WHAT DRIVES MOBILE COMMERCE?

AN ANTECEDENT MODEL OF MOBILE COMMERCE ADOPTION

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ABSTRACT

Mobile commerce - the consumer’s engagement in online transactions with sellers using mobile devices - differs from traditional or electronic commerce due to the potential for location-specific real-time transactions and the unique attributes of mobile devices. This paper aims to understand what drives consumers to engage in mobile transactions by viewing m-commerce adoption as a process consisting of three distinct, yet inter-related behaviors: (a) ‘getting information’ (b) ‘giving information’, and (c) ‘purchasing’ products and services using mobile devices. First, these three behaviors are integrated, using the theory of implementation intentions. Second, following the theory of planned behavior, each behavioral intention is predicted through its attitude, subjective norm, and perceived behavioral control (self-efficacy and controllability). Third, a set of beliefs for each of the three m-commerce behaviors is identified, resulting in a comprehensive model of the drivers of m-commerce adoption. Finally, an empirical study with consumers in the United States tests and validates the proposed m-commerce adoption model. Implications for the adoption of m-commerce are proposed.

Keywords: Mobile Commerce, Mobile Commerce Adoption, Online Consumer Behavior, Theory of Planned Behavior
1. INTRODUCTION

Business-to-consumer (B2C) mobile commerce (m-commerce) refers to consumers exchanging information with and purchasing products from sellers using mobile devices (Balasubramanian, Peterson, and Jarvenpaa 2002). M-commerce may have a substitution effect on other forms of commerce due to its ability to enable transactions without time, space, and “wired” restrictions. The ability for anywhere, anytime transactions has been termed ubiquitous commerce (Watson, Leyland, Berthon, and Zinkhan 2002). M-commerce not only facilitates the expansion of commerce by enabling transactions that would otherwise not be feasible, but it also generates new opportunities for shaping the nature of buyer-seller transactions, such as real-time personalization of the transaction based on the buyer’s location. However, for m-commerce to deliver its potential benefits, consumers must engage in transactions with their mobile devices, such as getting and giving information to sellers and purchasing product and services from them.

B2C m-commerce adoption - the consumer’s engagement in mobile transactions with sellers using mobile devices – differs from traditional or online commerce due to (1) the potential for location-specific, real-time transactions, (2) the use of mobile devices with a distinctive user interface, and (3) the unique attributes of mobile devices, such as the small screen size and the low bandwidth. Given these idiosyncrasies, its drivers are likely to be different from those of traditional (Hoyer and MacInnis 2001) or electronic commerce (Pavlou and Fygenson 2006). However, the literature has narrowly viewed m-commerce adoption as a simple instance of technology acceptance (e.g., Hung, Ku, and Chang 2003) and focused solely on purchasing as the only behavior (e.g., Nysveen et al. 2005). We argue that m-commerce adoption is a multi-dimensional phenomenon of a consumer’s using a unique technology to engage in a complex set of inter-related behaviors with sellers. Following this perspective, this study seeks to identify and empirically test a comprehensive set of antecedent factors that drive three behaviors that capture
m-commerce adoption: getting information from, giving information to, and purchasing products and services from sellers using mobile devices.¹

The three proposed behaviors - ‘getting information from’, ‘giving information to’ and ‘purchasing products’ are first integrated following the theory of implementation intentions (Gollwitzer 1999). Second, since the Theory of Planned Behavior (TPB) has been particularly effective in predicting both traditional and online consumer behaviors (e.g., Hung et al. 2003, Mathieson 1991, Nysveen et al. 2005, Pavlou and Fygenson 2006), a TPB-based model is introduced to predict each of the three focal behaviors by examining TPB’s major constructs (Attitude, Subjective Norm, and PBC) and their antecedent beliefs.

2. MOBILE COMMERCE BEHAVIORS

M-commerce adoption is the consumer’s engagement in mobile transactions with sellers using mobile devices. From a consumer’s standpoint, getting and giving information and purchasing products and services can be viewed as the basic mobile behaviors. However, to the best of our knowledge, m-commerce studies have solely focused on purchasing. Still, consumers must also engage in getting and giving information before they can purchase products and services using their mobile devices.

