Adoption and Diffusion of M–Commerce

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INTRODUCTION

Mobile commerce (or in short, m-commerce) is currently at the stage where e-commerce was a decade ago. Many of the concerns consumers had regarding e-commerce (such as security, confidentiality, and reliability) are now directed towards m-commerce. To complicate the matter further, the lack of a standardized technology has made m-commerce grow in multiple directions in different parts of the world. Thus, the popularity of m-commerce-based services varies by country, by culture, and by individual user. For example, in Europe the most popular application is SMS (short message service) or text messaging, in Japan interactive games and picture exchange via NTT DoCoMo i-mode, and in North America e-mail via interactive pagers (such as RIM BlackBerry) and wireless application protocol-based (WAP-based) wireless data portals providing news, stock quotes, and weather information. It is safe to predict that these applications will take on different forms as the technologies mature, devices become more capable in form and functionality, and service providers become more innovative in their business models.

It is true that m-commerce has witnessed spectacular growth across the globe. It is also encouraging that several factors are expected to accelerate the pace of adoption of m-commerce. Notable among these drivers is convergence in the voice/data industry, leaping improvements in related technology and standards, adoptive technology culture in many parts of the world, and governmental and regulatory initiatives.

Despite the undisputed promise of m-commerce, there are several barriers that are slowing the pace of adoption of m-commerce. The major barriers include: (a) lack of good business models to generate revenues, (b) perception of lack of security, (c) short product lifecycle due to rapidly changing technology, (d) non-convergence of standards, (e) usability of devices, (f) limitation of bandwidth, and (g) cost.

Many of the aforesaid were common to e-commerce also at its introduction and growth stage. We strongly believe it is worthwhile to investigate how e-commerce has been able to overcome these barriers so that we can incorporate some of the successful strategies to m-commerce. In our study, we will first compare and contrast e-commerce and m-commerce with respect to a set of common criteria such as: (1) hardware requirement, (2) software requirement, (3) connection or access, and (4) content. In the process, we will identify the principal barriers to the development of m-commerce as outlined in the above list.

The Growth in E-Commerce

Electronic commerce or e-commerce is the mode of commerce wherein the communication and transactions related to marketing, distributing, billing, communicating, and payment related to exchange of goods or services is conducted through the Internet, communication networks, and computers. Since the Department of Defense opened up the Internet for the public to access in 1991, there has been exponential growth in the number of Web sites, users on the Web, commerce through the Web, and now change of lifestyle through the Web (Pew, 2006).

The chronology of events shows that as the Internet became easier and cheaper to use, and as the applications (such as e-mail and Web interaction) became necessary or useful to have, the rate of adoption of the Internet accelerated. In fact, the rate of adoption of the Internet surpassed all projections that were made based on the traditional technology adoption rates that were documented for electricity, automobile, radio, telephone, and television (Pew, 2006). Unfortunately, the over-enthusiastic media hyped up the growth rate to an unsustainable level, leading to unprecedented growth of investment in the Internet technologies and followed by a melt-down in the stock market. This shattered the confidence in Internet technologies in the investment market. Although there was a significant deceleration in IT investment, e-commerce has rebounded to a large extent since the dot.com bust. It has been growing at about 30% compound rate per year (Pew, 2006).

In the last 10 years, the adoption of e-commerce has been extensively studied both by academicians as well as practitioners. During this period e-commerce and the scope of its definition also went through various iterations. For example, people may not buy a car on the Internet, but it is documented that 65% of car buyers have done extensive research on the Web about the car they eventually buy. Is this e-commerce? Should we restrict the e-commerce definition

to financial exchange for goods or services? We have various such examples in the marketplace where extensive research about the product or service is conducted on the Internet, but the final purchase is made in the physical environment. Hence, although the number of consumer financial transactions has not grown to the level industry projected initially, there has been a significantly high rate of adoption of the activities supporting e-commerce.

In addition, there has been a very high rate of adoption of business-to-business (B2B) commerce both in terms of financial and supporting transactions. In this article, we are interested in business-to-consumer (B2C) commerce. Hence, the comparison and contrast is made between e-commerce and m-commerce. All our discussion henceforth will be on B2C commerce using desktop and/or mobile technologies.

