Journal of the Association for Information Systems

Volume 9
Issue 6 *Special Issue 3/4*

Article 15

6-2008

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Recommended Citation

Sheng, Hong; Nah, Fiona Fui-Hoon; and Siau, Keng (2008) "An Experimental Study on Ubiquitous commerce Adoption: Impact of Personalization and Privacy Concerns," *Journal of the Association for Information Systems*, 9(6), .
DOI: 10.17705/1jais.00161
Available at: https://aisel.aisnet.org/jais/vol9/iss6/15

Journal of the Association for Information Systems
JAIS

Special Issue

An Experimental Study on Ubiquitous Commerce Adoption: Impact of Personalization and Privacy Concerns *

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Abstract

Ubiquitous commerce (u-commerce) represents "anytime, anywhere" commerce. U-commerce can provide a high level of personalization, which can bring significant benefits to customers. However, privacy is a major concern to customers and an obstacle to the adoption of u-commerce. This research examines how personalization and context can impact customers' privacy concerns as well as intention to adopt u-commerce applications. As u-commerce is new and emerging, we used the scenario-based approach to operationalize personalization and context in an experimental study. The experimental results show that the effects of personalization on customers' privacy concerns and adoption intention are situation dependent.

Keywords: *Personalization, privacy concerns, personalization-privacy paradox, situation dependency, adoption intention*

* This paper was originally presented at the Pre-ICIS (2006) HCI workshop. It was invited for fast tracking on February 14, 2007 and went through two major revisions and one minor revision. Ping Zhang and Bernard Tan are accepting senior editors. Ho-Geun Lee, Khawaja Asjad Saeed, and Iris Junglas are the reviewers.

Volume 9, Issue 6, pp. 344-376, Special Issue 2008

An Experimental Study on Ubiquitous Commerce Adoption: Impact of Personalization and Privacy Concerns

1. Introduction

The advancement of new technologies, such as radio frequency identification (RFID) and sensor networks, has initiated a trend toward ubiquitous computing, which is also called "anytime, anywhere" computing (Lyytinen et al., 2004). In a ubiquitous computing environment, computing devices, applications, networks, and data will be fully integrated and merged (Junglas and Watson, 2006). Almost any physical item can be embedded with the computing power to establish a unique and verifiable identity, store a wealth of information, collect observations from the physical world, and sense changes in the environment. Ubiquitous technologies will increasingly form the background of the way we expect things to work (Russell et al., 2005) and become part of our daily life (Chen and Nath, 2005).

Ubiquitous computing has enabled a new paradigm of commerce that goes above and beyond traditional commerce (Junglas and Watson, 2006). This new type of commerce is called "ubiquitous commerce," or simply "u-commerce," and is considered the ultimate form of commerce (Watson et al., 2002; Junglas and Watson, 2006; Galanxhi-Janaqi and Nah, 2004). U-commerce refers to the ability to interact and transact anywhere, at any time, with anything and anyone (Accenture, 2001b). Therefore, u-commerce is pervasive, as it will become a part of everyday life (Lyytinen et al., 2004; Russell et al., 2005). U-commerce is going to be the next wave in commerce, i.e., after e- and m-commerce (Watson, 2000). Friedman (2006, p.198) reported that

> *"DoCoMo is now working with other Japanese companies on an arrangement by which you may be walking down the street and see a poster of a concert by Madonna in Tokyo. The poster will have a bar code and you can buy your tickets by just scanning the bar code. Another poster might be for a new Madonna CD. Just scan the bar code with your cell phone and it will give you a sample of the songs. If you like them, scan it again and you can buy the whole album and have it home-delivered."*

Personalization is the key in u-commerce (Sheng et al., 2005; Accenture, 2002). Technologies used in u-commerce, such as RFID, GPS, and sensor networks, have the ability to identify, track, and trace objects automatically (Asif and Mandviwalla, 2005; Ohkubo et al., 2005). The use of such technologies has made it technically possible for service providers and merchants to deliver personalized products to their customers based on the customers' identities, preferences, and geographical locations (Junglas and Watson, 2006). U-commerce can provide a higher degree of personalization, which can bring additional benefits and values to customers (Junglas and Watson, 2006).

Despite the promising future of u-commerce and the tremendous benefits it can bring to customers, customers' privacy concerns appear to be the biggest obstacle and social issue in their adoption (Asif and Mandviwalla, 2005). The advancement of technologies embedded and used in the u-commerce environment raises concerns of customers because their personal information not only can be constantly accessed and continuously tracked, but also can be easily disseminated and possibly used in ways unknown to them (Gunther and Spiekermann, 2005). Therefore, customers' privacy concerns have become a major obstacle to the adoption of u-commerce applications. For example, Consumers Against Supermarket Privacy Invasion and Numbering (CASPIAN) criticized Benetton, an Italian apparel company, concerning their plan to attach RFID tags to products, which then led to the boycott of those products (Ohkubo et al., 2005).

While acceptance and adoption of IT services has been one of the most prevailing IS research topics (e.g., Davis et al., 1989; Taylor and Todd, 1995; Ven and Verelst, 2008), the pervasiveness of u-commerce raises new questions in studying its adoption, such as what factors explain the adoption and use of such services, and how do contextual factors intervene in the process (Lyytinen and Yoo, 2002).

This study introduces the concept of situation dependency and empirically investigates the personalization-privacy paradox in u-commerce. The results of this study not only help to increase our

understanding of customers' adoption in u-commerce, but also provide practical implications to organizations embarking on u-commerce applications.

The rest of the paper is organized as follows: (i) Literature Review and Theoretical Foundations; (ii) Hypotheses Development; (iii) Research Method; (iv) Data Analysis; (v) Discussions; (vi) Theoretical and Practical Implications; (vii) Limitations and Future Research; and (viii) Conclusions.

2. Literature Review and Theoretical Foundations

In this section, we review the literature on u-commerce, which stands for ubiquitous commerce or ultimate commerce, and explain its four u-constructs to provide the background information for this research. As personalization is a key driver of u-commerce, we provide detailed explanation of personalization and the technologies used in personalizing u-commerce services. Personalization, however, raises privacy concerns, which pose a major obstacle in the adoption of u-commerce. Thus, we also discuss privacy concerns in the context of u-commerce.

2.1. Ubiquitous Commerce

Ubiquitous computing is the enabler for ubiquitous commerce. The term "ubiquitous computing" was first introduced by Weiser (1993a; 1993b) as a computing environment where computing devices are seamlessly embedded in the everyday objects of our lives and interwoven with the physical world through a continuous network. Ubiquitous computing is a socio-technical phenomenon (Lyytinen et al., 2004). From the technical perspective, ubiquitous computing refers to a set of computing devices that is enabled by mobile and wireless technologies and is able to perform an array of tasks automatically or semi-automatically. From the social perspective, ubiquitous computing provides a means for people to stay connected and interact with others without the constraints of time and space (Lyytinen et al., 2004). Ubiquitous computing has emerged as a new wave of computing and has shown great promise for future applications and markets (Lyytinen et al., 2004).