Getting information involves the transfer of information from the seller to the consumer using mobile devices. The value of getting information has been widely acknowledged (Bellman et al. 1999) since it is critical for consumers to learn about product specifications and potential alternatives, determine requirements, and gain sufficient knowledge to make product comparisons and reach the best possible decision.

¹ Getting and giving information are herein viewed as behaviors that aim to facilitate purchasing of products and services, and they are distinguished from getting and giving information as a goal behavior on its own right (e.g., entertainment purposes, news, etc.)
**Giving information** refers the transfer of information from consumers to sellers. Giving information is used to describe product and service preferences, registering, providing feedback, and offering private information (e.g., address information, product preferences).

**Purchasing** refers to the procurement of a product or service using a mobile device in exchange of monetary compensation.

These three behaviors are also supported by well-established consumer behavior theories, such as the Buyer’s Decision Making Model (Engel *et al.* 1973), the Customer Resource Life Cycle (Ives and Learmonth 1984), and the Consumer Mercantile Model (Kalakota and Whinston 1997). They are thus representative of the consumer’s process of engaging in mobile transactions, and they are proposed to *jointly* determine m-commerce adoption.

### 2.1 Integrating the Three Mobile Behaviors

To link the behavioral intentions between the getting information, giving information, and product purchasing, we refer to Gollwitzer’s (1999) notion of *implementation intentions*, which are self-regulatory strategies that aim to enable a goal-oriented behavior. Following Gollwitzer (1999), a goal behavior triggers a set of goal-enabling (implementation) intentions that help accomplish the goal behavior (Sheeran and Orbell 1999). Consistent with the proposed notion of m-commerce adoption as a sequential set of behaviors, we view purchasing as the goal behavior, while getting and giving information as the implementation intentions that help achieve the goal behavior. In terms of the temporal order, consumers first form the intentions to purchase a product to fulfill their needs, and they *then* form the implementation intentions to fulfill the need.

For example, a consumer that intends to buy a MP3 from eBay Mobile using her mobile device is likely to visit eBay to get information about the MP3 Mobile and give necessary information. Therefore, the product purchasing (goal) intention precedes and drives getting and giving information (implementation) intentions. We thus expect the intentions to purchase a product to
positively influence a consumer’s intentions to both get information from and also to give information to a seller using a mobile device.

2.2 The Theory of Planned Behavior in Mobile Commerce Adoption

Ajzen’s (1991) TPB is one of the most influential theories in predicting human behavior across many settings. According to TPB, the direct antecedent of any Behavior is its Behavioral Intentions; after all, people do what they intend to do. Behavioral intention is defined as “the strength of one’s intention to perform a specified behavior (Fishbein and Ajzen 1975, p. 288). Hence, we expect a positive relationship for the three focal behaviors – getting information, giving information, and purchasing – with their respective behavioral intentions. In turn, behavioral intentions are determined by the three TPB variables: Attitude, Subjective Norm, and Perceived Behavioral Control. Attitude is defined as a “positive or negative feelings (evaluative affect) about performing the target behavior” (Fishbein and Ajzen 1975, p. 216). In m-commerce, a consumer’s attitude toward getting information, giving information, and purchasing is expected to influence the consumer’s corresponding intentions to undertake the three mobile behaviors. Subjective norm is defined as a person’s “perception that most people who are important to her think she should or should not perform the behavior” (Fishbein and Ajzen 1975, p. 302). Applying TPB to m-commerce, Hung et al. (2003) and Teo and Pok (2003) showed subjective norm to influence behavioral intentions. We expect subjective norm to shape intentions to get information, give information, and purchase products with mobile devices.

PBC is a person’s perception of how easy or difficult it is to undertake a behavior. PBC is a determinant of behavioral intentions by reducing perceptions of control, confidence, and effortlessness in executing a behavior. While Ajzen (1991) originally suggested that PBC is a unitary construct, recent literature suggests that PBC has two distinct dimensions: self-efficacy and controllability (Cheng and Chan 2000, Conner and Armitage 1998).
Self-efficacy is defined as a person’s judgment of her own capabilities to successfully undertake a behavior (Bandura 1986). Controllability is defined as a person’s judgment of the resources and opportunities needed to undertake a behavior (Ajzen 2002a). While controllability refers to external factors that facilitate a behavior, self-efficacy refers to a person’s internal capabilities. Applied to m-commerce adoption, PBC is proposed to positively impact intentions to get information, give information, and purchase products using a mobile device.