The Growth Potential of M-Commerce

Mobile commerce is the model of commerce that performs transactions using a wireless device and data connection that result in the transfer of value in exchange for information, services, or goods. Mobile commerce is facilitated generally by mobile phones and newly developed handheld devices. It includes services such as banking, payment, ticketing, and other related services (DEVX, 2006; Kini & Thanarithiporn, 2005).

Currently, most m-commerce activity is performed using mobile phones or handsets. This type of commerce is common in Asian countries led by Japan and South Korea. Industry observers are expecting that the United States will catch up soon, with mobile phones replacing existing devices such as ExxonMobil's Speedpass (eMarketer, 2005; Kini & Thanarithiporn, 2005).

Although the U.S. is lagging behind many countries in Asia and Europe in m-commerce, a UK-based research firm projects North American m-commerce users to total 12 million by 2009, with two-thirds of them using the devices to buy external items such as tickets and goods, and a third of them using it to make smaller transactions through vending machines (eMarketer, 2005). The firm also notes that there is a large potential number of the 95 million current American teens who are already making purchases on the Web that will adopt m-commerce. However, the study also remarks that generating widespread user interest in m-commerce and addressing security fears of mobile payment technologies and m-commerce services are critical in achieving a high level of adoption (eMarketer, 2005).

While the Asia Pacific Research Group (APRG, 2006) projected in 2002 that global m-commerce would reach US$10 billion 2005, Juniper Research currently projects that the global mobile commerce market, comprising mobile entertainment downloads, ticket purchases, and point-of-sale (POS) transactions, will grow to $88 billion by 2009, largely on the strength of micro-payments (e.g., vending machine type purchases). See eMarketer (2005) for more details.

Today, a large percentage of mobile phone users use mobile phones to download ring tones and play games; hence content-based m-commerce is expected to make up a small percentage of m-commerce. One recent study, however, projects that in the future mobile phone users will move up the value chain from purchases that are used and enjoyed on the mobile phone to external items such as tickets, snacks, public transportation, newspapers, and magazines (eMarketer, 2005).

Diffusion Models of Technology Adoption

There are many models that have been formulated and studied with regard to technology adoption, acceptance, diffusion, and continued adoption. These theories identify factors that are necessary to support different levels of adoption of information and communication technologies (ICTs). Notable among these models are the innovation-diffusion theory (Roger, 1995), technology acceptance model (or TAM) based on the theory of reasoned action (Davis, 1989; Fishbein & Ajzen, 1975), extended TAM2 model that incorporates social factors (Venkatesh & Davis, 2000), technology adoption model based on the theory of planned behavior (Ajzen & Fishbein, 1980), post acceptance model based on marketing and advertising concepts (Bhattacherjee, 2001), and SERVQUAL (Parasuraman, Berry, & Zeithaml, 1988) for service quality. These models have been extensively used to predict and evaluate online retail shopping and continued acceptance of ICTs. In addition, varieties of integrated models have been developed to measure the success of information systems, ICT, and Internet adoption and diffusion. Currently, many of these models are being tested in the context of mobile technology (primarily mobile phone services).

The integration models mentioned above have been empirically tested in the e-commerce area. The models have been authenticated and proven to be extremely useful in predicting behavior of users of ICT and e-commerce. In the case of m-commerce, the results have been slightly inconsistent. Primarily these inconsistencies have been found because of the differing market maturity levels or the usage pattern of mobile devices. For example, in a South Korean study where mobile phones have been in use for quite some time, the results of testing an integrative m-commerce adoption model yielded different results for actual use than in a similar study conducted in Thailand where mobiles devices were introduced much later in the market. South Koreans were not influenced much by advertising, unlike Thai people in the initial adoption phase of m-commerce. Conversely, Thai people were not influenced by word-of-mouth to the extent South Koreans were influenced in the initial adoption (Thanarithiporn, 2005). According to Thanarithiporn

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