U-commerce refers to "the use of ubiquitous networks to support personalized and uninterrupted communications and transactions between a firm and its various stakeholders to provide a level of value above and beyond traditional commerce" (Watson et al., 2002; Junglas and Watson, 2006). These stakeholders include customers, suppliers, governments, financial institutions, managers, employees, and the public at large. U-commerce can be viewed as an application of ubiquitous computing that supports communications and transactions between organizations and their stakeholders.

The underlying vision of u-commerce is to overcome spatial and temporal boundaries in traditional commerce, such as m-commerce and e-commerce (Junglas and Watson, 2006). U-commerce can be viewed as a logical extension of e-commerce and m-commerce. It represents the next phase of commerce, which is initiated by e-commerce and propagated by m-commerce (Junglas and Watson, 2006; Siau et al., 2006). Examples of existing u-commerce applications include the Speedpass introduced by ExxonMobile, an RFID-based system for payment. Speedpass uses a small transponder that can be attached to a key ring. Customers can pay for gasoline by waving the transponder in front of the gas pump. ExxonMobile has also introduced a Speedpass Timex watch that is embedded with a radio frequency transponder. The watch can be used to pay for purchases at Exxon and Mobile gasoline stations nationwide and at more than 400 McDonald's restaurants in the Chicago area (ExxonMobile, 2002). Also, some Gap stores have implemented "smart shelves" where RFID readers monitor the inventory on the shelves and gather information on each garment.

In the u-commerce environment, computing devices can be embedded in ordinary objects to make them intelligent and interactive. For example, Accenture introduced several prototypes of ubiquitous computing applications in which objects, such as dolls, are embedded with microchips that are programmed to react to sensors in similar "smart" objects and to recognize other objects, such as accessories of interest to them. These intelligent dolls are then able to make purchases depending on the expense account they are given (Accenture, 2005).

Another example of a u-commerce application is the Online Medicine Cabinet, which was developed by Accenture and described in Fano and Gershman (2002). By using a camera and face-recognition software, the cabinet can identify different persons in a household and their special needs. For example, if an individual suffers from allergies or asthma, the Online Medicine Cabinet will provide information such as that day's pollen count, and remind him/her to take the appropriate medicine. RFIDs or sensors on prescription bottle labels allow the cabinet to identify each drug and alert consumers if they have taken out the wrong bottle from the cabinet. The Online Medicine Cabinet also enables consumers to monitor their vital signs and immediately share this information with their doctors via the Internet. In this example, various technologies, such as RFID, sensors, face-recognition, and wireless technologies, are implemented and integrated to provide personalized services to individuals.

Based on a literature review and the interview results from practitioners in the field, Junglas and Watson (2003) identified four fundamental characteristics of u-commerce – ubiquity, universality, uniqueness, and unison. Junglas and Watson called them the u-constructs.

Ubiquity = Reachability + Accessibility + Portability
Universality = Mobile networks + Mobile devices
Uniqueness= Localization + Identification + Portability
Unison = Mobile applications + Data synchronization

Ubiquity means that computers are everywhere, and people are able to access networks and be reachable anytime and anywhere. Universality will eliminate the problem of incompatibility caused by the lack of standardization, so people can have universal devices that stay connected all the time regardless of their locations.

Uniqueness suggests that users can be uniquely identified not only by identity and preferences, but also in terms of geographical positions. Therefore, uniqueness incorporates the idea of identification, localization, and portability. Unison allows data to be integrated across different applications so that people have a consistent view of information (Watson, 2000; Junglas and Watson, 2003; Junglas and Watson, 2006).

The major differences between m-commerce and u-commerce lie at the conceptual level as well as the technological level (Junglas and Watson, 2006). First, u-commerce is grounded in the four u-constructs – ubiquity, uniqueness, universality, and unison – while m-commerce is centered around wireless networks. Second, u-commerce describes a new computing environment (also termed ubiquitous computing environment) that differs from m-commerce in terms of applications, networks, devices, and data synchronizations (Junglas and Watson, 2003, 2006). Currently, most of these factors/dimensions appear to be limitations in m-commerce. But with time, these limitations are expected to be overcome, i.e., mobile applications, networks, and devices are expected to merge, and data are expected to be fully synchronized in the future. For example, in the ubiquitous computing environment, applications will become independent of the underlying network, data, or the device used. A wider range of computing devices will become available to help users perform their tasks, including desktop computers, PDAs, wrist watches, game consoles, and even clothing (Lyytinen et al., 2004). Because these devices will provide integrated and synchronized data, any change in one device or application will be automatically transmitted and updated in other devices, applications, and networks. The devices will be universally usable across different networks, thus solving the compatibility issues with existing wireless networks.

Another view of u-commerce is that it comprises the combination of various types of commerce including e-commerce, wireless commerce, and silent commerce (e.g., sensors, GPS). This definition of u-commerce is given by Accenture (2001a) and adapted by Galanxhi and Nah (2004, 2006).

These two perspectives of u-commerce complement one another in that they help to address how “anytime, anywhere” commerce can be achieved. Accenture’s (2001a) definition focuses on technology platforms available in u-commerce, whereas Junglas and Watson’s (2006) definition focuses on the four

u-constructs that shape u-commerce. In this research, we adopt a general definition of u-commerce, that is, u-commerce represents anytime, anywhere commerce. With regard to the four u-constructs (ubiquity, universality, uniqueness, and unison), we are specifically interested in studying the uniqueness dimension. In other words, uniqueness (or personalization) is the dimension that we focus on in this research.

Table 1 summarizes the key concepts of u-commerce, as well as the differences between m-commerce and u-commerce.

Table 1: Summary of Differences between M-commerce and U-commerce

		M-commerce	U-commerce
Conceptual level	Characteristics	Mobile Wireless	Ubiquity Uniqueness Universality Unison
Technological level	Application	Limited in the range of applications	Broader range of functionality
	Network	Limited coverage of networks and heterogeneous networking standards	Multiple networks, with ability to access data and applications across networks
	Device	Mobile devices such as cell phones or PDAs	Combination of various devices, including "non-traditional" devices such as everyday objects
	Data	Limited integration and synchronization	Integrated and synchronized data

2.2. Personalization

Understanding the users and their requirements has become the cornerstone of any information system (Albert et al., 2004). Personalization, which refers to "the ability to provide content and services that are tailored to individuals based on knowledge about their preferences and behaviors" (Adomavicius and Tuzhilin, 2005, p. 84), has been recognized as an important concept in IS research. Advances in mobile and ubiquitous technologies have enabled anytime, anywhere computing, and allow users to be uniquely identifiable based on their identity and associated preferences, as well as their locations (Junglas and Watson, 2003; Zhang, 2003). Thus, such technologies make personalization technically feasible in u-commerce.

