

ANTECEDENTS OF POST-PAYMENT AND PRE-PAYMENT MOBILE COMMERCE ADOPTION SERVICES

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ABSTRACT

Mobile business is considered the new frontier for selling new products and services. This article constructs and tests a research model to explain consumers' intention to adopt mobile commerce services. The authors develop a framework that integrate theories from the diverse fields of information systems research (Technology Acceptance Model) and psychology research (Motivational Theory) to develop an integrated model to explain the antecedents of two different types of mobile commerce services: post-payment and pre-payment mobile commerce services. Borrowing the Technology Acceptance Model from the work environment, we apply it to the consumer context and extend it by incorporating both intrinsic and extrinsic motivations of mobile commerce adoption behavior. A sample of 429 respondents is used to test the model.

Keywords:

M-commerce, self-efficacy, intrinsic motivations, extrinsic motivations, Technology Acceptance Model, Motivation Theory

1. Introduction

Since the commercialization of the World Wide Web, most established companies have set up websites to increase revenues (Pauwels et al., 2011). However, Mobile business has established as a novel field of activity in the economic and social sphere (Mylonopoulos and Doukidis, 2003) and is considered the new frontier for selling new products/services (Sumita and Yoshii, 2010). Understanding how companies should interact with their customers and deliver services in electronic environments is of decisive importance (Parasuraman and Zinkhan, 2002) and specially in this mobile environment. Thus, the success of M-commerce hinges on consumer willingness to adopt new technology and engage in activities using systems and devices different from what they have used in the past (Bruner and Kumar, 2005). In pursuing digital channels to sell and distribute products, the major challenge these businesses face is evoking user acceptance of the information service once the digital channels are in place (Luo et al., 2011). In particular, Mobile services users play the dual role of technology users and service consumers in contrast to traditional information systems users. Decisions to subscribe to and use new services are innovation behaviors, which vary according to the needs and perceptions of individual adopters (Gilbert and Han, 2005). Moreover, due to the anytime-anywhere connectivity of wireless devices, mobile business provides enormous opportunities for business process innovation services (Zwass, 2003).

With the popularization of mobile devices such as laptops, mobile phones and personal digital assistances (PDAs), the number of world wide wireless technology users is increasing (Economides and Grousopoulou, 2009) and it has fueled the expansion of the mobile Internet as a foundation for mobile commerce (m-commerce) (Lee and Benbasat, 2004). In recent years, handheld devices are in a time of rapid change with subscriptions reaching over two billion worldwide (Campbell, 2007). As a result, the use of mobile phones is almost twice as high as that of personal computers. This is creating a new opportunity for the growth of m-commerce (Sumita and Yoshii, 2010). The evolution of mobile communications from 2G/2.5G (64 Kbps) to 3G (384 Kbps) and 3.5G (3.5 Mbps), which is comparable to that of the wired Internet, has triggered the use of mobile devices, such as mobile phones to conduct M-commerce on the mobile Web (Liu and Liou, 2011).

Studies of M-commerce suggest that there is a general consumer interest in the services it provides (Mallat et al., 2009): purchases on web sites (Jih and Lee, 2003; Mahatanankoon, 2007), electronic receipts and tickets (Mallat et al., 2009), routine bank service (Kleijnen et al., 2007; Lee et al., 2003; Lin, 2011), peer-to-peer payments (Nysveen et al., 2005; Dahlberg et al., 2008), etc. However, the widespread use of cellular phones for shopping is still at the initial stage of innovation diffusion (Jih and Lee, 2004). In the near future, m-commerce will provide seamless extensions to the existing e-commerce infrastructure in many unforeseeable ways (Mahatanankoon, 2007). Accordingly, e-commerce is now in the process of being converted into m-commerce (Sumita and Yoshii, 2010). M-commerce is a technological frontier and is an attractive area for research because of its relative novelty, rapid growth, and potential applications.

