

December 2006

A Theoretical Model of Consumer Acceptance of mPayment

Lei-Da Chen
Creighton University

Follow this and additional works at: <http://aisel.aisnet.org/amcis2006>

Recommended Citation

Chen, Lei-Da, "A Theoretical Model of Consumer Acceptance of mPayment" (2006). *AMCIS 2006 Proceedings*. 247.
<http://aisel.aisnet.org/amcis2006/247>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2006 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

A Theoretical Model of Consumer Acceptance of mPayment

Lei-da Chen
Creighton University
lchen@creighton.edu

ABSTRACT

Mobile payment entails making payments using mobile devices including wireless handsets, personal digital assistants, and other radio frequency and near field communication based devices. While mPayment is still in its infancy, its acceptance is expected to increase exponentially in the coming years. By expanding the Technology Acceptance Model and the Innovation Diffusion Theory, this study aims to provide a theoretical model that explains US consumers' acceptance of mPayment. Using the Structural Equation Modeling technique, the data from the 299 surveys completed by consumers will be used to validate the proposed research model.

Keywords

mobile commerce, mobile payment, technology acceptance, innovation diffusion.

INTRODUCTION

Mobile payment (mPayment) refers to making payments using mobile devices including wireless handsets, personal digital assistants (PDA), radio frequency (RF) devices, and near field communication (NFC) based devices. The payment industry is hoping that mPayment will deliver the convenience, transaction speed, and versatility required in today's complex marketplace. While mPayment is still in its infancy, experts predict that the global mPayment transaction volume will exceed \$37 billion by 2008 (New Media Age, 2004). Research and development efforts from financial and technology firms to develop mPayment methods have given rise to a myriad of incompatible and competing standards. According to ePayment Systems Observatory's database (<http://www.e-pso.info/>), over 183 types of mPayment systems exist just within Europe.

The fundamental question that motivated this study is what factors determine U.S. consumers' acceptance of mPayment. Increasing acceptance of mPayment methods is witnessed in Europe and Asia in the recent years, but in the US, the potential of mPayment is still largely unexplored. As a result, much of the research in this area was conducted outside the U.S. (e.g. Haque, 2004). In addition, most existing studies on mPayment have been conceptual or anecdotal, and they largely focus on the technical aspects of payment processes (e.g. Herzberg, 2003; Varshney, 2003; Chou, et al., 2004). This study aims to provide theoretical contribution to the area of mPayment by identifying some of the factors that determine consumer acceptance of mPayment. Understanding these factors will lead to more effective design and marketing of mPayment procedures, devices, and services. By expanding the existing adoption theories, this study proposes and validates a theoretical model for consumer acceptance of mPayment.

MOBILE PAYMENT

Two major forms of mPayment exist today: cellular mPayment and contactless mPayment. In cellular mPayment, also called "dial & confirm", payments are made using cellular based mobile devices for both online and point-of-sale transactions. Contactless mPayment, also called "wave & go", on the other hand, is a proximity payment method in which no contact between a payment device and interfacing reader is required. The transmission technologies behind contactless mPayment include RF and NFC technologies, among which, Radio Frequency Identification (RFID) is gaining increasing popularity. Contactless mPayment is generally used for point-of-sale transactions.

The integration of Cellular and Contactless mPayment on a single device will likely revolutionize the payment industry. Recently, NTT DoCoMo claims that the next big thing in mobile commerce is embedding a NFC chip with payment information in handset combining both cellular and contactless mPayment functions into one device (Economist, 2005). Imagine if a consumer could use one universal payment device to make both point-of-sale purchases (e.g. food, grocery, and

parking) and online purchases (e.g. ringtone, music, online products, and online services). The device allows consumers to decide which payment mechanism they prefer (debit, credit, pre-paid, etc.) and receive one usage statement at the end of each billing period. Industry experts believe that this device can be the consumer's mobile handset, PDA, or other wireless and mobile devices. According to ABI research, more than 50% of all mobile handsets will incorporate contactless payment features by 2010 (Sullivan, 2005).