What is Personalization?

Although personalization has drawn increasing attention from both academia and practitioners, there is little consensus in defining, characterizing, operationalizing, and measuring the construct (Fan and Poole, 2003, 2006). Personalization is frequently used interchangeably with other terms such as "customization" and "individualization" (Fan and Poole, 2006; Zo, 2003).

Various definitions of personalization exist. Personalization means different things to different people, and its meaning often depends on the focus of the research. From the perspective of marketing, personalization is also known as "one-to-one marketing" or "individualization" (Watson et al., 2002; Murthi and Sarkar, 2003), and it refers to "building customer loyalty by building a meaningful one-to-one relationship" (Riecken, 2000). For computer scientists, personalization refers to a toolbox of technologies to enhance the user experience through user interface design (Kramer et al., 2000; Fan and Poole, 2003; Greer and Murtaza, 2003). Other researchers look at the process of personalization, which consists of

three main stages: learning, matching, and evaluation (Murthi and Sarkar, 2003; Adomavicius and Tuzhilin, 2005).

In this study, we adopt a general definition of personalization as "the ability to provide content and services that are tailored to individuals based on knowledge about their preferences and behaviors" (Adomavicius and Tuzhilin, 2005, p. 84). Similar definitions were also adopted by Zhang (2003), and Chellappa and Sin (2005). This definition reflects the common themes across the various definitions of personalization and the various perspectives on personalization. First, personalization is about people and rests in human behavior. Second, personalization is adaptive (Fan and Poole, 2003, 2006).

Personalization in U-commerce

Personalization can be achieved by using information that was either obtained or collected previously or that is obtained in real time (Zhang, 2003). An enormous amount of information will become available in the u-commerce environment, which provides opportunities for service providers and merchants to deliver personalized products and services (Siau et al., 2001). Murthi and Sarkar (2003) described the application of u-commerce in a retail store. The radio-frequency identification (RFID) tag embedded in a discount card could be used to identify registered customers of a store as soon as the customers pass through the door; a wireless connection to a profiling database could help the salesperson make personalized recommendations to a customer based on his/her previous interactions with the customer; and voice recognition systems could capture new interactions between the salesperson and the customer. Such information can be stored in databases and analyzed for future use (Murthi and Sarkar, 2003).

Personalization is key in u-commerce. This is also evident from the four u-constructs identified by Junglas and Watson (2003), in which "uniqueness" incorporates the ideas of identification, localization, and portability. In the mobile valet example described by Fano and Gershman (2002), when a user enters an electronics store while carrying a wireless-enabled PDA, the device will recognize the location of the user and present the user with appropriate personalized information for shopping such as product information, customer services, warranties, financing, and so forth. If the user is interested in an electronic device in the store, such as an inkjet printer, he/she can point his/her PDA to the device and product comparison information will be displayed on the PDA. The Online Medicine Cabinet (Fano and Gershman, 2002) example discussed earlier is another u-commerce application that illustrates the importance of personalization in u-commerce.

Advancements in networks, applications, devices, and data synchronization allow service providers to identify users based on who they are and where they are at any time in order to provide highly relevant services in real-time. Hence, personalization in u-commerce can be characterized as having three dimensions – identity, time, and location (Junglas and Watson, 2003, 2006).

Identity is an important characteristic that encompasses the elements that make individuals unique as well as the preferences that are associated with them (Roussos et al., 2003). Identification is the basis for personalization. In a u-commerce environment, technologies such as RFID and sensor networks can be used to uniquely identify objects; for example, mobile devices that are carried around by users can carry the identity of the users. Identity-enacted products or services such as mobile financial applications and user-sensitive advertising can be delivered to customers based on who they are and what they want (Watson et al., 2002; Liang and Wei, 2004).

Time is also an important dimension of personalization in u-commerce. The portability of mobile devices and the use of ubiquitous networks in u-commerce have enabled the delivery of products/services to customers in real time. U-commerce customers can request personalized products or services (e.g., weather information or stock price information) to be delivered to their devices for easy access to information anytime. Organizations can provide real-time alerts to customers based on customers' preferences and needs, such as alerts on stock quotations or notifications on promotions (Sheng et al., 2005).

Location is another dimension that characterizes personalization in u-commerce (Junglas and Watson, 2003). Location plays a key role in determining the type and nature of human activities. Location can determine customers' information needs as well as their product and service choices (Rao and Minakakis, 2003). Applications or services that utilize geographical positioning information to provide value-added services are termed "location-based services" (Xu and Teo, 2004). Using advanced technologies in geographical positioning (e.g., GPS) and tracking (e.g., RFID), u-commerce enables such services. For example, wireless coupons, which are based on customer profiles and stated preferences, allow companies to deliver time sensitive promotions to customers based on their geographical locations (Siau et al., 2001).

Personalization in u-commerce can change or enhance not only the way organizations deliver their products and services to customers, but also the interaction between businesses and customers in time and space (Fano and Gershman, 2002; Galanxhi-Janaqi and Nah, 2004). Personalization enables: 1) services based on the identity and preferences of customers; 2) real-time access to information or alerts to keep customers informed or updated; and 3) location-based services (Accenture, 2002). Therefore, personalization is a key value driver of u-commerce.

2.3. Privacy Concerns

Privacy is defined as "the moral right of individuals to be left alone, free from surveillance or interference from other individuals or organizations, including the state" (Laudon and Traver, 2001, p. 467). According to Lessig (1999), there are several reasons for privacy protection: 1) privacy empowers people to control information about themselves; 2) privacy is the right to be left alone; 3) privacy is related to dignity in the reciprocal obligations of disclosure between parties; and 4) privacy can be used as an agent to regulate and control information collection and use.

Interest in privacy in MIS is triggered by the explosive development and use of digital storage and Internet technology (Dinev and Hart, 2006a). IS researchers have tailored the definition of privacy toward its information aspects, rather than its physical, legal, and behavioral aspects, and define privacy as the right to control the collection and use of information about oneself (Stone et al., 1983; Smith et al., 1996; Dinev and Hart, 2006a; Awad and Krishnan, 2006). Information privacy concerns refer to "an individual's subjective views of fairness within the context of information privacy" (Malhotra et al., 2004, p. 337). Customers feel threatened when technology has the capability to carry out surveillance, storage, retrieval, and communication of personal information (Culnan, 1993). Customers' privacy concerns arise from the feeling that their information is vulnerable and that they are not able to control their personal information (Dinev and Hart, 2004). Smith et al. (1996) identified several dimensions of individuals' concerns about information privacy: collection of personal information, unauthorized secondary use of personal information, errors in personal information, and improper access to personal information. Previous research has shown that consumers' privacy concerns are negatively associated with their purchases on the Internet (Dinev and Hart, 2006a), and many users are reluctant to purchase products online because of uncertainty relating to the privacy and security of transaction information (Luo, 2002). Information privacy, therefore, has been identified as one of the most important issues in today's technology-based environment (Stewart and Segars, 2002; Chellappa and Sin, 2005).