The purpose of this article is twofold. The first purpose is to develop a model that explains customers' intentions to adopt M-commerce based on Motivation Theory and Technology Acceptance Model (TAM) as an explanation for behavior. Second, we want to investigate the validity and differential predictive power of the model across two different categories of M-commerce: post-payment M-commerce services and pre-payment M-commerce services. Consequently, this study contributes to the emerging but limited body of research on consumer adoption of M-commerce by addressing two critical issues. First, our model is based on an integration of various theoretical fields that focus on consumers' motives for adopting M-commerce, thus capturing a broader and more holistic understanding of the antecedents of consumers' intentions to adopt M-commerce than existing research. Furthermore, studies of the antecedents of M-commerce usage have not focused these two different types of M-commerce. Through this comparison, we provide a more reliable understanding of consumer' motives for

adopting it. The remainder of this paper is organized as follows. The next section analyzes the mobile services. In section 3 we discuss the relevant literature, and then we advance our hypotheses. In section 4, we describe the methodology. Finally, section 5 presents the preliminary results of our analysis.

2. Mobile services

Mobile services are becoming increasingly important for firms and consumers because of ubiquitous, universal and unison access to information and services, and the possibility for unique and personalized exchange of information (Watson et al., 2002). It is important to understand the driving forces of consumers' intentions to use mobile services and to adapt the services to fulfill consumers' motives for using them (Nysveen, 2005). Mobile services have several different characteristics. According to Hoffman and Novak's (1996) categorization, we can distinguish between person-to person interactive services (e.g., text messaging services, contact services), machine interactive services (e.g., gaming services, payment services, location services or information services), goal-directed services (e.g., location or information services) and experiential services (e.g., gaming services). Because of the differences in mobile services' characteristics, consumers' motives for using them differ across service categories. Therefore, the antecedents of customers' intentions to use mobile services should be studied across service categories (Nysveen, 2005). Mobile services can be classified into two major categories: *traditional mobile services* that were introduced relatively early and already have an established tradition (López-Nicolás et al., 2008), like ringtones, icons, short messaging service (SMS) or text messaging- and *advanced mobile services*, such as information, transaction and entertainment services that are provided via high capacity networks, enabling the use of multimedia services that have the look and feel of the Internet on mobile devices (López-Nicolás et al., 2008). In this study we focus on M-commerce in particular which can be considered an advanced mobile service.

2.1. M-commerce (Post-payment and Pre-payment)

M-commerce refers to the mobile character of wireless devices (particularly mobile phones) that support electronic service transactions, such as product ordering, fund transfers, and stock trading (Kleijnen et al., 2007). Any electronic commerce transaction, processed by anyone, anywhere, through wireless devices, is considered M-commerce (Kuo and Yu, 2006). It is frequent to characterize m-commerce as an extension of e-commerce, but it also might be regarded as a separate channel, because it can deliver a unique value proposition to consumers (Balasubramanian et al., 2002) through the technological differences it encompasses, including its communication mode and protocols and access devices (Dholakia and Dholakia, 2004). From a consumer's perspective, a uniquely defining characteristic of m-commerce is its ubiquity, that is, the ability it offers to engage in commerce anytime and anywhere. It eliminates temporal and spatial constraints to the delivery of services (Nysveen et al., 2005). Thus, users can conduct business real time via mobile devices. Given these idiosyncrasies, its drivers are likely to be different from those of traditional or e-commerce (Pavlou and Fygenson, 2006). These differences attest to the need to go beyond traditional factors to understand m-commerce adoption. Just as the Internet and user-friendly web browsers provided the preconditions for the take-off of e-commerce, mobile telephones that are date-ready and connected to digital communication networks provide the preconditions for m-commerce (Dholakia and Dholakia, 2004).

The ability to make payments over mobile networks is a key element of the definition of M-commerce (Mylonopoulos and Doukidis, 2003). The lack of suitable payment instruments has for a long time been regarded as a factor that hampers the development of M-commerce. It is a type of payment transaction processing in which the payer uses mobile communication techniques in conjunction with mobile devices for initiation, authorization, or completion of payment (Pousttchi, 2008), being an alternative payment method for goods, services, and bills or invoices. In this research we distinguish between two types of m-commerce according to the moment the payment is carried out:

- Pre-payment M-commerce services: those types of mobile services which you have to pay before consuming the good or service. For example, reservation or purchase of cinema/theatre/concert tickets, reservation or purchase of flight/train/bus tickets, reservation for accommodation.
- Post-payment M-commerce services: those kinds of mobile services which you have to pay after consuming the good or service. For example, micropayments, banking or gambling.

3. Hypotheses

The present study is influenced by the Social Cognitive Theory (SCT) which is a widely accepted and empirically validated theory of individual behavior based on the work of Bandura (Bandura, 1977; 1986). Self-efficacy theory states that behavior is cognitively mediated by the strength of person's self-efficacy beliefs. This belief has an influence on one's ability to perform a specific task, degree of effort expended and persistence of effort. Following Bandura (1986), we define self-efficacy as individual judgments of a person's capabilities to perform a behavior.

