

A confidence-based framework for business to consumer (B2C) mobile commerce adoption

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Received: 24 May 2006 / Accepted: 1 September 2006 / Published online: 3 November 2006
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Abstract The Technology Acceptance Model (TAM) has been considered to be fundamental in determining the acceptance of new technology in the past decades. The two beliefs, ease of use and usefulness, in the model may not, however, fully explain the consumers' behavior in an emerging environment, such as mobile commerce (m-commerce). This paper aims to develop a framework for m-commerce adoption in consumer decision-making processes. In this paper TAM has been adopted and extended to analyze successful m-commerce adoption. The key elements of the proposed confidence-based framework for B2C m-commerce adoption include psychological and behavioral factors. Psychological factors include history-based confidence, institution-based confidence and personality-based confidence. Behavioral factors include perceived ease of use and perceived usefulness of the mobile application and technology.

Keywords Mobile commerce adoption · Technology acceptance model · Confidence · Buying decision making process

1 Introduction

Mobile commerce (m-commerce) has seen significant growth in the last 10 years with rapid growth in a

number of areas such as mobile marketing and mobile internet business. It has been predicted that this rapid growth will continue, with a more than doubling of users to 3.9 billion users, and 50% of the world's population, in the next 5 years [37].

In 2005, the global total number of SMS messages sent has reached 670 billion and this figure is expected to grow to 2.6 trillions by 2007 [2]. The usage of SMS business such as mobile advertising products or services is rapidly increasing. Recently reports estimated that approximately 15% of SMS global traffic would be for commercial purposes in 2004. In comparison, the m-commerce activities are more active in some of the advanced countries as such Finland which has reported between 50 and 70% [8]. It has been reported that over 70% of mobile users have received mobile marketing in 2005 whereas, around 10% are engaged with mobile business activities where customers who buy products via their mobile phones [21, p. 1]. As a result, it is important to further explore strategies for implementing m-commerce.

1.1 Contributions

As mobile technologies rapidly change, m-commerce adoption and acceptance is on the rise, but it is important to understand what are the factors that drive customer acceptance [3, 34–36]. Without a theoretical framework, it is difficult to predict what decides mobile users/customers in their buying decisions. It is a critical step to build a theoretical framework that can explore existing theories and models, where a theory consists of repeatedly tested statements that help explain a phenomenon.

The aim of this study focuses solely on the customer's perceptions of the m-commerce environment,

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rather than on the trust in intermediaries or in third parties that might mediate between the customer and the store. The focus is on development of a framework to explain m-commerce acceptance in consumers' decision-making process. The paper further extends the Technology Acceptance Model (TAM) in m-commerce, particularly in the context of the consumer's confidence level in the buying decision-making process, rather than only focusing on the users' acceptance of technology. The paper provides a theoretical framework for m-commerce adoption and also suggests the important relationships between psychological and behavioral factors in the consumer decision-making process.

2 Definition of m-commerce

The m-commerce environment is more uncertain and riskier than the traditional retail environment. Since the transactions can take place without personal contact, customers are generally concerned with the legitimacy of the vendor and authenticity of the products or services. Thus, buying confidence and trust over the mobile network or Internet are major concerns. Consumer's confidence has been identified as a construct that is critical for the success of m-commerce [25, 27, 29], because without it, customers will not use the vendor's technology application and do business with the online mobile vendors [23]. Therefore, it is important that online mobile businesses to recognize that developing customer's confidence is a key to success in m-commerce environments. As such, mobile business should continually analyze how to develop customer's confidence [27].

M-commerce is an extension of e-commerce. In terms of e-commerce, m-commerce often refers to the business to consumer (B2C) model [34]. In particular, Louis [15] classified mobile B2C to include the following characteristics:

- Wireless data delivery service is a critical element of m-commerce. Popular services are weather and sports reports, traffic conditions, financial news, stock portfolio tracking, stock quotes, and telephone directory assistance.
- M-commerce transactions often require immediate actions for people on the run. For example, typical m-commerce transactions include buying tickets,

purchasing goods from vending machines via wireless devices, and trading stocks.