In u-commerce, computing devices can be embedded within everyday objects that can potentially transmit and receive information from any other object. The aim of such technology is to empower users with more flexible and portable applications that can support the capture, communication, recall, organization, and reuse of diverse information (ITU, 2005). Ironically, the same innovative technologies that are necessary for the success of u-commerce also trigger privacy concerns in u-commerce (ITU, 2005; Galanxhi and Nah, 2006).

Customers' perceptions of loss of privacy in u-commerce arise mainly from two aspects: 1) they can be accessed or tracked continuously, and 2) the information can be easily disseminated or used (Ohkubo et al., 2005; Gunther and Spiekermann, 2005). For example, when RFIDs are attached to items, anyone with a RFID reader can access the information stored in the chips without the knowledge or consent of the owners. Service providers and merchants can know where their customers are at any time, so

"mobile devices and appliances become the eyes and ears of remote service providers" (Fano and Gershman, 2002).

Privacy concerns are considerably higher in u-commerce than in other types of commerce (e.g., e-commerce or m-commerce) for the following reasons: 1) advancements in ubiquitous technologies (such as sensor networks and location awareness technologies) have increased the amount of customers' personal data that is available; 2) the introduction of perceptual and biometric interfaces of certain u-commerce applications allows third parties to identify users; and 3) u-commerce will require the tracking or collection of users' everyday activities in order to provide personalized services (Ackerman, 2004; Cas, 2005).

The exploitation and integration of technologies, such as sensor technologies, RFID, video surveillance, voice recognition, and localization technologies, have undermined users' desires to control their personal information (Sackmann et al., 2006). In u-commerce, data is increasingly collected without any indication (e.g., there is no indication from the devices that data is being recorded); data is continuously being collected without any predefined purpose (e.g., an RFID-enabled cart in a supermarket will continuously identify and report the user's position); data will be collected and integrated from various devices, thus offering different viewpoints – the combination of these different views from different devices enables recognition and identification of the users. Once data is collected, it will be permanent and is not likely to be deleted due to the declining cost of data storage (Sackmann et al., 2006).

Privacy concerns have become the biggest social issue in u-commerce (Asif and Mandviwalla, 2005). Some researchers even believe that the central building blocks of a ubiquitous and pervasive computing environment contradict with the fundamentals of privacy protection (Cas, 2005). Privacy concerns pose a major barrier to the adoption and long-term success of u-commerce applications. A recent study found that more than 60 percent of customers who have heard of RFID are concerned about issues related to privacy (Stegeman, 2004). Customers' privacy concerns can outweigh the benefits of using u-commerce services (e.g., Ohkubo et al., 2005), which, in turn, influence their intentions to adopt u-commerce applications.

2.4. Situation Dependency

The value of a specific technology to a particular customer varies according to the context in which the technology is used. As defined in the Merriam-Webster's Collegiate Dictionary, contexts are "situations and environments about existing or occurring entities." An entity can be a person, place, or physical or computational object (Hwang et al., 2005). Situation and context are often used interchangeably.

Context provides an understanding of the way and circumstances for performing an activity (Basole, 2004). Because a user's concerns and needs vary with the context in which he/she uses an application, the services that can meet the user's needs in a specific context will provide the best value to the user (Figge, 2004). This notion is termed "situation dependency" (Figge, 2004).

"Situation dependency" has long been recognized by researchers in the consumer behavior area. Belk (1974) adopted a general view of situation as "something outside the basic tendencies and characteristics of the individual, but beyond the characteristics of the stimulus object to be acted upon" (pp. 156-157). In other words, a situation includes factors that are particular to a time and place of observation that are external to the individual or the object of consumption, and are likely to influence the user's behavior (Belk, 1975; Cote et al., 1985). Belk (1975) suggested that situational influences in consumer behavior consist of physical, social, temporal, and task-related dimensions of a purchase process. Physical features include geographical and institutional location, lighting, weather, and visibility of configurations of merchandise, or other materials surrounding the object. Examples of social surroundings include people in the surroundings, their characteristics, and their interpersonal interactions. Temporal perspectives can be specified in units ranging from time of day to season of the year. Task-related features of a situation describe the intent or requirement of a purchase (e.g., the event or occasion the purchase is for) (Belk, 1975). Results from previous literature have provided evidence

that supports situational influences on consumer behaviors (e.g., Belk 1974; Belk, 1975; Cote et al., 1985). Research has also shown that the decision context affects consumers' information preferences and the way in which they interpret relevant information (Grewal et al., 1996).

Researchers in MIS have extended the concept of context to mobile and ubiquitous settings. Research has shown that enabling mobile devices and applications to adapt to the changing environment will enhance the user experience (Zhang, 2003). Decoding "user context" is a key to improving usability, decreasing the need for user input, and reducing perceived complexity (Aaltonen et al., 2005). Use situations also moderate the benefits of mobility and perceived usefulness of mobile services. For example, Mallat et al. (2006) found that usefulness and benefits of mobile ticketing services are perceived differently in various use situations, and that use situation has a significant effect on users' intentions to use mobile ticketing services.

U-commerce is capable of offering services that can adapt to the circumstances in which they are being used. Therefore, context is key in u-commerce applications (Coutaz et al., 2005). Because all users' activities take place in time and space, time and location are essential characteristics of context with u-commerce applications. Combined with the identity of the user, these three dimensions (time, location, identity) can portray customers of u-commerce in a specific situation or circumstance (Cousins and Robey, 2005).

Therefore, situation dependency in u-commerce can be conceived to comprise three dimensions: identity (the identity of the user), spatiality (the place of use), and temporality (the time of use) (Figge, 2004). Identity is the most valuable information for any human activity, as it recognizes the user and leads to the availability of further information including personal background, preferences, and attributes (Cousins and Robey, 2005; Basole, 2004). Spatiality involves examining human behaviors in relation to geographical locations (Basole, 2004). Temporality of human activities can also provide a potential source for understanding user behaviors when using an application (Aaltonen et al., 2005).