An important prerequisite of engaging in a behavior is to have the necessary skills to undertake the behavior (Bandura, 1986). Mobile user skills specifically describe the knowledge and expertise a user has for a behavior, and thus it is a predictor of whether a certain behavior can be accomplished. Following Bandura (1986), self-efficacy is not equivalent to personal skills; self-efficacy deals with subjective judgments as to whether one has the personal skills needed to accomplish a behavior (p. 391). Thus, self-efficacy is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses (Bandura, 1977). Having the necessary behavioral skills is likely to increase consumer's judgments of their efficacy to purchase products with a mobile device, leading to higher self-efficacy (Pavlou and Fygenson, 2006). Perceived self-efficacy of m-commerce will be an important knowledge resource for consumers in adopting m-commerce.

H1: Perceived self-efficacy has a positive effect on the customers' intention to adopt mobile commerce

Perceived ease of use (PEOU) refers to "the degree to which a person believes that using a particular system would be free of effort" and perceived usefulness (PU) is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p.320). The proposed relationship between perceived self-efficacy, PEOU and PU is based on the theoretical argument by Davis (1989). Bandura (1986) argues that self-efficacy beliefs function as proximal determinants of behavior (here, m-commerce adoption) and motivation (PU and PEOU). Following Bandura, individuals are more likely to undertake behaviors they believe will result in valued outcomes than those they do not see as having favorable consequences. Outcome expectations have been considered by many IS researchers. The usefulness construct measured by Davis (1989) and Davis et al. (1989) reflects beliefs about outcomes. There also exists empirical evidence of a causal link between self-efficacy and perceived ease of use (Igbaria and Iivari, 1995; Venkatesh and Davis, 1996). It is considerably positive contributing to individuals' perceptions of system ease of use and usefulness (Compeau and Higgins, 1995).

Self-efficacy influences choices about which behaviors to undertake, the effort and persistence exerted in the face of obstacles to the performance of those behaviors, and thus, ultimately, the mastery of the behaviors (Compeau and Higgins, 1995). Individuals with high self-efficacy will perceive the system to be easy and useful due to the effect of self-efficacy on the degree of effort, the persistence and the level of learning, which takes place and will be less resistant to changes (Igbari and Iivari, 1995). Thus, self-efficacy is likely to affect system usage directly and indirectly through PEOU and PU.

H2: Perceived self-efficacy has a positive effect on the perceived usefulness of mobile commerce

H3: Perceived self-efficacy has a positive effect on the perceived ease of use of mobile commerce

Motivational perspectives have also been widely used to understand behavior. In addition to the TAM, there is also a motivation-oriented perspective (Davis et al. 1992), to predict technology acceptance and usage behavior. Motivation has been identified as a key determinant of behavior in a wide variety of domains (Deci, 1975). Motivation theorists often distinguish between two broad classes of motivation to be key drivers of behavioral intention to use (see Vallerand, 1997, for a review). In the motivational model, motivations related to intrinsic personal goals are contrasted with those related to extrinsic goals associated with job advancement issues. Extrinsic motivation refers to the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions. While extrinsic motivation influences behavior due to the reinforcement value of outcomes, intrinsic motivation refers to the performance of an activity for no apparent reinforcement other than the process of performing the activity per se (Davis et al., 1992). It refers to the pleasure and inherent satisfaction derived from a specific activity (Vallerand, 1997). System use, therefore, is determined not only by extrinsic motives but also intrinsic motives. Such intrinsic and extrinsic motivation together, influence on individual's intention to perform an activity as well as actual performance (Deci, 1975). Davis et al. (1992) tested a motivational model of technology usage. Consistent with prior research investigating other behaviors, they found that extrinsic and intrinsic motivation were key drivers of an individual's intention to perform the behavior (i.e., technology usage). Applied to M-commerce, we propose the following:

H4: Intrinsic motivations have a positive effect on mobile commerce adoption behavior

H5: Extrinsic motivations have a positive effect on mobile commerce adoption behavior