- M-commerce marketing functions may alert users of shops and special sales based on their locations.

There are a number of mobile technologies and applications supporting m-commerce. For example, location-based services can be used for advertising goods or services to customers in a unique way. Many innovative technologies and applications in B2C m-commerce can be found in the retail industry [7, 24, 34, 36]. However, to build trust and reach customers, it is important to understand customer's buying behavior such as their buying decision process.

3 Buying decision-making process

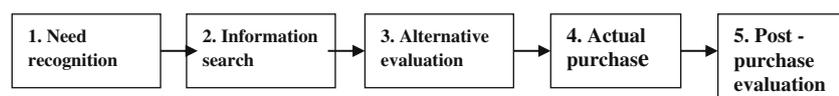
The consumers' buying decision-making process involves significant amounts of risk. As the need to purchase is realized, risk perception may grow, because, there is no immediate solution and not enough information. As the search begins and information is sought, risk might decrease. Depending on the complexity of the choice, overall risk perception should continue to fall during the evaluation phase. However, it may rise slightly just before the decision is taken, as last minute indecision causes an increase in uncertainty. Given that the purchase is satisfactory, there could then be a rapid decline in the risk perceived. It is important to understand what factors affect customer's confidence to reduce the level of risk over the whole purchase process.

A number of general frameworks in consumer behavior are available that capture the consumer purchase (decision-making) process [25, 30]. These frameworks distinguish a number of stages shown in Fig. 1, typically including at least the following: need recognition, information search, alternative evaluation, actual purchase, and post-purchase evaluation. This section will review the stages of the consumer purchase process and what factors of customer confidence online are involved.

3.1 The need recognition

The decision process begins with a customer recognizing a problem to be solved or a need to be satisfied. Need recognition is a realization by customers that they

Fig. 1 The stages of buying decision-making process



require something to get back to their normal state of physical and psychological comfort. In this stage, the perception of risk may grow, because consumers are afraid no immediate solution and not enough information is available. A customer seeking to engage for a business relationship with a vendor in an uncertain environment such as online business has initially a positive predisposition [20]. Thus, in m-commerce, inexperienced mobile consumers are forced to base their confidence primarily on their socialized propensity to confidence to reduce their uncertainty [10].

3.2 The information search

An m-commerce vendor should trigger a customer's interest in the store. However, adopting m-commerce faces one of its biggest challenging issues in that usability design in m-commerce includes lack of standards, small screen size, limited screen resolution, limited processing capacities, and cumbersome input mechanisms [25, 32]. With advanced database technology, the vendor should try to collect customer information and use that information to develop a relationship with customers. It is the best choice application for m-commerce; therefore, using SMS provides frequent buyer incentives, and ads for potential customers. In the stage of information search, consumers continue to turn first to recognized brands. Brands remain critically important to vendors [9], since they supply three fundamental benefits. Those benefits are lower search costs, building confidence, and to communicate quality [9]. Customers feel that the better the brand is, the higher the confidence they have. Hence in the information search stage, the creation of better brands should produce an important source of customer confidence and so overcome their uncertainty.

3.3 The evaluation of alternatives

At this point, the customer has found the relevant information. The question now arises as to whether he or she uses this information to arrive at the choices between alternative products and brands. Customers in m-commerce can also rely on references from their family and friends, consumer research group, or word-of-mouth.

Consumers tend to join the largest communities because they will benefit more from the exchange. The larger size of companies provides brand awareness and economies of scale. This allows a firm to take advantage of switching costs, and consumers' fear of being stranded with a failing store [9].

3.4 The actual purchase

The quality of the information posted on the company website or mobile portal has a direct impact on potential customers' perceptions of its products and services. The information quality and good interface design of vendor's information enhances the formation of customer confidence. Therefore, one would expect that the customer's experience with a good-quality website would also have a strong effect on customer's confidence in the company. However, a fundamental challenge for m-commerce is the small keypads and limited display interface of mobile devices. As a result, m-commerce web site designers should offer scaled web pages with a limited number of features on the mobile interface.