3. Hypotheses Development

3.1. Personalization-Privacy Paradox

Personalization is dependent on two factors: 1) companies' abilities to acquire and process customers' information; and 2) customers' willingness to share information and use personalized services (Chellappa and Sin, 2005). Companies would like to obtain as much information as possible about their customers so that they can provide personalized products or services. The customers, on the other hand, would like to obtain personalized products or services, but, would like to do so by giving out as little information as possible (Murthi and Sarkar, 2003; Adomavicius and Tuzhilin, 2005). Despite the benefits personalization can provide to organizations and customers, personalization requires the users to give up some of their personal information to their service provider, which raises privacy concerns (Culnan and Armstrong, 1999; Roussos et al., 2003) and creates a "personalization-privacy paradox" (Awad and Krishnan, 2006).

In studying consumers' attitudes toward ubiquitous retailing (or u-retailing), Roussos et al. (2002) found that consumers were concerned about the collection and storage of personal data in u-retailing. Consumers' concerns about loss of privacy were primarily triggered when they were presented with a personalized shopping list that was derived from an analysis of their purchasing history. Despite the benefits or added value provided by their personalized shopping list, consumers were concerned that their personal data could be shared with outside sources without their explicit consent (Roussos et al., 2002).

3.2. Categorizing Context

Context defines the conditions experienced by the users, while personalization refers to offering services with respect to these conditions. Based on the concept of personalization-privacy paradox and situation dependency, we hypothesize the effect of personalization and context on customers' privacy concerns and intention to adopt u-commerce services.

In this research, we categorize u-commerce context into two broad categories: an emergency context versus a non-emergency context. An emergency is any natural or human-originated situation that results in or may result in substantial harm or damage. Emergency contexts range from minor incidents (such as getting lost in an unfamiliar city) to natural and industrial disasters (such as storms, flooding, and fire), and medical emergencies (such as a car accident or a heart attack) (Thomas et al., 2003; Horan et al., 2003; Shen and Shaw, 2004; Curry et al., 2004; Yuan and Detlor, 2005; Shim et al., 2007). Using the three dimensions of the concept of "situation dependency," emergency context represents a situation where time is critical, location is important, and user identity is needed.

There are several reasons for using such a categorization of context: first, as u-commerce is still very new, there is no other established taxonomy to categorize use contexts of u-commerce applications. Second, previous literature has suggested that mobile and wireless technologies are particularly suitable for use in emergencies (e.g., Thomas et al., 2003; Horan et al., 2003; Curry et al., 2004). For example, wireless 911 calls grew from 22,000 per day in 1991 to 155,000 per day in 2001. In many regions, wireless calls represent the major form of emergency notifications (Horan et al., 2003). The U.S. government has also taken the initiative to better prepare citizens for emergencies by sending warnings of national emergencies to wireless phones, websites, and handheld computers to alert citizens in situations of war, terrorist attacks, natural disasters, or other hazards to public safety and well-being (Careless, 2006).

The two categories of context – emergency and non-emergency – are mutually exclusive, which makes experimental studies possible and feasible. From a practical perspective, categorizing context into emergency versus non-emergency is highly relevant given that providing emergency alerts is a major category of ubiquitous applications (Horan et al., 2003).

3.3. Privacy Concerns

The personalization-privacy paradox (Awad and Krishnan, 2006) suggests that customers need to give up some of their personal information in order to receive personalized services (Culnan and Armstrong, 1999; Andrade et al., 2002; Roussos et al., 2003). Technologies used in u-commerce have enhanced capabilities to not only collect customers' information or even capture customers' everyday activities in real-time, but also to analyze and profile such information (Ackerman, 2004). On one hand, these technologies have improved personalization capabilities that can bring added value to customers; on the other hand, these technologies threaten customers' privacy (Sheng et al., 2005). When personalization is present, customers are concerned that their personal information is being collected and continuously tracked, and that their personal information can be easily disseminated (Ohkubo et al., 2005; Gunther and Spiekermann, 2005).

Privacy concerns are not absolute concepts; rather, they are people's perceptions about their rights and control over their personal information (Galanxhi and Nah, 2006). A user's perception of privacy often involves an assessment of the potential privacy risk and benefits related to his/her use of a particular IT/IS application. Consistent with expectancy theory, users will behave in ways that maximize positive outcomes and minimize negative outcomes (Dinev and Hart, 2006b). Therefore, users usually exhibit "a calculus of behavior" that accounts for situational constraints. This is also known as privacy calculus (e.g., Culnan and Bies, 2003; Chellappa and Sin, 2005), as researchers have found that people are willing to expose themselves to some degree of privacy loss as long as there is a positive net outcome from such information disclosure. In other words, consumers may be willing to disclose and share some of their personal information for the benefits of personalization, but only if the value of personalized services outweighs the loss of information privacy. For example, one may agree to disclose location information via the GPS system of a mobile phone so assistance is available in case of an emergency (Galanxhi and Nah, 2006).

Therefore, consistent with the theoretical perspective of situation dependency, customers' privacy concerns vary depending on the purpose or context of using the technology. Hence, customers' privacy concerns in the context of IS adoption and use are situation dependent (Belk, 1974; Cote et al., 1985; Figge, 2004).

As mentioned earlier, situation or context in u-commerce can be conceived in terms of three dimensions: identity (the identity of the user), spatiality (the place of use), and temporality (the time of use) (Figge, 2004).

In an emergency context, all of the three dimensions are critical. Therefore, personalized delivery of services based on the customer's identity, location, and time at that location is more likely to better satisfy the customer's needs. Thus, customers are more willing to give up their personal information for personalized services and be less concerned about their privacy for emergency needs.

In a non-emergency context, none of the three dimensions are critical. Hence, the tracking of personal information offered by personalized services, which capture customers' identities and locations, is more threatening. Customers feel more vulnerable and perceive the risks of sharing or disclosing personal information to be higher. Therefore, customers are more concerned about loss of privacy in a non-emergency context.

According to the personalization-privacy paradox, personalized services trigger privacy concerns, and one's tolerance of perceived privacy loss is situation dependent. Hence, we hypothesize that customers' privacy concerns are greater in a non-emergency than in an emergency context because privacy is perceived to be of much less concern when emergencies are expected. In short, we hypothesize that context will moderate the effect of personalization on privacy concerns. Thus,

H1: The difference between customers' privacy concerns about personalized services and non-personalized services is greater in a non-emergency than in an emergency context.

3.4. Intention to Adopt

The context has been shown to have a significant impact on consumer behavior and decision making (e.g., Belk, 1974). Similarly, intention to adopt personalized or non-personalized u-commerce services is influenced by the user's context. As discussed earlier, personalization is more likely to meet customers' needs in an emergency (where identity, location, and time are critical) than a non-emergency, and hence, customers are more likely to adopt personalized applications when emergencies are expected. However, in a non-emergency context, personalized delivery of services may not be as important and, hence, customers may not be willing to allow their identities, locations, and times at various locations to be tracked. Therefore, We hypothesize that customers are more likely to adopt personalized services in an emergency context, but they are more likely to adopt non-personalized services in a non-emergency context.

