A THEORY-DRIVEN FRAMEWORK FOR CONSUMERS TO ADOPT M-COMMERCE DEVICES

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Abstract: M-commerce (mobile commerce) is the buying and selling of goods and services through wireless handheld electronic devices such as portable personal computers, mobile phones and personal digital assistants. This paper proposes a theory-driven examination of the adoption of M-commerce devices (MCD) by consumers in their on-line purchase processes. By integrating the concepts of the options model with the major ideas of the technology acceptance model (TAM), we identify four M's (merits, maturity, maneuverability and mentality) as the influencing factors of the adoption of MCD. Based on the generic attributes of m-commerce, we further identify two M's, matching and mobility, as the antecedents of these influencing factors. We then propose a conceptual model of the adoption of MCD by consumers. Because of the ubiquitous nature of m-commerce, the proposed framework would have universal implications and would make significant contributions to a more in-depth understanding of the spread and acceptability of m-commerce.

1 INTRODUCTION

It is estimated that by 2007, the total number of the Internet users in the world will be over 1.4 billion and the percentage of wireless users is projected to take up about 57% of the vast number (Magura, 2003). Most people anticipate that the next-generation commerce will emerge from traditional commerce, to PC-based e-commerce, and eventually to mobile commerce (Chircu & Kauffman, 2000; Ellis-Chadwick et al., 2000, Miller, 2002). M-commerce (mobile commerce) is the buying and selling of goods and services through wireless handheld devices such as mobile phone and personal digital assistants. It is an extension, rather than a complete replacement, of PC-based e-commerce (electronic commerce) and allows users to interact with other users or businesses in a wireless mode, anytime and anywhere (Balasubramanian et al, 2002; Samuelsson & Dholakia, 2003). It is very likely that PC-based e-commerce will still prevail for a relatively long period of time in spite of the trend that more and more people will choose to adopt m-commerce for their purchases (Miller, 2002).

As content delivery over mobile devices becomes faster, more secure, and efficient, there is wide speculation that m-commerce will surpass PC-based e-commerce as the preferred method of choice for digital commerce transactions. The industries and services affected by m-commerce will include: 1) information services, which include the delivery of financial news, sports, horse racing and traffic updates to users; 2) financial services, which includes e-banking (when customers use their handheld devices to access their accounts and pay their bills) as well as brokerage and investment services, in which stock quotes can be displayed and trading conducted from mobile devices; 3) telecommunications, in which service charges, bill payment and account reviews can all be conducted from mobile devices; and 4) retail consumers are given the ability and opportunity to place orders and pay through mobile devices.

The emerging technologies behind m-commerce is based on the Wireless Application Protocol (WAP) and high speed wireless network such as 3G, 3.5G and 4G (Cowles, Kiecker, & Little, 2002; Watson et al., 2002). These technologies enable users to download video/audio information seamlessly. The focus of this research framework is on the consumers' adoption of m-commerce devices (MCD), which are equipment and technologies that facilitate users to make use of m-commerce. MCD

include mobile phones, Personal Digital Assistants (PDA), portable computer notebooks, Bluetooth, WAP and other facilities that can have access to the wireless networks. Because of the need of the standardization of the application, interface and inter-connectivity of all hardware and software, it is relevant to the adoption and usage of MCD (Dholakia and Rash 2004; Buellingen and Woerter 2004). We expect that the heading towards a world of mobile networks and wireless devices, which will present a new perspective of time and space, is definitely on its way.

1.1 Objectives

Several basic questions about MCD will be addressed in this study. First, why should consumers adopt MCD? What are the influencing factors for consideration? Second, how do the MCD compare with the devices for other types of commerce such as e-commerce? Consumers will only adopt MCD when there are some potential significant advantages when comparing to old devices for other types of commerce. There is still a lack of comprehensive frameworks within which the adoption of MCD can be evaluated. Traditional viewpoints regarding this issue, especially those that are based on technology acceptance models, will need to be revisited and revised when consumers are considering such an adoption.