Before making a mobile transaction, consumers are concerned about wireless payment security, reliability, and privacy of the mobile transaction [10]. Perceived security and perceived privacy are critical factors in acquiring and retaining consumers as mobile shopping service users. However, the security and privacy issues are more than a technology problem, so they cannot be resolved by technological advancements alone [26]. This is where third-party assurances such as insurance and Web seal can help. For example, in traditional international trading, the credibility of both the buyer and the seller is critical to a successful trading relationship [26]. An insurance company will assure that the seller keeps its promise to deliver the products or services to satisfy consumers. In this way, consumer confidence can be created and the mobile buying experience may even be better than traditional commercial transactions.

3.5 The post-purchase evaluation

The buyer's satisfaction is a function of the judgment between the buyer's product expectations and the product's perceived performance [19]. It is a post-purchase phenomenon reflecting how much the customer likes (is satisfied) or dislikes (is dissatisfied) with the service or product after experiencing it [19].

If performance is below expectations, then the consumer will be dissatisfied and will suffer the consequences resulting from the mismatch. Therefore dissatisfied consumers will try to reduce the cognitive dissonance. In reducing this cognitive dissonance the consumer exhibits risk-reducing behavior. This time, risk-reducing strategies are employed to reduce the consequences of a less than satisfactory purchase. Strategies are good customer service or support that includes returning the good to the place of sale, obtaining a refund or an exchange and acquiring

information from formal and informal sources to confirm its high value.

4 Framework for m-commerce acceptance

This section reviews some research streams, and based on identified factors effecting confidence from the previous section determines which ones may affect consumer's buying decisions. A framework of m-commerce acceptance is proposed and discussed. A significant body of knowledge from several research streams sheds light on how confidence forms. Drawing from those theoretical streams, a number of confidence antecedents have been identified from the literature. The framework of the mobile TAM has a number of elements which are psychological and behavioral factors that effect buying behavior (see Fig. 2). The behavioural factors include perceived ease of use and perceived usefulness (these two factors are directly adopted from TAM) [4]. The psychological factors refer to security, convenience and trust.

4.1 Behavioral factors

In most technological inventions, success or failure is determined by user acceptance. Attewell and Rule says it's "the pivotal factor" [1]. User cooperation is essential for many technology applications of mobile technology. Three important factors that lead to acceptance:

- Users have a need for increased security, and believe that the mobile technology will increase security [36].

- Mobile technology is more convenient to use than previous/alternative systems.
- Users trust those holding the data to keep them secure and not use them in any other way than the advertized purpose.

4.1.1 Perceived usefulness and perceived ease of use

The TAM is an information systems theory that models how users come to accept and use a technology. The TAM was first introduced by Davis et al. in 1986 [4]. The model provides a traditional view point about technology acceptance from the users' perspective. The level of the users' acceptance depends on perceived usefulness and perceived ease of use. TAM is a well-respected model of IT adoption and use. TAM shown in Fig. 3 includes two constructs; perceived usefulness and perceived ease of use [4].

TAM is used as a base model to produce a causal model resembling a network of relationships among the constructs of the study. This work has also indicated that perceived usefulness has the largest influence on IT acceptance followed by users' attitudes toward IT. Perceived usefulness is demonstrated to operate directly on IT acceptance and indirectly through user attitudes [4]. Meanwhile, perceived ease of use has a larger influence on users' attitudes than perceived usefulness [4].

The core concept of TAM is that perceptions of usefulness, ease of use and other external variables will influence an individual's intention to use IT, which will ultimately influence actual usage behavior [4]. The TAM also offers a promising theoretical basis for examining the factors contributing to IT acceptance in

Fig. 2 Confidence-based framework for m-commerce adoption—an extension of the technology acceptance model