H2: Customers' intention to adopt personalized services is higher than their intention to adopt non-personalized services in an emergency context, while their intention to adopt non-personalized services is higher than their intention to adopt personalized services in a non-emergency context.

3.5. Relationship between Privacy Concerns and Intention to Adopt

Privacy concerns, in general, have been found to have a negative effect on users' intentions to adopt an IT/IS application. For any rational decision maker, decisions are made based on an evaluation of perceived benefits and costs (Goodhue et al., 1992). A rational decision maker is motivated to minimize negative outcomes (Dinev and Hart, 2006b). Forfeiting privacy is considered a negative outcome in conducting u-commerce. In line with the theory of reasoned action (Ajzen and Fishbein, 1980), privacy concerns can be viewed as a negative antecedent belief, which could affect a person's attitude and, in turn, influences a person's behavioral intention (Xu and Teo, 2004).

Many prior studies also provide empirical evidence that provide support for a direct negative impact of privacy concerns on behavioral intention in the e-commerce context (e.g., Malhortra et al., 2004; Dinev and Hart, 2006) and in location-based services (Xu and Teo, 2004; Xu et al., 2005). Therefore, we expect a similar negative relationship between privacy concerns and behavioral intention in the u-commerce context.

H3: Privacy concerns will have a negative impact on intention to adopt u-commerce services.

4. Research Method

In this section, we present the research model, research design, and research procedures.

4.1. Research Model

In this research, we examine and assess: 1) the moderating effect of personalization and context on privacy concerns in u-commerce, 2) the moderating effect of personalization and context on intention to adopt in u-commerce, and 3) the effect of privacy concerns on intention to adopt u-commerce services.

The research model for this study is depicted in Figure 1.

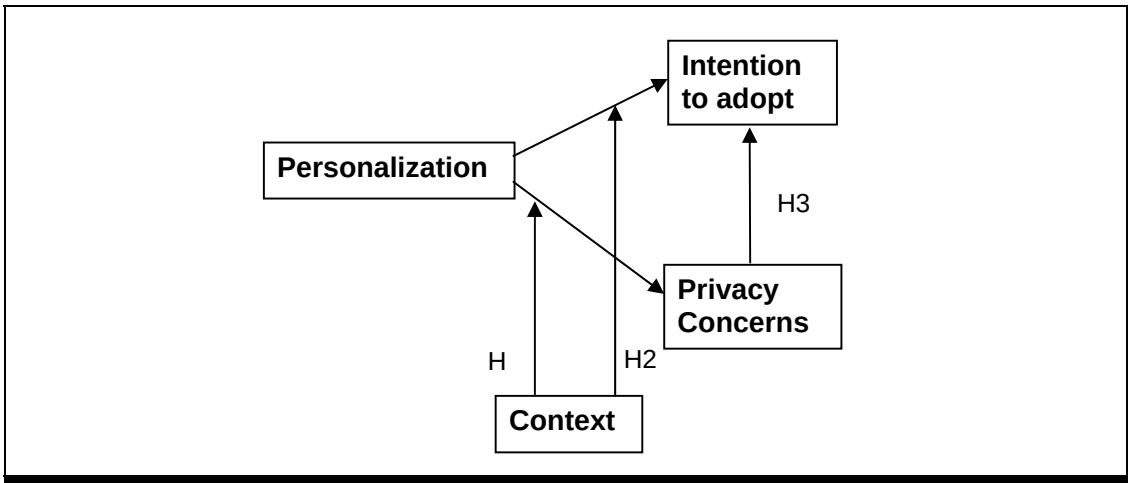

Figure 1. Research Model

4.2. Research Design

We used an experimental design because it allows for the manipulation of variables and the testing of causal relationships. We used a within-subject experimental design because when compared to the between-subject design, the within-subject design provides greater efficiency and control of subject variability (that is, it accounts for individual differences as subjects serve as their own control) (Keppel, 1991). In this study, we employed a 2 (personalization versus no-personalization) X 2 (emergency versus non-emergency context) within-subject factorial design (see Figure 2).

4.3. Experimental Manipulations

Personalization and context were operationalized using the scenario-based method. Scenarios are descriptions of possible futures states (Camponovo et al., 2004). Scenarios provide a form or tool to study a possible and plausible future, and to create an awareness of which future applications are possible (Bria et al., 2001). Scenarios are commonly used in experimental studies to manipulate different conditions of variables, simulate user tasks, or represent a context for study (e.g., Xu and Teo, 2004; Malhotra et al., 2004; Resnick and Montania, 2003).

Since most applications of u-commerce are not yet available, and hence, have not been experienced by customers, the scenario-based method is appropriate for this research. It is extremely important that research related to u-commerce be carried out today because insights and results derived from today's research can serve as roadmaps for further development and enhancement of u-commerce applications (Bria et al., 2001). The use of scenarios makes it possible for researchers to study the emerging u-commerce phenomenon without being constrained by the timing of the study or the state-of-the-art of technology.

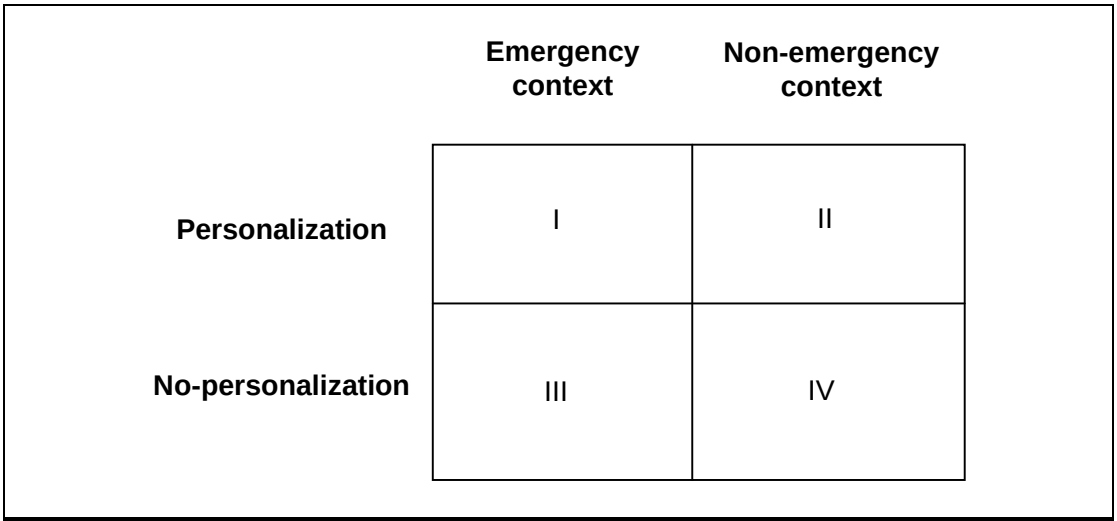

Figure 2. Research Design

Scenarios can be created in a systematic manner: starting with the literature review to identify factors and attributes related to the phenomenon under study, then creating scenarios that systematically cover all the attributes (Pitkanen et al., 2003). Scenario-based methodology, therefore, offers a scientific base for describing future states while evaluating them from present-day perspectives (Pitkanen et al., 2003).