THEORETICAL DEVELOPMENT

While the Technology Acceptance Model (TAM) was originally designed to study technology adoption at workplace (Davis, 1989), it has been widely adopted to study consumer online behaviors (e.g. Gefen and Straub, 2000; Pavlou, 2003; Chen, Gillenson and Sherrell, 2004). TAM argues that two variables (i.e. perceived usefulness and perceived ease of use) help determine the acceptance of a technology. They influence the user's attitude towards a technology, which in turn affects the user's intention to use the technology. Finally, intention to use correlates highly with actual use. Another well established adoption theory is Innovation Diffusion Theory (IDT) (Rogers, 1995). IDT identified the determinants of the rate of adoption to be relative advantage, compatibility, complexity, trialability, and observability. In 1982, Tornatzky and Klein (1982) conducted a meta-analysis of 75 diffusion studies and found that only relative advantage, compatibility and complexity were consistently related to the rate of innovation adoption. When using mPayment, consumers conduct transactions by engaging in a wide array of relatively new wireless and payment technologies, hence TAM and IDT are well versed to study mPayment adoption.

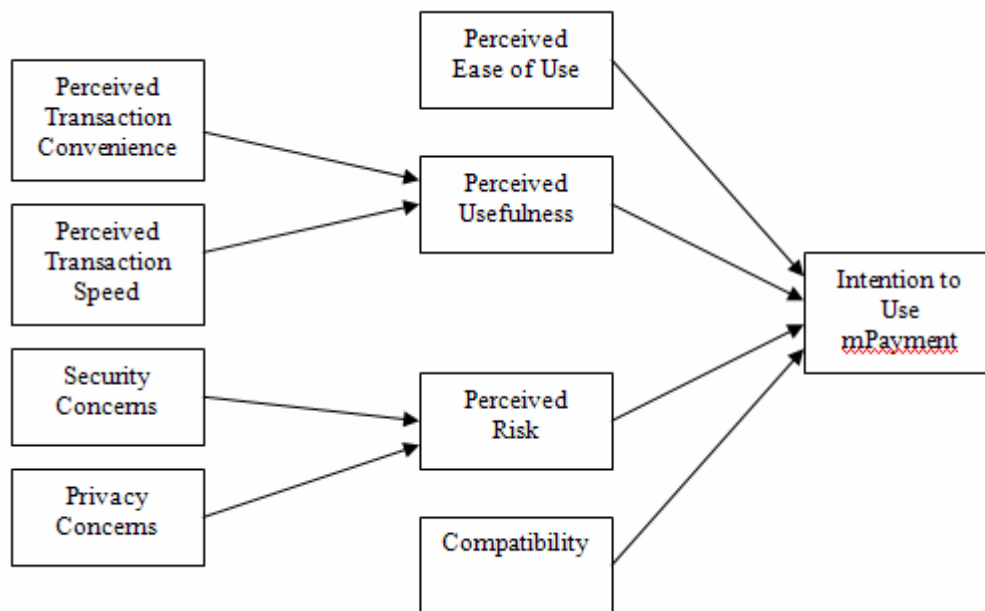


Figure 1. Research Model

The proposed research model is an extension of TAM and IDT (Figure 1). In the proposed model, the key TAM and IDT variables (perceived usefulness, perceived ease of use, and compatibility) are posited as key drivers of mPayment acceptance. In addition, the construct of perceived risk is also included due to the uncertainty created by the mPayment environment. Perceived risk has been found in prior studies to be a direct antecedent of consumers' intention to transaction in an online environment (Pavlou, 2003) suggesting uncertainty reduction is imperative in online transactions. In the context of mPayment, much of the perception of uncertainty is the direct result of consumers' security and privacy concerns. Therefore, security and privacy concerns are postulated to influence perceived risk in the research model. As transaction speed and convenience have often been cited as the main advantages of cashless payment, they are proposed to influence consumers' perceived usefulness of mPayment. Brief description of the constructs in the hypothesized model is included in Table 1.