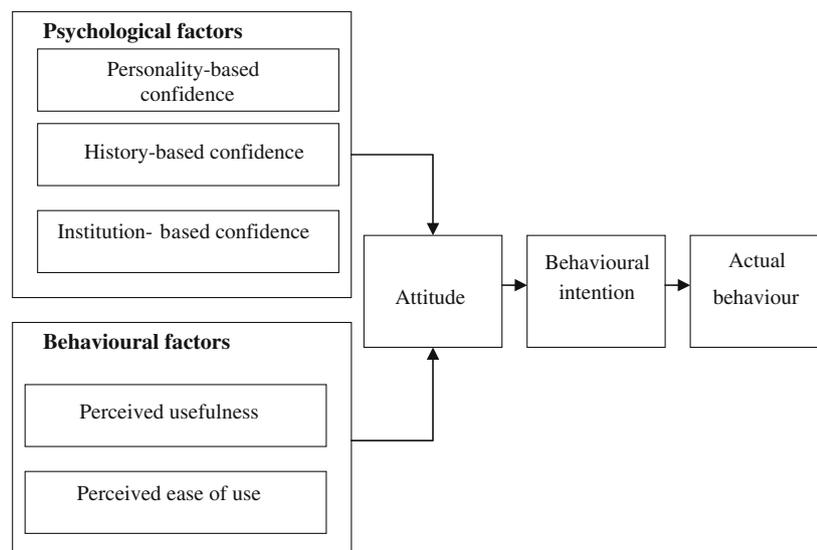
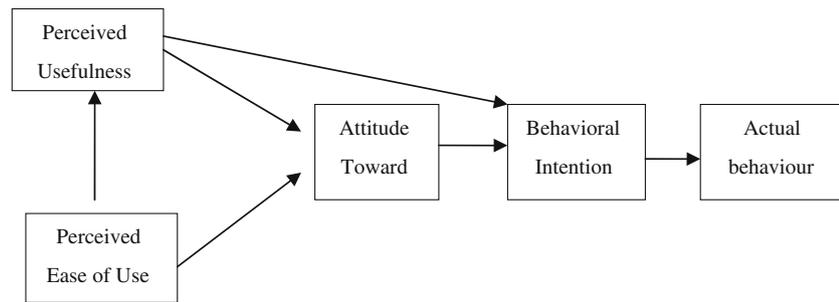


Fig. 3 Technology acceptance model [5, p. 985]



natural settings. A key purpose of TAM therefore, is to provide a basis for tracing the impact of external factors on internal beliefs and attitudes [4]. TAM was formulated in an attempt to achieve these goals by identifying a small number of fundamental variables suggested by previous research dealing with cognitive and affective determinants of computer acceptance [5].

Perceived usefulness and perceived ease of use are the two particular beliefs, as depicted in Fig. 3. According to this model, system usage is determined by the users' attitude towards using the system while attitude towards using is jointly determined by usefulness and ease of use [4]. Perceived usefulness is defined as “the degree to which a person believes that using a particular system would enhance performance” [4, p. 210].

Perceived ease of use is defined as “the degree to which a person believes that using a particular system would be free of physical and mental efforts” [4, p. 320]. Davis [4] also suggested that perceived ease of use may actually be a prime causal antecedent of perceived usefulness. TAM also postulates that perceived ease of use is an important determinant of attitude toward using a system. We consider that the user friendliness of mobile devices has been a central focus in mobile technology developments over the last 20 years.

4.2 Psychological factors

4.2.1 Personality-based confidence

Personality-based confidence is defined as the extent to which one displays a consistent tendency to be willing to depend on others across a broad spectrum of situations and persons [16, 18]. This form of confidence is based on a belief that others are typically well-meaning and reliable [34]. These beliefs are confidence that is influenced by cultural background and personality type [16]. Such a disposition is especially important in the initial stages of a relationship [16, 17].

Existing researches have revealed that an individual's propensity to confidence has a relation to cus-

tomers confidence in the m-commerce context. For example, research conducted by Gefen [10] suggested that the propensity to confidence has a significant association with customer confidence. This evidence suggested that propensity to confidence should be especially important for inexperienced online mobile customers, since, in the absence of social cues and experience with an online mobile retailer, new customers are forced to base their confidence primarily on their socialized propensity to confidence [10]. Findings from a study carried out by Teo and Liu [28] in US, Singapore, and China indicated that propensity to confidence has a positive impact on customer confidence in online purchases. Similarly, the research conducted by Wingreen and Baglione [31] also suggested that propensity to confidence positively affects mobile confidence. However, the above studies did not take place in an Australian environment and this study seeks to verify that a propensity to confidence influences m-commerce confidence in an Australian environment.