We manipulated personalization versus no-personalization in emergency versus non-emergency context using four variant scenarios.

Personalization in u-commerce was operationalized as a weather service that not only provides real-time weather reporting based on the customer's location using voice recognition systems, but also alerts the customer to serious weather conditions based on the customer's preferences. Non-personalized services in u-commerce were presented as weather services in which users look up weather information using the drop down menus or by entering the zip code of their location, after which the requested weather information is displayed on their devices.

Our manipulation of personalization reflects the definition of personalization adopted in this study; that is, personalization is the "ability to provide content and services that are tailored to individuals based on knowledge about their preferences and behaviors" (Admavicius and Tuzhilin, 2005). All three dimensions of personalization (identity, time, and location) are present in our manipulation of personalization in u-commerce.

Context was operationalized as emergency versus non-emergency context. We chose natural disasters (i.e., likelihood of tornados) to represent the emergency context, and perfect weather conditions (i.e., no likelihood of tornados) to represent non-emergency situations. Along with the definition of context or situation, the contexts we chose for this study are external to customers and the u-commerce applications under study. They also reflect the three dimensions for context: spatiality, temporality, and identity (Figge, 2004). In the emergency manipulation, the subjects were asked to take the position of someone who lives in an area where tornados occur very frequently. When a tornado occurs, it is critical to know who the customer is and where he/she is in order to facilitate a rescue effort or to know if the customer is in danger. Customers also need to know the location of nearby tornado shelters right away.

Hence, a total of four scenarios were presented to subjects (refer to Appendix I): 1) Personalization in an emergency context; 2) Personalization in a non-emergency context; 3) No-personalization in an emergency context; 4) No-personalization in a non-emergency context. We performed manipulation checks after the presentation of each scenario.

4.4. Measurement

Privacy concerns have been a fairly established construct. Hence, we adapted the measurement scale of privacy concerns from the existing literature based on Smith et al. (1996) and Dinev and Hart (2004) – refer to Appendix II for the measure. As mentioned earlier, customers' perceptions of loss of privacy in u-commerce arise mainly from two concerns: 1) they can be accessed or tracked continuously; and 2) the information can be easily disseminated or used (Ohkubo et al., 2005; Gunther and Spiekermann, 2005). Hence, we used four items adapted from Smith et al. (1996) and Dinev and Hart (2004) to measure privacy concerns in u-commerce applications, which assess subjects' concerns about their information being collected, tracked, accessed, or misused.

Intention to adopt has been studied extensively in the MIS literature. We adopted the measurement scale of intention to adopt from Gefen et al. (2003) and Xu and Teo (2004). Three items measuring customers' intentions to adopt u-commerce applications were included in this study (refer to Appendix II for the measure).

4.5. Research Procedures

The within-subject design was administrated using questionnaires. Each subject was issued a questionnaire that consists of three parts: 1) Part I surveyed general attitudes of the subjects; 2) Part II presented four scenarios in which different u-commerce services (personalization versus no-personalization) were offered in different contexts (emergency versus non-emergency). The presentation of each scenario is followed by manipulation check questions as well as questions that measure the subject's privacy concerns and intention to adopt the u-commerce application that was just described (refer to Appendix II for the items). Each subject was asked to put himself/herself in the position of one who is experiencing each of the four given scenarios when answering the questions; and 3) Part III captured the subjects' background information (e.g., demographic information and their experience with IT).

To minimize possible ordering effects of scenarios to subjects, we created four versions of the questionnaires in which the various scenarios were presented in a different order. Although complete randomization of the scenarios in the questionnaires is ideal, there are a total of twenty-four possible versions or orders, which could add even more challenges to the experimental design such as inequivalence across these 24 possible versions. An adaptation of the Latin square design is a more efficient technique to counterbalance the ordering effects (Keppel, 1991). In this study, we adopted a modified Latin square design in which scenarios describing personalization in an emergency context and personalization in a non-emergency context were presented first and second an equal number of times in different versions of the questionnaire. Similarly, scenarios describing non-personalization in an emergency context and non-personalization in a non-emergency context were also presented in a different order among these questionnaires.

We carried out a pilot study with graduate students to evaluate the clarity of the scenarios and the items in the questionnaire. No major issues were identified during the pilot study; the pilot subjects made minor suggestions on wording and phrasing that were incorporated in the questionnaire. After another round of thorough review, we conducted the experiment.

4.6. Subjects

A total of 100 subjects participated in this study. Subjects were recruited from students at a large Midwestern university. Demographic information of the subjects is presented in Table 2.

Assuming a medium effect size (f=0.25), with a power of 0.80 at alpha equals 0.05 significance level, the required sample size for each cell is 32 (Cohen, 1988). According to Keppel (1991), a power of 0.80 is reasonable to acknowledge that Type I errors are more serious than Type II errors, and a 4:1 ratio of Type II errors to Type I errors is appropriate. It is also realistic considering the sharp increase in sample size required to increase the power from 0.80 to 0.90 or higher (Keppel, 1991). Since this study is a 2X2 within-subject design, 100 subjects for each experimental treatment is adequate for data analysis.

Table 2: Demographic Information of Subjects			
Gender	Female	37	37%
	Male	63	63%
Age	18-25	52	52%
	25-38	38	38%
	38-45	9	9%
	>45	1	1%
Ethnicity	Caucasian	67	67%
	African American	3	3%
	Asian	28	28%
	Other	2	2%
Degree	High school	38	38%
	Bachelor	27	27%
	Graduate	35	35%

We adopted the purposive sampling technique in this study. Purposive sampling is a non-probability sampling that conforms to certain criteria (Cooper and Emory, 1995). The reason for choosing purposive sampling is that u-commerce is still new and visionary, and hence, very few customers have actually experienced u-commerce applications. Previous studies have suggested that e-commerce users are more likely than non e-commerce users to adopt mobile commerce (Anckar and D'Incau, 2002). Similarly, e-commerce and mobile commerce customers are potential u-commerce customers, as they are more likely to adopt u-commerce. Therefore, subjects either had to have e-commerce experience or experience in using mobile devices.