Factor	Definition
Perceived Transaction Convenience (TC)	The extent to which the prospective user perceives that mPayment increases convenience in the payment process.
Perceived Transaction Speed (TS)	The extent to which the prospective user perceives that mPayment improves the speed of transaction.
Security Concerns (SC)	The extent to which the prospective user is concerned about the following security aspects relevant to mPayment. The factor includes the following sub-constructs (Suh and Han, 2003): <ul style="list-style-type: none"> • <i>Authentication:</i> Data exchanged during the transaction will be restricted to legitimate users only. • <i>Confidentiality:</i> Data exchanged during the transaction can only be read and understood by intended users. • <i>Non-Repudiation:</i> Participants of the transaction cannot deny their participation in the transaction • <i>Data Integrity:</i> Data exchanged during the transaction are accurate.
Privacy Concerns (PC)	The extent to which the prospective user is concerned about the following privacy aspects relevant to mPayment. The factor includes the following sub-constructs (Smith, Milberg and Burke, 1996): <ul style="list-style-type: none"> • <i>Collections:</i> The company is collecting too much personal information. • <i>Unauthorized Access:</i> Personal information in the database is not protected. • <i>Errors:</i> Personal information in the database is inaccurate. • <i>Secondary Use:</i> Personal information in the database will be used for purposes other than the ones the consumer authorized.
Perceived Usefulness (PU)	The extent to which the prospective user expects mPayment to increase his or her performance in transactions.
Perceived Risk (PR)	The extent to which the prospective user expects mPayment to be risky.
Perceived Ease of Use (PEOU)	The extent to which the prospective user expects mPayment to be free of effort.
Compatibility (C)	The extent to which mPayment is consistent with the prospective user's lifestyle and the way he or she likes to shop.
Intention to Use mPayment (I)	The extent to which the prospective user intends to use mPayment.

Table 1. Factors in the Proposed Research Model

Data collected from a survey of consumers will be used to validate the research model. The following hypotheses will be tested:

H1: A consumer's perceived transaction convenience of mPayment positively affects perceived usefulness of mPayment.

H2: A consumer's perceived transaction speed of mPayment positively affects perceived usefulness of mPayment.

H3: A consumer's security concerns about mPayment positively affect perceived risk of mPayment.

H4: A consumer's privacy concerns about mPayment positively affect perceived risk of mPayment.

H5: A consumer's perceived ease of use of mPayment positively affects his or her intention to use mPayment.

H6: A consumer's perceived usefulness of mPayment positively affects his or her intention to use mPayment.

H7: A consumer's perceived risk of mPayment negatively affects his or her intention to use mPayment.

H8: The compatibility between using mPayment and a consumer's belief, values and needs positively affects his or her intention to use mPayment.

RESEARCH METHODOLOGY

Survey is the primary research method employed in this study. A multi-stage approach was undertaken to develop the questionnaire items that measure the constructs in the proposed research model. In the first stage, an extensive literature review on the constructs generated the initial items. Some of the items were adopted from prior studies and modified to fit the context of mPayment. In some cases, new items were developed as none could be found in the previous literature, but these new items were based on existing literature conceptualizations and theories. In the next stage, these items were shown to 2 IS researchers and 3 payment industry executives. They were asked to comment on the validity of the items. Finally, two IS researchers reviewed the items independently to further refine the questionnaire. As the result of this process, 40 items were retained to be included in the final questionnaire (see Appendix I).

Four hundred and fifty consumers were solicited to participate in the study. So far, 299 complete and usable surveys have been received. Structural Equation Modeling (SEM) techniques will be used to test the hypotheses. The final results will be ready for presentation during the conference.

REFERENCES

1. Chen, L.D., Gillenson, M.L., and Sherrell, D.L. (2004) Consumer Acceptance of Virtual Stores: A Theoretical Model and Critical Success Factors for Virtual Stores, *Data Base*, 35, 2, 8-31.
2. Chou, Y., Lee, C., and Chung, J. (2004) Understanding m-commerce payment systems through the analytic hierarchy process, *Journal of Business Research*, 57, 12, 1423-1430.
3. Davis, F.D. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, *MIS Quarterly*, 13, 3, 319-340.
4. Economist (2005) "Pay with a Wave of Your Phone," *Economist*, 376(8436), p. 71.
5. Gefen, D., and Straub, D.W. (2000) The Relative Importance of Perceived Ease-of Use in IS Acceptance: A Study of e-Commerce Acceptance, *Journal of AIS*, 1, 8, 1-30.
6. Haque, A. (2004) Mobile Commerce: Customer Perception and Its Prospect on Business Operation in Malaysia, *Journal of American Academy of Business*, 4, 1/2, 257-262.
7. Herzberg, A. (2003) Payments and Banking with Mobile Personal Devices, *Communications of the ACM* 46, 5, 53-58.
8. New Media Age. (2004) M-payment predicted to be worth £20bn by 2008, *New Media Age*, 11.
9. Pavlou, P.A. (2003) Consumer Acceptance of Electronic Commerce: Integrating Trust and Risk with the Technology Acceptance Model, *International Journal of Electronic Commerce*, 7, 3, 101-134.
10. Rogers, E.M. (1995) *The Diffusion of Innovations*, 4th ed., New York: Free Press.
11. Smith, H.J., Milberg, S.J., and Burke, S.J. (1996) Information privacy: measuring individuals' concerns about organizational practices, *MIS Quarterly*, 20, 2, 167-196.
12. Suh, B., Han, I. (2003) The impact of customer trust and perception of security control on the acceptance of electronic commerce, *Informational Journal of Electronic Commerce*, 7, 3, 135-161.
13. Sullivan, L. (2005) Atlanta sports fans test cell phone payment service, *InformationWeek*, December 15, available at <http://www.informationweek.com/hardware/showArticle.jhtml?articleID=175004206>.
14. Tornatzky, L.G. and Klein, K.J. (1982) Innovation Characteristics and Innovation Adoption Implementation – A Meta-Analysis of Findings, *IEEE Transactions on Engineering Management*, 29, 1, 28-45.
15. Varshney, U. (2003) Wireless I: Mobile and Wireless Information Systems: Applications, Networks, and Research Problems, *Communications of the Association for Information Systems*, 12, 155-166.