4.2.2 History-based confidence

History-based confidence (also known as knowledge-based confidence) is based on the development of the predictability of the other party through knowing the other sufficiently well that their behavior is predictable [14]. History-based confidence relies on information rather than fear of punishment or rewards of being trustworthy. It assumes that the parties have first-hand or second-hand knowledge of each other, based on an interaction history and knowledge. The first-hand knowledge should come through direct familiarity with the online mobile vendor. If there is no interaction history with the particular party, Hoffman et al. [12] have noted that customers do not have confidence with most online mobile stores enough to engage in “relationship exchanges” that involve money and personal information. While the second-hand knowledge like store reputation, brand name, and store size may influence confidence, one missing factor is the implicit comfort of face-to-face communication present in first-

hand interactions [33]. Aspects of history-based confidence such as familiarity, reputation, brand, and size will be discussed below.

History-based confidence antecedents such as familiarity with the online mobile vendor suggest that confidence develops over time with the accumulation of confidence. Thus, the development of confidence between parties requires time and an interaction history [18]. Familiarity is experience with the what, who, how, and when of what is happening. While confidence reduces social complexity relating to future activities of the other party, familiarity reduces social uncertainty through increased understanding of current actions of the store.

In m-commerce, customer familiarity, for example, corresponds to how well a customer comprehends the online procedures, including when and how to enter credit card information [10]. Accordingly, familiarity with an online mobile vendor should increase customer confidence because more familiarity implies an increasing amount of accumulated knowledge derived from experience from previous successful interactions through the online activities [10]. People tend to trust the familiarity obtained through frequent exposure has the potential to engender confidence. Brands remain critically important to vendors [9], since they supply three fundamental benefits. Those benefits are lower search costs, building confidence, and the communication of quality [9]. Customers feel that the better the brand is, the higher the confidence they have. Hence, the creation of better brands should produce an important source of customer confidence and so overcome their uncertainty.

Reputation is conceptualized as a customer's perception of a store's reputation, where reputation is defined as the extent to which customers believe a store is honest and concerned about its customers [6]. When customers do not have personal experience with a vendor, word of mouth reputation can be a key to attract customers. Hearing from someone else that having a positive experience with a vendor can help ease users' perceptions of risk and insecurity in interacting with the vendor [35].

Doney and Canon [6] stated that the size of a vendor is its overall size and market share position in a transitional business environment. Since a large market-share vendor should serve a more diverse and heterogeneous set of customers, research suggests that the large vendor consistently delivers on its promise to its customers and many customers tend to have confidence in it. The reasoning is that otherwise, it would not have been able to maintain its position in the industry [6]. Large organizational size also indicates

that the vendor is likely to possess expertise and necessary support systems to produce confidence and loyalty [13]. In an m-commerce environment, customers consider that the large size of a vendor is able to guarantee their products or services or if a product failure or the loss of a transaction occurs the vendor can compensate buyers accordingly [13].

4.2.3 Institution-based confidence

The concept of institution-based confidence proposed by McKnight et al. [18] represents the beliefs held by customers about impersonal structures and favorable conditions, in which they feel safe, assured, and comfortable with the prospect of depending on the business. Although institution-based confidence considers technological components of the institution, prior theoretical [18] and operational definitions have been very general with respect to technological factors present in the electronic marketplace [18, 25]. The two types of institution-based confidence discussed in the literature are structural assurance and situational normality [11, 18].

Structural assurances or structural safeguards refer to an assessment of success due to structures such as legal recourse, guarantees, regulations, or other procedures that exist in a specific context [11, 18]. Structural assurance leads the customer to believe that it is not in the best interest of the business to defect [6].

Mobile shopping also contains a level of risk [25]. Customers cannot physically check the quality of a product or monitor the safety and security of sending sensitive personal and financial information while shopping on an electronic network [36]. This condition creates a sense of powerlessness among online mobile shoppers. Structural assurance can decrease customer risks. For example, on the Web, cues appear on the Web page, and may include seals of approval [18], explicit privacy policy statements [18], insurance, and affiliations with respected companies.