PEOU is a construct focused on an individual's perception about the level of effort needed to use a system, and represents the user's subjective evaluation of the process of interaction with a system (Venkatesh, 1999). PEOU is related to efficacy beliefs (Venkatesh and Davis, 1996). Based on intrinsic motivation research and user acceptance research, it can be expected that for a given objective level of effort, greater levels of intrinsic motivation during the process of adopting M-commerce will have a favorable impact on perceptions of effort (PEOU). Those who are more intrinsically motivated to use computer technologies are expected to be pleased using a new technology just for the sake of using it, rather than just the specific positive outcomes associated with use. Such individuals may tend to "underestimate" the difficulty associated with using a new technology because they enjoy the process and do not perceive it as being effortful compared to those have less intrinsic motivation. This implies that a positive relationship between intrinsic motivation and PEOU is likely to exist. Research in psychology suggests that higher levels of intrinsic motivation typically lead to willingness to spend more time on the task (e.g., Deci, 1975), facilitating perceptions of ease of use. Prior research on computer usage found that intrinsic motivation strongly predicted perceptions of ease of use (Venkatesh and Davis, 1996). We extend this argument to suggest that higher levels of intrinsic motivations will lead to lowered perceptions of effort in using mobile phones to purchase.

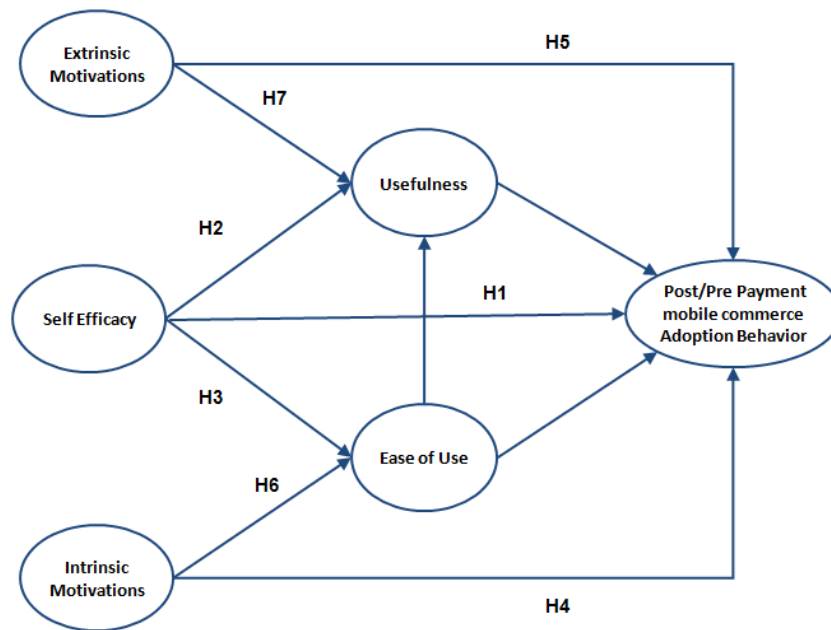
H6: Intrinsic motivations have a positive effect on the perceived usefulness of mobile commerce

According to Bouwman et al (2007), the benefits of mobile services are related to mobility in space. Mobile devices and services offer the opportunity to move around while maintaining access to relevant services and staying (socially) connected (Jarvenpaa et al., 2003). The nomadic value of mobile services is reflected in concepts like anytime, anyplace, which are mentioned in almost every paper discussing the potential of mobile services. Pagani (2004) mentions mobility, availability (anytime, anyplace), and personalization as important benefits of (multimedia) mobile services. The perceived flexibility that is provided by mobile technology is seen as one of the most important motivations towards adopting m-commerce services.

Combining the portability of mobile devices and wireless communications, m-commerce provides users the benefits of retrieving rich and current information via the Internet anywhere and anytime (Lee et al., 2007). Many benefits have been associated with the use of mobile services, such as timeliness, easy access, place and time interdependence (Kleijnen et al. 2007). In contrast to earlier technologies whose users' extrinsic motivations used to be proxied by the PU of the system (Davis et al., 1992), current mobile devices and services are adopted for the sake of flexibility (López-Nicolás et al., 2008). Therefore, in the context of advanced mobile services, the extrinsic motivation of a consumer to adopt them may rely on her/his perceptions of flexibility (portability and instant accessibility), and their perceptions of portability can enhance PU. Usefulness has to do with the degree to which a person believes a certain system will help perform a certain task. Kleijnen et al. (2007) find that those benefits derived from the ubiquitous nature of mobiles can create value for mobile services in terms of, among other things, usefulness, efficiency, and functionality. Also, Hong and Tam (2006) find that perceived service availability, defined as the extent to which an information appliance is perceived as being able to provide timely connections, is positively related to PU of mobile data services. Accordingly, a perceived higher flexibility will increase the PU of m-commerce services.