3. IDENTIFYING ANTECEDENTS OF MOBILE COMMERCE ADOPTION

Following Ajzen and Fishbein (1980), the antecedents of attitude, subjective norm, and PBC are a set of attitudinal, normative, and control beliefs, respectively. Attitudinal beliefs are assessments about the likelihood of the behavior’s consequences, normative beliefs are assessments about what important others think of the behavior, and control beliefs are assessments of the internal (individual) and external factors that facilitate or impede the behavior. The idea that TPB beliefs can be decomposed into disaggregated beliefs has been credited to Taylor and Todd (1995a), who introduced the Decomposed TPB (DTPB). Following this view, we decompose the resulting beliefs for each belief, as described for each behavior.

3.1 Getting Information

3.1.1 Attitudinal Beliefs for Getting Information

Mobile Device Screen Quality

One of the major limitations of m-commerce is the quality and size of the screen of mobile devices that consumers must use to get information from mobile sellers. The screen of mobile devices must be large enough to adequately display the necessary information for consumers. Therefore, having a mobile device with a screen of high quality and size would make it easier for consumers to get information from sellers.

\textit{H1a: Screen quality positively influences a consumer’s attitude toward getting information from a seller using a mobile device.}
Informativeness

Informativeness is defined as the degree to which a mobile seller provides consumers with resourceful and helpful information (Luo 2002). It is a perceptual construct that reflects whether consumers feel that the seller has offered them a large variety of rich information that they consider valuable (Ducoffe 1996, Resnik and Bruce 1977). An appropriate breath and depth of information presented in mobile websites is found to enhance the usage of mobile websites (Venkatesh and Ramesh 2006), and also develop positive attitudes towards mobile sellers (Tsang et al. 2004). Building upon this logic, attitude toward getting information is likely to be enhanced if consumers can get information about a product of their interests.

**H1b: Informativeness positively influences a consumer’s attitude toward getting information from a seller using a mobile device.**

Perceived Usefulness of Getting Information

Perceived usefulness has been defined as is the extent to which one believes that using a system will enhance her performance (Davis 1989). Perceived usefulness of getting information is defined as the extent to which a consumer believes that a mobile device would enhance her effectiveness in getting information about products. Perceived usefulness has been shown to shape positive attitudes in system use (Taylor and Todd 1995a). Extended to m-commerce, perceived usefulness of getting information enhances attitude toward getting information from sellers using mobile devices.

**H1c: Perceived usefulness positively influences a consumer’s attitude toward getting information from a seller using a mobile device.**

3.1.2 Control Beliefs for Getting Information

Portability

One of the greatest advantages of m-commerce is the portability of mobile devices that allow buyers to get information about products and services from virtually anywhere in the world. The...
portability of mobile devices makes it easier to get information from vendors wherever they are, thus facilitating their ability to get information.

**H2a: Portability positively influences a consumer’s perceived behavioral control over getting information from a seller using a mobile device.**

**Download Delay**

Download delay is defined as the amount of time needed for a mobile device to display the buyer’s requested information (Rose *et al.* 1999). Download delay relates to a mobile device’s response time, a factor associated with lower intentions to use a system (Ives *et al.* 1983). Download delay is also negatively related to the time needed to perform a task, which has been shown to lower intentions to use a system (Mawhinney and Lederer 1990). In m-commerce, Tsang *et al.* (2004) showed that irritation due to download delay is an important impediment to mobile advertising, while Schultz (2001) argues that slow connection speeds impede the adoption of m-commerce. Since download delay acts as an impediment to getting information, it increases the difficulty for consumers to get information from mobile devices.

**H2b: Download delay negatively influences a consumer’s perceived behavioral control over getting information from a seller using a mobile device.**

**Perceived Ease of Getting Information**

Perceived ease of use has been defined as the extent to which a user believes that using a system will be effortless (Davis 1989). Applied to m-commerce, perceived ease of getting information is defined as the extent to which a consumer believes that getting product information from a seller using a mobile device would be free of effort. The instrumental aspect of perceived ease of use (Davis 1989) is a control belief that facilitates a behavior with lower effort (Lepper 1985). Applied to m-commerce, a mobile device that is perceived easy to get information is likely to increase the consumer’s ability and confidence in getting information. Similarly, an easy to use mobile device removes the cognitive impediments of getting
information. It thus makes the mobile behavior to be perceived as being under the consumer’s full control, thus makes getting product information easier to accomplish.