As m-commerce is an innovative concept surrounded by considerable skepticism, a mobile retailer's actions must be congruent with its promises. This refers to situational normality. Some researchers stated that firms can maintain customer retention by responding to service failures in a fair manner [19]. These findings suggest that purchase intentions will remain stable, and possibly increase, when service recovery is effective. These findings imply that effective customer support also decreases customer risk and inspires confidence again. On the other hand, a poor customer service effort may substantially reduce one's future intentions to purchase from the failing firm, because the firm does

not keep its promise and that dramatically reduce the confidence worthiness of the firm. In online business environments, Reibstein [22] conducted a study over a million respondents to find out which attributes are most important in the customer choice process for the repeat buyers. His findings suggested that the highest connection falls between “perceived customer service support” and “likelihood to purchase again”. Those findings implied that customer support is an important factor for customer purchase decisions in both offline and online m-commerce. However, there is no empirical study to use customer service as a factor of measuring m-commerce confidence and this study considers that an effective customer service will affect confidence between customers and online mobile vendors [25].

Research on the concept of confidence in the online mobile environment, starting from the late 1990s has generated a valid list of factors that engender customer confidence in an online business environment. The commonly cited study by Hoffman et al. [12] focuses on security and privacy as the key drivers of mobile confidence. They argue that environmental control or customer’s ability to control the actions of a web vendor directly affects customer’s perception of online mobile security and privacy. They also discuss the effectiveness of third-party trust-certification bodies (e.g., TRUSTe or Verisign) and the public key encryption infrastructure for ensuring transactional security (including privacy protection) as central success factors for building customer’s confidence in online network [25, 27].

5 Discussion

The Confidence-based Framework for Mobile Commerce Adoption has been described from an empirical point of view to identify which factors should be investigated in relation to m-commerce adoption. The discussion of psychological factors from several research streams was provided above.

With personality-based confidence, new customers or inexperienced customers in the absence of social cues and experience with an online mobile store, his/her tendency to initialize a relationship with an online mobile store is primarily based on their propensity to confidence [10, 36].

With history-based confidence, consumer’s confidence develops over time. Thus, the development of confidence between parties requires time and experience. Experience such as familiarity reduces social uncertainty through increased an understanding of

function of the store’s activity. Other antecedents in history-based confidence are reputation, brand name, and size of an online mobile store. Consumers recognize that the better reputation and brand name of an online mobile store, the more confidence worthy the online mobile store will be. Perceived size of an online mobile store was identified as an antecedent for measuring customer’s confidence. However, the perceived size of an online mobile vendor does not influence customer’s confidence in the same way as the perceived size of a traditional vendor does. Further, the size of an online mobile vendor is not easily or correctly judged through its technology application as in the case of a physical store. Hence, customers tend to recognize reputation and brand, and do not place much reliance on the size of an online mobile vendor unless they can know it.

Many successful methods adopted by m-commerce companies to overcome confidence barriers are institution-based confidence antecedents, reflecting that an online mobile store will perform a particular action to secure customers’ feeling about their situation, guarantees and safety. Steele and Tao [25] recently proposed an approach to build confidence via a certificate-based m-commerce architecture. Perceived security and technology application quality have some empirical support for measuring mobile confidence and most studies indicated that those two factors significantly influence mobile confidence [34]. Both perceived privacy and third-party assurance have contradictory empirical findings for measuring mobile confidence. Two other factors, insurance and customer support, have no current empirical study for measuring mobile confidence.

6 Conclusion

Rapid developments in technology have made significant contributions to secure the network for m-commerce. However, challenges remain in this area, and consumer confidence remains a substantial issue for the development of m-commerce. Many other researchers have reinforced this belief asserting that only after security and privacy have been addressed customers will consider other features (i.e., familiarity, reputation, technology application quality) to determine the extent to which they can have confidence and feel safe transacting with a merchant. This paper overviewed important factors in m-commerce acceptance both behavioral and psychological. To examine customer acceptance of m-commerce, we have applied and extended the TAM. The confidence-based framework for

B2C m-commerce has been developed for empirical validation of the research problems.

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