In this proposed research, we intend to integrate the major ideas of the technology acceptance models (both TAM and TAM2) and the options model as our basic framework for studying m-commerce. Very little research has ever been done along this direction. We can contribute to the literature by exploring and identifying the various options, or independent variables, that will affect the decision of buyers to adopt new technologies related to m-commerce. The research framework will be of interest to marketers in m-commerce and also to academics in the fields of marketing and IT. Both are keen to determine how they can perform further relevant research and position themselves well in the next generation of m-commerce. Our proposed framework will have both theoretical and practical implications through knowing why and how relevant MCD are adopted for m-commerce.

2 M-COMMERCE DEVICE ACCEPTANCE

The emergence of m-commerce requires relevant new technologies and attracts some current studies on its adoption (Xu and Gutierrez, 2006; Dholakia and Dholakia 2004; Bruner and Kumar, 2005; Okazaki, 2005; Harris et al., 2005). Empirical observation suggests that there is typically a substantial lag between the discovery of a new technology and its adoption (Doraszelski, 2004). The theories on the diffusion of innovation can be traced back to Everett Rogers (1962). Since then, many authors have worked further on this theory, but the core remained the same: when a new product/new technology is introduced, the target market can be divided into five segments along an axis of risk aversion: in the beginning there are the innovators, followed by the early adopters, the early majority, the late majority and the risk-allergic laggards. This proposed framework is not on the diffusion process but primarily on the intention to adopt new m-commerce technologies by early adopters.

Literature on the delayed acceptance of technology has stressed primarily on the benefits and use of new technologies (Davis et al., 1989), comparison between old and new technologies (Sheasley, 2000), role of sunk costs in existing technology (Salter, 1966) or in complementary technologies (Frankel, 1955). There are some models that associate diffusion lags of new technologies with the reduction of complementary costs such as specific human capital (Chari and Hopenhayn, 1990), learning-by-doing (Parente, 1994; Jovanovic & Lach, 1989), and search costs (Jovanovic & MacDonald, 1994). Other behavior-based models, such as the information cascades theory on the acceptance of new technology, suggests that an individual who adopts new technologies may do so based on the actions of others and contrary to his or her private preferences (Bikhchandi et al. 1992).

2.1 Why TAM and Options Model are used Together

In line with mainstream literature, we acknowledge that TAM will be our primary research framework. The technology acceptance model (TAM) is an information systems theory that models how users come to accept and use a new technology, with reference to two major considerations, perceived usefulness and perceived ease of use (Bagozzi et al.,
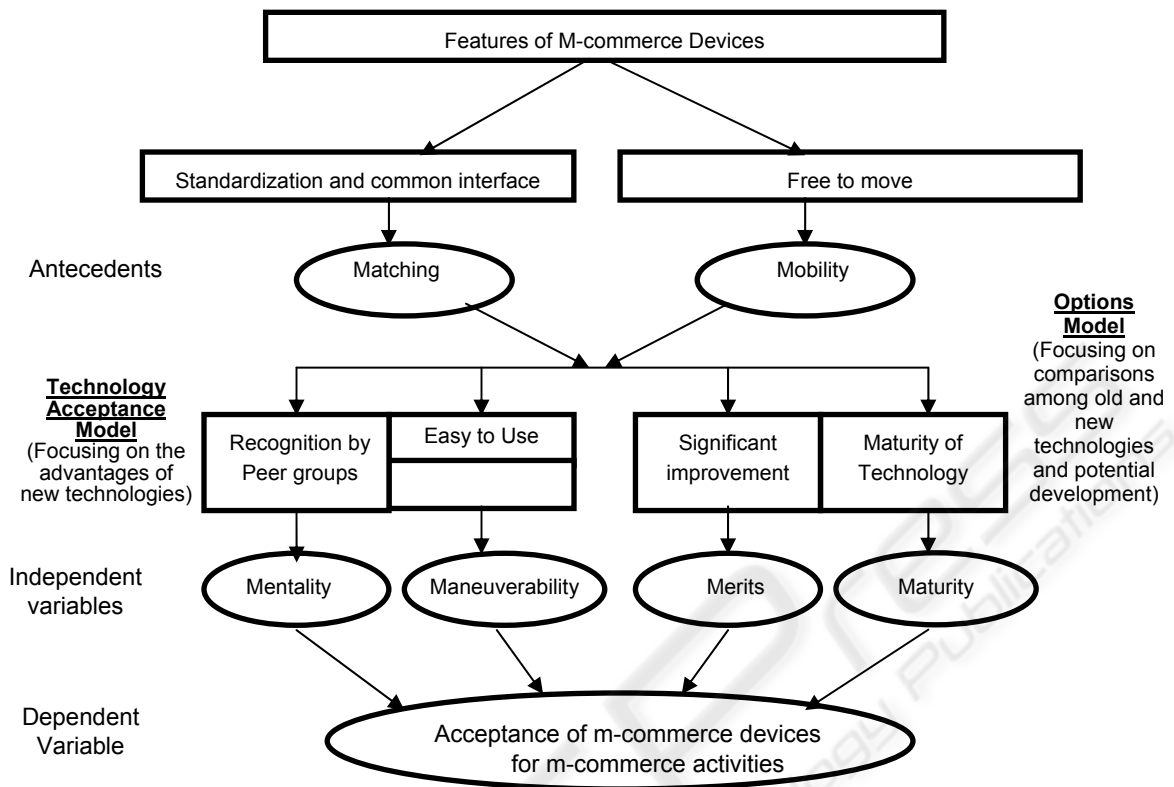
Figure 1: A Conceptual Model of the Acceptance of M-commerce Devices (MCD).