**H2c: Perceived ease of getting information positively influences a consumer’s perceived behavioral control over getting information from a seller using a mobile device.**

**Consumer’s Getting Information Skills**

An important prerequisite of engaging in a behavior is to have the necessary skills and knowledge to undertake the behavior (Koufaris 2002). Following Bandura (1986), self-efficacy is not equivalent to personal skills; self-efficacy deals with subjective judgments as to whether one has the skills needed to accomplish a behavior (p. 391). Therefore, it is composed of elements of individual constraints of performing a behavior. In contrast, consumer skills specifically describe the knowledge and expertise a consumer has to undertake a behavior, and it is thus a predictor of whether a certain behavior can be accomplished. Having such skills is likely to increase a consumer’s judgments of how well they can get information from a seller, thus increasing the consumer’s perceived behavioral control over getting information.

**H2d: Getting information skills positively influence a consumer’s perceived behavioral control over getting information from a seller using a mobile device.**

The preceding hypotheses are summarized in Figure 1a:

**Figure 1a. The Proposed Research Model for Getting Information**
3.2 Giving Information

3.2.1 Attitudinal Beliefs for Giving Information

Information Protection

Information security and privacy breaches have made consumers concerned of online transactions (George 2002). Information security refers to a consumer’s belief about the mobile seller’s ability to fulfill security requirements (Cheung and Lee 2001). Information privacy refers to a consumer’s belief about the mobile seller’s ability to protect their personal information from unauthorized use or disclosure (Cassell and Bickmore 2000). Information protection is defined as the consumer’s belief about the mobile seller’s ability to safeguard her personal information from security and privacy breaches. While information security and privacy can be viewed as distinct constructs, we propose a unitary view of information protection (Pavlou and Fygenson 2006). When consumers feel comfortable with how mobile sellers protect their personal information, they overcome the barriers to giving information.

H3a: Information protection positively influences a consumer’s attitude toward over giving information to a seller using a mobile device.

Perceived Risk

Perceived risk - the subjective belief of suffering a loss in pursuit of a desired outcome (Featherman and Pavlou 2003) - is a key element of buyer-seller relationships. Perceived risk reduces the buyers’ intentions to engage in e-commerce transactions (Jarvenpaa et al. 2000) and transact in online auction marketplaces (Pavlou and Gefen 2004). Risk perceptions relate to expectations of negative and harmful consequences if giving information to a mobile seller, thus creating negative attitudes toward giving information to a seller using a mobile device.

H3b: Perceived risk positively negatively a consumer’s attitude toward giving information to a seller using a mobile device.
Perceived Usefulness of Giving Information

Following Davis (1989), perceived usefulness of giving information is defined as the extent to which a consumer believes that a mobile device would enhance her effectiveness in giving product information. Perceived usefulness has been shown to shape behavioral intentions by shaping attitudes (Taylor and Todd 1995a). Applied to giving information to mobile sellers, we propose:

H3c: Perceived usefulness positively influences a consumer’s attitude toward giving information to a seller using a mobile device.

3.2.2 Control Beliefs of Giving Information

Website Personalization

One of the key aspects of m-commerce is its potential for personalization (Kalakota and Robinson 2001). Personalization is defined as the extent to which the communication between consumers and sellers is shaped to the consumers’ preferences, needs, and shopping habits. Personalization ensures that consumers see the most relevant and appropriate message (Kim et al. 2001). In general, consumers prefer the context of their mobile services to be personalized to their needs (Robins 2003). Personalization not only enhances their perception of the seller (Xu 2003), but also decrease the effort to navigate mobile sites (Karkkainen and Laarni 2002; Venkatesh and Ramesh 2006), thus enhancing the consumer’s ability to give information.

H4a: Personalization positively influences a consumer’s perceived behavioral control over giving information to a seller using a mobile device.

