In the next section, we briefly introduce the m-learning development in China and its potentials and challenges faced. Then, theoretical background and the research model are presented, which is followed by a detailed report on the results of the study. Thereafter, results are discussed with a number of implications and conclusions. Finally, limitations of this study and implications for future studies are discussed as well.

2. Related research

2.1. M-learning in China

Since 2005, the ideas and concepts of m-learning started to become popular in China, in which mobile manufacturers played a central role in offering m-learning products and services. At the end of 2005, Bird Corp (a domestic mobile manufacturer) launched a marketing campaign with a theme of 'learning in mobiles' for selling its new mobile phones with powerful English learning functions. Well-known material for English study was included in Bird's mobile phone and more learning material could be downloaded to a memory card from its cooperating partner (www/wap.englishto.com). After a successful initiation of the m-learning concept in 2005 and 2006, nearly all mobile manufacturers, including Nokia, Amoi, Lenovo, LG, OKWAP and GIGANYTE, to some extent, started to offer m-learning products and services. For instance, in September 2007, Nokia officially announced its cooperation with the BBC in the m-learning field. A number of well-known BBC English teaching modules were then included in Nokia's new mobile English Language Teaching (ELT) platform (www/wap.mobiledu.cn), including Real English, Take Away English, Quizzes and other BBC classic courses. Today, a wide spectrum of m-learning courses in management, golf, cooking, Yoga, health preserving, etc. are available from the platform as well. Some of these sophisticated courses are sold with a price of 2 RMB (approximately .3 USD) per course, which gives a new source of revenue. M-learning platform tends to be a built-in function for a wide spectrum of mobile phones. For instance, Nokia m-learning platform is embedded in most of recent Nokia phones. English to m-learning platform is embedded in a number of domestic mobile phones in China as well. In basic education, a series of new handheld digital learning devices has been developed especially for m-learning use by companies such as Noah Ltd. According to the prediction of the China Market Intelligence Center (CMIC), 7 million portable electronic learning products will be sold in the Chinese market in 2010 (CMIC, 2009). Along with this, a variety of advertisements were launched in various media to persuade customers to purchase m-learning devices in 2007 and 2008, particularly by influential TV channels.

2.2. Potentials and challenges faced

M-learning can be defined as 'the acquisition of any knowledge and skills through the use of mobile technology, anywhere, and anytime' (Geddes, 2004, p. 1). It is ushering us into a new era of training and education. For companies, mobile learning helps reduce the traditional training infrastructure, facilitates the learning process of employees and improves their productivity and effectiveness whilst on the move (e.g. Grohmann, Hofer, & Martin, 2005; Donnelly, 2009). On campus, mobile learning provides a useful mechanism to enrich students' learning experience. It facilitates the collaboration and informal interaction between peer students, which is helpful in building social capital and in motivating disengaged or at-risk students (Naismith, Peter, Giasemi, & Sharples, 2004; Sharma & Kitchens, 2004). It adds a new dimension for student–instructor interaction and a positive attitude among the students towards the instructor and learning (Vogel, Kennedy, Kuan, Kwok, & Lai, 2007; Pei-Luen, Gao, & Li-Mei, 2006; Grohmann et al., 2005). In addition, m-learning contributes to improving the accessibility, interoperability and reusability of educational resources, and to enhancing interactivity and flexibility of learning at convenient times and places (Murphy, 2006). It extends learning opportunities to all social-economic levels, in particular those previously unreachable from traditional education approaches, such as school dropouts (Attewell, 2005). As Naismith et al. pointed out, m-learning would enable a sort of 'highly situated, personal, collaborative and long-term (learning); in other words, truly learner-centered learning' (Naismith et al., 2004, p. 36). In a similar way, Sharma and Kitchens (2004) suggested that the advent and subsequent development of mobile learning indicates a profound evolution from distance learning (d-learning) to electronic learning (e-learning) and then on to m-learning.

In spite of tremendous potential, there are a number of challenges to the adoption of m-learning. The studies of Attewell (2005) and Attewell and Savill-Smith (2003) showed that an important proportion of the learners did not show any preference for future use of m-learning at the end of the projects. A survey conducted by Corbeil and Valdes-Corbeil (2007) indicated that many students and education programmes are still not ready for m-learning in spite of their familiarity with advanced mobile technologies. This is in line with the findings of a series of large consumers studies (with a random sample of 1000 consumers and a response rate of around 50%) of the use of mobile services annually carried out in Finland in 2002–2008 (cf. Bouwman, Carlsson, Molina-Castillo, & Walden, 2007, Bouwman, Carlsson, & Walden, 2008). These studies show that consumers – as a general rule – do not use the technological features of advanced mobile phones but are satisfied with the traditional voice and SMS services. As a kind of new advanced mobile service, there is, therefore, a need to find out the factors driving m-learning adoption.

3. Theoretical background and the research model

3.1. TAM

Among all the adoption theories, TAM enjoys an excellent reputation with regard to its robustness, parsimony and explanatory power (Davis, 1989). TAM is rooted in the social psychology theory of reasoned action (TRA) (Ajzen & Fishbein, 1980). TRA postulates that beliefs affect attitude, which influences intention, while intention in turn brings about behaviours. TAM adopts this belief-attitude-intention-behaviour relationship and posits that users' IT acceptance is a function of two cognitive beliefs: perceived ease of use and perceived usefulness (Davis, 1989). Perceived ease of use refers to the degree to which a user believes that using a particular service would be free of effort. Perceived usefulness is defined as the degree to which an individual perceives that using a particular system would enhance his or her