1992; Davis et al., 1989). The former is about the degree to which a person believes that using a particular system will make his or her life easier, e.g. by enhancing his or her job performance or reducing the workload, while the latter is the degree to which a person believes that it is not difficult to actually use a particular system (Davis et al., 1989). An extended version of the TAM model, referred to as TAM2, was later developed to explain perceived usefulness and usage intentions in terms of social influence and cognitive instrumental processes (Venkatesh and Davis, 2000).

The options model demonstrates that a new technology with a moderate expected improvement in performance can experience substantial delays in acceptance and price dropping in a competitive market (Bessen, 1999; Sheasley, 2000). Rather than adopting a new technology that demonstrates only marginal improvement, consumers have the option of not adopting until the new technology, in terms of performance and price, is substantially better than the old technology. Consumers contemplating the adoption of a new technology are, of course, aware of the possibility of sequential improvement. They consider not only the current technical level of the new technology, but also their expectations of

possible upgrades and changes in the future of the new technology (Sheasley, 2000).

While using technology acceptance models (TAM) as our primary reference, we also incorporate the important implications of the options model into our basic framework for analyzing consumers' adoption of MCD for m-commerce. We observe that TAM is primarily about to what extent people will adopt new technologies with reference to the advantage and benefits (perceived usefulness and perceived ease of use). However, we observe that, although it is very likely that new technologies will eventually replace old ones, the devices of old and new technologies are very often being used at the same time, based on people's assessment of the comparative merits of the two generations of technologies. We, therefore, consider that the options model (which focuses on the comparison between old and new technologies) is a useful tool in our analysis of the acceptance of MCD for m-commerce.

3 THE INTEGRATED FRAMEWORK

In essence, options model focuses on the comparison between existing and old MCD while TAM places emphasis on the generic attributes and utility of MCD. We integrate the major ideas of these two models into our new proposed model as shown in Figure 1. Based on our theoretical framework, we identify four influencing factors: merits, maturity, maneuverability, and mentality, which we consider to be relevant to the decision of consumers in adopting MCD. We also identify two generic antecedents of these influencing factors, mobility and matching. This suggests an extent of influence of these influencing factors and their antecedents to affect consumers' adoption decision of MCD.

3.1 Influencing Factors based on Technology Acceptance Model

With reference to technology acceptance model (TAM, TAM2 and UTAUT) (Venkatesh & Davis, 2000; Venkatesh et al. 2003), we consider whether the adoption of MCD will bring advantages to consumers. We identify two M's, maneuverability and mentality, for relating the acceptability of MCD to users.

The first influencing factor, maneuverability, is related to the perceived usefulness in the adoption of MCD and the degree to which a person can make the best use of such MCD. Consumers will tend to adopt devices that are user-friendly and do not require some intensive training of adoption (Prasanna et al, 1994). It would be measured by the usability of the MCD.

The second influencing factor, mentality, is concerned with the match between the new technology and consumers' own mindset, as well as the appropriate recognition of their peer groups (Bessen, 1999; Venkatesh & Davis, 2000). General acceptance by the consumers, especially by their peer groups, will be very important to consumers when they consider using MCD for matching the devices of other people. Mentality can be evaluated by the perceived peer groups' acceptance of MCD.