Download Delay

As described above, download delay relates to a mobile device’s response time, and it makes it more difficult to perform a task. Download delay is proposed to negatively impact the perceived behavioral control over giving information since having to wait too long to give information creates negative expectations about giving information. Download delay is thus an
impediment to giving information, making it difficult for consumers to give out personal
information to sellers using their mobile device.

*H4b: Download delay negatively influences a consumer’s perceived behavioral control over giving information from a seller using a mobile device.*

**Perceived Ease of Giving Information**

Perceived ease of giving information is defined as the extent to which a consumer believes
that giving personal information to a seller using a mobile device would be free of effort.

Applied to m-commerce, a mobile device that is perceived easy to give information is likely to
increase the consumer’s confidence in giving information. Similarly, an easy to use mobile
device removes the cognitive impediments of giving information. It thus makes these mobile
behaviors to be perceived as being under the consumer’s full control, thus making giving
information completely up to consumer.

*H4c: Perceived ease of giving information positively influences a consumer’s perceived behavioral control over giving information to a seller using a mobile device.*

**Consumer Giving Information Skills**

An important prerequisite of engaging in a behavior is to have the necessary skills to
undertake the behavior (Bandura 1986). Applied to m-commerce, giving information skills
captures a consumer’s expertise in giving information to a mobile seller. Having such skills is
likely to increase consumers’ judgments of how well they can give information to a seller, thus
increasing their self-efficacy for giving information.

*H4d: Giving information skills positively influence a consumer’s perceived behavioral control over giving information to a seller using a mobile device.*

The preceding hypotheses are summarized in Figure 1b:
3.3 Purchasing

3.3.1 Attitudinal Beliefs for Purchasing

Perceived Purchasing Value

Product value refers to a product that offers an attractive combination of quality and price. Price discounts are examples where the consumer can save money by getting a product at a lower price, and they have been shown to influence purchase intentions (Alford and Biswas 2002). Perceived product value favorably predisposes consumers by allowing them to expect a high quality product at a low cost, enhancing their attitude toward purchasing from a mobile seller.

**H5a:** Purchase value positively influences a consumer’s attitude toward purchasing from a seller using a mobile device.

Perceived Risk of Purchasing

As noted above, perceived risk is the subjective belief of suffering a loss in pursuit of a desired outcome. Risk perceptions relate to expectations of negative outcomes if purchasing products with a mobile device, creating negative attitudes toward purchasing from a seller using a mobile device.

**H5b:** Perceived risk positively influences a consumer’s attitude toward purchasing from a seller using a mobile device.
Perceived Usefulness of Purchasing

As described above, perceived usefulness of purchasing describes the extent to which a consumer believes that a specific seller would enhance her effectiveness in purchasing products. Perceived usefulness has long been shown to influence behavioral intentions by shaping attitude toward a behavior (Taylor and Todd 1995a). Applying these arguments to purchasing from a seller using a mobile device, we propose:

\textit{H5c: Perceived usefulness of purchasing positively influences a consumer’s attitude toward purchasing from a seller using a mobile device.}

3.3.2 Control Beliefs of Purchasing

Monetary Resources

Purchasing a product necessitates an outlay of monetary resources. Having the required monetary resources is a prerequisite for purchasing a product, and evidence suggests that the cost for mobile services impede their proliferation (Schultz 2001). By overcoming the financial impediments to purchasing, consumers will find it easier to purchasing products from sellers using their mobile devices.

\textit{H6a: Monetary resources positively influence a consumer’s perceived behavioral control over purchasing from a seller using a mobile device.}

Download Delay

As described above, download delay captures a mobile device’s response time to purchasing. Download delay is proposed to negatively impact perceived behavioral control over purchasing since having to wait too long to complete a purchase creates negative expectations about purchasing. Download delay is thus an impediment to purchasing, making it difficult for consumers to purchase from a seller using a mobile device.

\textit{H6b: Download delay positively influences a consumer’s perceived behavioral control over purchasing from a seller using a mobile device.}
Perceived Ease of Purchasing

Perceived ease of purchasing is defined as the extent to which a consumer believes that purchasing products from a seller using a mobile device would be effortless. Perceived ease of purchasing is viewed as a control belief that facilitates a behavior with lower effort (Lepper 1985). An easy to use mobile device removes the cognitive impediments of purchasing products, and it thus makes these mobile behaviors to be perceived as being under the consumer’s full control, thus making purchasing completely up to consumer.