H7: Extrinsic motivations have a positive effect on the perceived ease of use of mobile commerce

FIGURE 1
Theoretical Model



4. Methodology

4.1. Data collection and sample

The respondents were selected from a large panel of 25,000 households that are regularly used for survey research, and that are representative of the Dutch population. Potential respondents (N = 900) were first approached via telephone to ask them if they would be willing to participate and whether or not they used a mobile phone. In April 2009, respondents who agreed and matched the selection criterion (N = 714), received an e-mail with a link to the online questionnaire. We received 429 questionnaires, which represent a response rate of 60%. The sample was checked against relevant criteria to establish whether or not the sample was representative of the Dutch population. The results demonstrated adequate levels of sample representativeness.

4.2. Measures

Our multi-item scales were drawn from prior studies. To develop the intrinsic/extrinsic motivation we used items from Davis et al. (1992). The review of this study yielded a total of five items that measure motivations in its dual perspective. To measure the different dimensions of TAM MODEL PU, PEOU and self efficacy we use scales adapted from the work of Davis (1989), Davis et al. (1989) and Compeau and Higgins (1995). Finally, M-commerce pre-adoption and post-adoption behaviors were adapted on the basis of the different mobile commerce services (Mahatanankoon, 2007; Mallat et al., 2009; Kleijnen et al., 2007; Nysveen et al., 2005) and the moment the payment of this services take place.

5. Preliminary results

To refine our measures, we conducted a confirmatory factor analysis (CFA) using LISREL 8.8 to determine the validity and reliability of our measures. As can be observed from Table 1, the results of the six factor model provided an acceptable fit ($\chi^2(168) = 456.21$ CFI=.97 RMSEA=.06 RMSEA Range= (0.05;0.07)). The factor loadings of each individual indicator on its respective construct were statistically significant ($p < .001$) establishing convergent validity. Since our research contains several multi-item reflective scales, we investigated the psychometric properties of these measures through the composite reliability index (Bagozzi and Yi, 1988) and the average variance extracted index (Fornell and Larcker, 1981). Both indexes exceeded the recommended benchmark of .60 and .50 respectively. Evidence of discriminant validity among the dimensions was provided by two different procedures recommended in the literature as follows: 1) the 95% confidence interval constructed around the correlation estimate between two latent variables never includes value 1 (Anderson and Gerbing, 1988). 2) the comparison of the square root of the AVE (diagonal in Table 1) with the correlations among constructs (i.e., off-diagonal elements) reveals that the square root of the AVE for each component is greater than the correlation between components, in support of discriminant validity (Fornell and Larcker, 1981). These findings provide evidence of discriminant validity among the components and the constructs. Overall, the results obtained from these tests provided evidence reliability for reflective constructs. The hypotheses will be subsequently tested using a structural model and the analysis of alternatives models will be conducted in order to test whether TAM dimensions fully or partially mediate the effect of motivations on pre-payment and post-payment M-commerce adoption behavior.

TABLE 1
Descriptive and measurement statistics for reflective constructs

	Mean	SD	CR	AVE	1	2	3	4	5	6	7
1. Extrinsic Motivations	2,89	1,01	0,82	0,70	0,84						
2. Intrinsic Motivations	1,59	0,82	0,84	0,64	0,32	0,80					
3. Self Efficacy	3,14	1,04	0,82	0,62	0,42	0,34	0,79				
4. Usefulness	2,78	0,92	0,75	0,50	0,65	0,46	0,49	0,71			
5. Ease of Use	2,99	0,90	0,83	0,64	0,47	0,21	0,74	0,46	0,80		
6. Mobile commerce post-adoption	2,91	1,15	0,87	0,68	0,31	0,17	0,28	0,43	0,26	0,82	
7. Mobile commerce pre-adoption	2,37	1,03	0,77	0,52	0,22	0,31	0,31	0,38	0,27	0,59	0,72

Notes: Mean = the average score for all items included in this measure; SD = standard deviation; CR = composite reliability; AVE = average variance extracted; n.a. = not applicable. The numbers on the diagonal are the square root of the AVE. Off-diagonal elements are correlations among constructs.

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