**APPENDIX I
MEASUREMENT ITEMS**

Construct	Item
Perceived Transaction Convenience (New items)	I believe that using mPayment will be convenient.
	I believe that using mPayment will be hassle-free.
	Compared to traditional payment methods, I believe that mPayment methods are more convenient.
Perceived Transaction Speed (New items)	I believe that using mPayment will improve the speed of transaction.
	I believe that using mPayment will save me time.
	Compared to traditional payment methods, I believe that transactions will be fast if I use mPayment.
Security Concerns (Adapted from Suh and Han, 2003)	I believe that the data exchanged in mPayment will be restricted to legitimate users only (Authentication).
	I believe that mPayment methods have security controls to maintain data confidentiality (Confidentiality).
	I believe that mPayment methods will have controls to prevent merchants from denying having participated in a transaction (Non-Repudiation).
	I believe that mPayment methods will have controls to ensure the accuracy of data (Data Integrity).
	I believe that mPayment methods will incorporate sufficient security.
Privacy Concerns (Adapted from Smith, et al., 1996)	I am concerned about the amount of personal information I will be required to provide when using mPayment (Collection).
	I believe that my personal information stored in the databases for mPayment will be protected (Unauthorized Access).
	I believe that my personal information stored in the databases for mPayment will be accurate (Errors).
	I believe that the personal information I provide for mPayment will only be used for the purposes I authorize (Secondary Use).
	I believe that using mPayment will put my privacy at risk.
Perceived Usefulness (Adapted from Davis, et al., 1989)	I believe that using mPayment will improve my shopping experience.
	I believe that using mPayment will enhance my shopping effectiveness.
	I believe that using mPayment will improve my shopping productivity.
	Compared to traditional payment methods, I believe that using mPayment will make it easier for me to shop.
	Overall, I believe that I will find mPayment useful.
Perceived Risk (Adapted from Pavlou, 2003)	In general, I believe that it would be riskier to use mPayment.
	Compared to traditional payment methods, I believe that using mPayment is riskier.
	I believe that there will be high potential for loss associated with using mPayment.
	I believe that there will be too much uncertainty associated with using mPayment.
	I believe that using mPayment will involve many unexpected problems.
	I believe that the companies enabling me to use mPayment will protect my interests.
Perceived Ease of Use (Adapted from Davis, et al., 1989)	I will feel safe using mPayment.
	I believe that learning to use mPayment will be easy for me.
	I believe that mPayment will be easy to use.
	I believe that when I use mPayment the process will be clear and understandable.
	I believe that the user interface on the mPayment device will be confusing for me to use.
Compatibility (Adapted from Chen, et al., 2004)	I believe that it will be easy for me to become skillful at using mPayment.
	I believe that using mPayment will fit my lifestyle.
	I believe that using mPayment methods is compatible with the way I like to shop.
	I believe that using mPayment methods will enhance my lifestyle image.
	I believe that using mPayment methods will be fun.
Intention to Use mPayment (Adapted from Davis, et al., 1989)	I believe that using mPayment methods is suitable for me.
	I intend to use mPayment when it is available to me.