*H6c: Perceived ease of purchasing positively influences a consumer’s perceived behavioral control over purchasing from a seller using a mobile device.*

Consumer Purchasing Skills

Purchasing skills refer to the consumer’s knowledgeability about purchasing products from sellers using mobile devices, which are likely to increase consumers’ judgments of their efficacy to purchase products using mobile devices, leading to higher self-efficacy.

*H6d: Consumer purchasing skills positively influence a consumer’s perceived behavioral control over purchasing from a seller using a mobile device.*

The preceding hypotheses are summarized in Figure 1c:

*Figure 1c. The Proposed Research Model for Purchasing*
Control Variables

Past Experience: The literature has shown that past behavior influences future behavior (e.g., Conner and Armitage 1988). Hence, we control for the role of past experience on intentions.

Demographics: We control for age, gender, education, and experience with mobile device.

4. RESEARCH METHODOLOGY

4.1 Measurement Development

All measurement items were drawn from the literature, and they were then adapted using standard psychometric scale development procedures and a refinement procedure based on several pilot studies (Churchill 1979).

Transaction intentions were based on Ajzen (2002b). Attitude and subjective norm were adapted from Karahanna et al. (1999). Perceived behavioral control was based on Taylor and Todd (1995a) and Compeau and Higgins (1995). A single indicator (criterion variable) was also used to assess PBC directly (Taylor and Todd 1995a). Perceived usefulness and ease of use were adapted from Gefen et al. (2003). Download delay was based on Rose et al. (1999), screen quality was assessed with a new scale, information protection was based on the scales of perceived privacy and security developed by Cheung and Lee (2001) and Salisbury et al. (2001). Informativeness was based on Luo (2002), product value on Chen and Dubinsky (2003), personalization on Yang and Jun (2002), monetary resources on Bellman et al. (1999), perceived risk from Jarvenpaa et al. (2000), and consumer skills on Koufaris (2002). Portability was measured with a new scale. Finally, past behavior used standard items for past activities.

A major obstacle in our study was the large number of survey items we had to pose to our respondents in order to simultaneously assess three mobile behaviors. We were thus limited to the use of mostly two-item scales. We thus used well-validated scales and undertook multiple
pretests to judiciously reduce the number of items per scale without weakening the underlying construct’s measurement properties.

4.2 Survey Administration

Following the development of the constructs and their operationalization, several small-scale pretests (including personal interviews) were conducted with a total of 12 respondents to enhance the psychometric properties of the measurement scales. The items were then refined with a small scale size with 50 students.

The study’s final sample comprised of 900 consumers in the United States taken from a list provided by the eLab of the UCR Sloan Center for Internet Retailing (www.sloan.ucr.edu). The respondents were asked to click on the Web URL link provided in an invitation e-mail message, which linked to an online survey instrument. The respondents were offered incentives in the form of a $100 monetary prize, and they were assured that the results would be reported in aggregate to guarantee their anonymity. In the beginning of the data collection session, an introduction to eBay Mobile was presented to inform the participants about the study’s context.

300 responses were obtained (33% response rate). Non-response bias was assessed by testing if the early and late respondents were not significantly different (Armstrong and Overton 1977). We compared these two samples based on their demographics (gender, age, education, and experience with mobile device) and their responses to the study’s constructs. All t-test comparisons between the means of the two groups showed insignificant differences (p<0.1).

5. RESULTS

We used Partial Least Square (PLS) to analyze the data. PLS employs a component-based structural equation modeling approach for estimation purposes (e.g., Lohmoller 1989), and it places minimal restrictions on measurement scales, sample size, and residual distributions (Chin et al. 2003). PLS was chosen to accommodate the presence of multiple 2-item constructs.
5.1 Measurement Validation

Measure reliability was assessed using internal consistency scores, calculated by the composite reliability scores (Werts et al. 1974). Internal consistencies of all variables are considered acceptable since they all exceed 0.70, showing adequate reliability.