3.2 Influencing Factors based on Options Model

While mainstream literature on the adoption of new technologies is primarily based on the technology acceptance model, we consider that, in the context of m-commerce, we also need to think about some other aspects. With regards to the options model (Bessen, 1999; Sheasley, 2000), we consider the comparison between MCD and devices for other types of commerce, and in particular, the comparative advantages of MCD to consumers. Based on the options model, we identify two M's, merits and maturity, in relation to the comparison.

We identify the third influencing factor, merits, which is about the degree to which a buyer believes that the MCD can provide significant improvement in the purchase process. Handheld mobile devices, such as PDA and other enhanced alphanumeric communicators, have supplemented mobile telephones, thus expanding the range of MCD available for m-commerce transactions. With the abilities to be connected to digital communication networks, MCD are considered to be in possession of important comparative advantage of mobility. Merits can be measured by the comparative advantages of the MCD in relation to the old devices for other types of commerce.

The fourth influencing factor, maturity, is the possibility that the technology of the MCD is mature enough so that there will not be any possible significant improvements at a later stage. While academic researchers and business practitioners recognize that the electronic market will penetrate and replace traditional type of commerce, there are still some reservations that will likely cause the early adopters of new technologies some problems in terms of the obsolescence of devices (Samuelsson & Dholakia, 2003). Most consumers will prefer adopting MCD with more mature technologies so that there is no need for a high level of subsequent upgrading of devices. Maturity can be assessed by the perception that the relevant MCD can or cannot be upgraded.

3.3 Generic Attributes of MCD

In addition to the identification of the influencing factors of the adoption of MCD, we also consider their antecedents, which are related to the very basic and essential characteristics of MCD. We start our analysis by considering two generic attributes of MCD, mobility and matching.

Mobility is the most fundamental aspect of m-commerce because the name m-commerce arises from the mobile nature of the wireless environment that supports mobile electronic transactions (Coursaris et al, 2003). Mobile wireless devices, such as mobile phones, PDA, and portable computer notebooks, can have the ability to help users gain

access to the Internet. Based on these wireless devices, m-commerce is a natural extension of e-commerce but can provide some additional advantages of mobility for consumers. Mobility is a major prerequisite for the adoption of MCD. It is an antecedent of the influencing factors of the adoption of MCD because people will consider adopting wireless connection because it can allow significant improvement (i.e. merits), easy to use (i.e. maneuverability), and can be accepted by peer groups (i.e. mentality). It can be measured by the extent of access to wireless networks.

Matching describes the need for the standardized and common interface of MCD (Coursaris et al, 2003). The unique characteristic of m-commerce very often requires both ends of this new type of commerce to have a common interface. M-commerce applications have the challenging task of discovering services in a dynamically changing environment. Effective mechanisms need to be in place for the interface between various types of MCD. Matching is an important antecedent of the influencing factors of consumers' adoption of MCD because the need for standardization (i.e. matching) is important for m-commerce technology which allows for the interface of MCD with the wireless networks when the technology and interface is mature (i.e. maturity). It also provides utility for consumers for interacting with other devices (i.e. merits). Matching can be measured by the degree that MCD can be compatible with each other.

Based on our conceptual framework, we identify the various influencing factors (i.e. 4 M's) which can affect consumers' decision of the adoption of MCD in their purchases. It is possible to collect data on whether consumers will consider the adoption of MCD, and at the same time, researchers can also investigate the reasons why they adopt or do not adopt MCD, in terms of timing, opportunities, changing trends and applications.

4   CONCLUSIONS

We are proposing new insights and new adoption behavior in the ubiquitous world of m-commerce, which we believe, are still not yet fully understood by most marketers and scholars (Stevens & McElhill, 2000; Struss et al., 2003). Our conceptual framework contributes to literature by suggesting the new constructs: merits, maturity, maneuverability, and mentality, which we consider to be relevant to the decision of consumers in adopting MCD. It also represents an examination of the adoption of MCD

by consumers in their purchase processes and will be of interest to the MCD market.

ACKNOWLEDGEMENTS

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