Convergent and discriminant validity is inferred when the PLS indicators (a) load much higher on their hypothesized factor than on other factors, and (b) when the square root of each factor’s Average Variance Extracted (AVE) is larger than its correlations with other factors (Chin 1998). The first test for discriminant and convergent validating was performed by calculating the PLS theta matrix (Agarwal and Karahanna 1999). All items loaded on their respective factors, which were much higher than all cross loadings. Second, the square root of all AVEs was above .80, which was much larger than all cross-correlations. Third, all correlations were less than unity by an amount greater than twice their standard errors. These tests suggest that all measures have adequate convergent and discriminant validity and unidimensionality.

A series of tests were performed to account for the possibility of common method bias: First, we performed Harman’s one-factor test (Podsakoff and Organ 1986). Each principal construct from a principal components factor analysis explains roughly equal variance, which suggests that our data do not suffer from high common method variance. Second, a partial correlation method was used, following Podsakoff and Organ (1986). The highest factor from a principal component factor analysis was added into the PLS model as independent factor on all dependent variables. This factor is assumed to “contain the best approximation of the common method variance if is a general factor on which all variables load” (Podsakoff and Organ 1986, p. 536). This factor did not significantly increase the variance explained in any of the dependent variables, indicating lack of common method bias. Third, there were no extremely correlated factors in the correlation matrix. In sum, these tests suggest that common method bias does not account for the study’s results.
Figure 2. PLS Results for the Three Mobile Behaviors

Mobile Device Screen Quality
Informativeness
Perceived Usefulness of Getting Information
Portability
Download Delay
Perceived Ease of Getting Information
Consumer’s Getting Information Skills

Attitude toward Getting Information
Subjective Norm toward Getting Information
Intention to Get Info
Perceived Behavioral Control over Getting Information

Perceived Usefulness of Purchasing
Perceived Purchasing Value
Perceived Purchasing Risk
Perceived Usefulness of Purchasing
Monetary Resources
Download Delay
Perceived Ease of Purchasing
Consumer’s Purchasing Skills

Attitude toward Purchasing
Subjective Norm toward Purchasing
Intention to Purchase
Perceived Behavioral Control over Purchasing

Perceived Usefulness of Giving Information
Information Protection
Perceived Risk of Giving Information
Perceived Usefulness of Giving Information
Personalization
Download Delay
Perceived Ease of Giving Information
Consumer’s Giving Information Skills

Attitude toward Giving Information
Subjective Norm toward Giving Information
Intention to Give Info
Perceived Behavioral Control over Giving Information

78% 70% 75%
35% .33** .07**
.70** .11* .15** .43**
67% .61** .70**
80% .37**

71% .47**

75%
70%
5.2. The Structural Model

The PLS parameter estimates (path coefficients) are shown in Figure 2. For clearer exposition, the item loadings of each construct are omitted since they are all above .80. All control variables were initially included in the model, but since none were significant, they were dropped. This is consistent with Ajzen (1991) who argues that the TPB constructs account for past experience. The sample size of 300 respondents was large enough to capture the largest number of structural paths directed at any construct (Chin et al. 2003).

As shown in Figure 2, all proposed hypotheses were validated, explaining a high degree of variance in intentions, attitude, and perceived behavioral control for the three behaviors.

6. DISCUSSION

6.1 Key Findings

This paper examines m-commerce adoption as a set of three inter-related behaviors, (getting information, giving information and purchasing), which correspond to Leung and Antypas’ (2001) definition of mobile commerce, as the “content delivery (notification and reporting) and transactions (purchasing and data entry) on mobile devices” (p. 12). The proposed behaviors are interrelated (following Gollwitzer’s (1999) theory of implementation intentions) in which purchase intentions induce intentions to get and give information to sellers using mobile devices.

To predict each of the three behaviors, we referred to an extended version of the TPB (Ajzen 2002a; Pavlou and Fygenson, 2006) to identify the most salient consumer beliefs that drive each of the behavior’s attitudes and PBC. The derivation closely follows Ajzen and Fishbein (1980) who recommend selecting 5-9 beliefs that are most likely to influence each behavior.

Given that the literature has offered numerous variables to predict m-commerce adoption, this study identified the most influential ones. The proposed beliefs include technology adoption variables (perceived usefulness and ease of use), technological variables (screen quality,
portability, download delay), information characteristics (informativeness and information protection), product characteristics (perceived purchasing value and personalization), and consumer characteristics (monetary resources and consumer skills). It is empirically validated that these beliefs can adequately predict the attitude and PBC of each behavior, which in turn predict the three m-commerce behavioral intentions. In contrast to simple models with a few variables (e.g., Hung et al., 2003; Nysveen et al., 2005; Yankee Group, 2002), the proposed model is a comprehensive representation of m-commerce adoption.

6.2 Contributions and Implications for Theory and Research

The proposed model makes three key contributions: First, it empirically assesses the key drivers that enable consumers to engage in three prevalent “mobile” transaction behaviors. While the literature has focused on a single behavior (i.e., purchasing), this study presents a more comprehensive view of m-commerce adoption as an inter-related set of behavioral intentions (i.e., getting information, giving information, and purchasing). Therefore, it contributes to the marketing and m-commerce literature by validating a comprehensive model with the most influential drivers of m-commerce adoption.

Second, to the best of our knowledge, this is the first study to simultaneously model three distinct behaviors in an integrated model from a TPB perspective, and also to identify a separate set of external beliefs for attitude and PBC. In doing so, the proposed helps identify a more detailed and specific set of attitudinal and control beliefs, and it also helps explain a higher degree of variance in all three behaviors. Third, the proposed model is empirically tested and validated with a large sample of 300 consumers in the United States.

6.2.1 Implications for Mobile Commerce Adoption

Mobile commerce requires the use of mobile devices, which share the unique benefit of portability, yet having smaller screens, lower processing capabilities, and more inconvenient
input/output facilities compared to stationary devices. This study identifies a set of beliefs that drive three distinct behavioral intentions that are specific to m-commerce. Besides the technology acceptance variables (perceived ease of use and perceived usefulness) that have been shown to influence purchases of mobile services (Hung et al., 2003) and product value and monetary resources that facilitate consumer transactions in traditional environments, portability, download delay, screen quality, information protection, and personalization are distinct variables that are unique to m-commerce. Moreover, ‘consumer skills’ is another influential driver of m-commerce adoption, indicating the importance of training to use mobile devices.

Finally, viewing m-commerce adoption as a multi-stage process, not only yields a more parsimonious understanding of “mobile” consumer behavior, but since the three behaviors are interrelated, it also enhances the predictive power of the proposed m-commerce adoption model.

6.2.2 Implications for the Theory of Planned Behavior

In striving to fully understand and simultaneously predict three distinct, contingent, and non-volitional behaviors, this paper contributes to the social psychology literature by extending TPB in two major ways:

First, while TPB is commonly used to model behaviors independently, this study extends TPB to allow modeling the association between several inter-related behaviors. The behaviors are linked at the intention level, while perceptions and beliefs remain strictly behavior-specific (consistent with TPB). One behavior can thus impact another without violating TPB. Also, following Gollwitzer’s (1999) notion of implementation intentions, a goal intention can trigger a set of goal-driven intentions that serve as the means for accomplishing the goal. Allowing multiple related behaviors to be simultaneously modeled opens new avenues for future research and paves the way for a more complete explanation and prediction of inter-related behaviors.
6.3 Implications for Practice

The proposed m-commerce adoption model describes a concrete set of factors that sellers can manipulate to enable consumers to get information, give information and purchase from them using their mobile devices. It also suggests that sellers should develop specific marketing plans to improve consumer attitudes and enhance their PBC over these three behaviors. The proposed external beliefs (and their impact on attitude and PBC) are specific variables that sellers could focus their investments to facilitate consumer adoption of m-commerce.

Accordingly, it is suggested that mobile service provider focus on capturing the revenues from selling services by paying much attention on the available monetary resources of different market segments, for designing appropriate mobile services with reasonable and affordable prices with more product values for users across cultures, income level, ages etc.

7. CONCLUSION

This study represents a systematic approach to better understanding and predicting “mobile” consumer behavior. The identification and development of a large set of factors that drive m-commerce adoption aim to prescribe what needs to be done for m-commerce to proliferate. Most important, it aims to entice IS researchers to view “mobile” consumer behavior as a new research area where IS can assume a leadership role.
REFERENCES