The subjects recruited in this study have fairly extensive e-commerce and m-commerce experience (see Table 3), which suggests that they are potential u-commerce customers. Also, prior research has suggested that younger people are more likely to embrace new information technologies, whereas older people (e.g., people over 45) are more resistant to using new information technologies (Kirk, 2006). Since the subjects in this study are relatively young, we argue that this relatively young group of subjects represents a group of people who are more likely to adopt u-commerce applications. Although this may limit the generalizability of the study, these subjects are potential customers targeted by u-commerce vendors.

Table 3: Subjects' Experiences with E-commerce and M-commerce				
E-commerce	Average Internet experience		9.4 (years)	
	Average Internet usage per week		23.4 (hours/week)	
	Average e-commerce experience		4.9 (years)	
M-commerce	Own mobile device	Yes	95	95%
		No	5	5%
	Average mobile device experience		5.5 (years)	
	Average m-commerce experience		1.6 (years)	

People can be classified into three groups based on their privacy propensity or tendency (Taylor, 2003). They are: privacy fundamentalists, privacy unconcerned, and privacy pragmatists. Privacy fundamentalists are those who are extremely concerned about their privacy and are not willing to give out their personal information to others. Privacy unconcerned refers to people who are not concerned about

their privacy or how their information is being collected or used. Privacy pragmatists are those who are concerned about their privacy, but are willing to allow some degree of access or use of their personal information as long as they understand the reasons for its use and see tangible benefits from its use (Taylor, 2003). According to Taylor (2003), the majority of people (64 percent) are privacy pragmatists. Furthermore, studies have shown that younger people tend to be more pragmatic. People over the age of 45 tend to be either not at all concerned about privacy or highly concerned about privacy (Sheehan, 2002). In our research, we are interested in studying the moderating effect of personalization on customers' privacy concerns. Hence, our subjects who are below the age of 45 (except one) are appropriate subjects for the study.

5. Data Analysis

5.1. Manipulation Checks

The manipulations of personalization and context were assessed following the presentation of each scenario (see Appendix II for the manipulations check questions). These questions were used to test the subjects' interpretations and understanding of the scenarios.

We conducted paired-sample T-tests to test the effectiveness of the manipulations. The results show that all treatments were manipulated effectively. First, subjects perceived scenarios where tornados occur very frequently to be greater emergencies than those scenarios with no weather threats (Mean difference = 4.10, Std. deviation = 1.79, $t=32.46$, $p<0.05$). Second, subjects perceived that the scenarios describing personalized services provided greater personalization based on their preferences and locations than the no-personalization scenarios (Mean difference = 1.11, Std. deviation = 1.64, $t=9.61$, $p<0.05$).

5.2. Factor Analysis

We conducted factor analysis to assess the reliability and validity of the constructs – Privacy Concerns (PC) and Intention to Adopt (INT). The results are presented in Table 4. All items loaded on the constructs they were intended to measure, with non-significant loadings on the other construct. The eigenvalue for Privacy Concerns is 4.11, and 58.66 percent of the variance is explained by this factor. The eigenvalue for Intention to Adopt is 2.33, and 33.32 percent of the variance is explained by this factor. A total of 91.98 percent of the variance can be explained by these two factors (See Table 5).

Table 4: Results of Factor Analysis

	Component	
	Privacy Concerns	**Intention to Adopt**
PC3	**.955**	-.133
PC2	**.953**	-.131
PC1	**.930**	-.106
PC4	**.878**	-.123
INT3	-.123	**.980**
INT2	-.141	**.978**
INT1	-.126	**.976**

Table 5: Variance Explained

Factor	Eigen-value	Variance Explained	Cumulative Variance
Privacy Concerns	4.11	58.66%	58.86%
Intention to Adopt	2.33	33.32%	91.98%

Cronbach's alpha coefficients are also used to assess the internal consistency or reliability of the constructs (see Table 6). Since Cronbach's alpha coefficients for all constructs far exceed Nunnally's (1978) threshold of 0.70, the measurements for privacy concerns and intention to adopt are highly reliable.

Table 6: Cronbach's Alpha Coefficients

Construct	Cronbach's Alpha
Privacy concerns	0.95
Intention to adopt	0.99

5.3. Hypothesis Testing

We used repeated measure ANOVA to analyze the hypothesized interaction between personalization and context, and their impact on privacy concerns and intention to adopt. The repeated measure ANOVA focuses on testing the significance of differences of means in different conditions in a within-subject design, and has been used widely in experimental studies to uncover the main and interaction effects of categorical independent variables (called "factors") on interval dependent variables. Therefore, the repeated measure ANOVA is an appropriate statistical method to examine the main and interaction effects of personalization and context on customers' privacy concerns and intention to adopt u-commerce services.

We used regression to examine the relationships between privacy concerns and intention to adopt u-commerce services. Since this study is a within-subject design, we tested the relationships between privacy concerns and intention to adopt for each scenario separately. This is needed in order to satisfy the independence assumption of regression.

Privacy Concerns

Data associated with privacy concerns was analyzed using a repeated-measure ANOVA test with two within-subject factors as independent variables: personalization and context. The mean values and standard deviations are shown in Table 7, while the results of the repeated measure ANOVA test is presented in Table 8. The results in Table 8 suggest that there is a significant interaction effect between personalization and context on privacy concerns ($F=5.62$, $p<0.05$).

Table 7: Means and Standard Deviations for Privacy Concerns

Within-Subject Factors		Privacy Concerns	
Personalization	**Context**	**Mean**	**Standard Deviation**
Personalized service	Emergency	3.98	1.64
	Non-emergency	4.37	1.63
Non-personalized service	Emergency	2.97	1.53
	Non-emergency	3.13	1.52

Table 8: Results for Repeated-Measure ANOVA for Privacy Concerns			
Within-Subjects Factors	**F**	**P-value**	**Observed Power**
Personalization	61.10	0.001	1.00
Context	11.89	0.001	0.93
Personalization X Context	5.62	0.020	0.65

Figure 3 depicts the interaction effect of personalization and context on privacy concerns. As presented in Figure 3, personalization triggers higher privacy concerns in both emergency (t=6.66, p<0.05) and non-emergency (t=8.12, p<0.05) contexts. The difference between customers' privacy concerns for personalized services versus non-personalized services is greater in the non-emergency than in the emergency context because emergencies can trigger customers' needs for personalization services and diminish their privacy concerns. It is interesting to note, however, that for non-personalized services, there is no significant difference in privacy concerns between emergency and non-emergency contexts (t=-1.94, p>0.05); but for personalized services, customers' privacy concerns are significantly higher in the non-emergency context than in the emergency context (t=-3.74, p<0.05). Hence, H1 is supported.

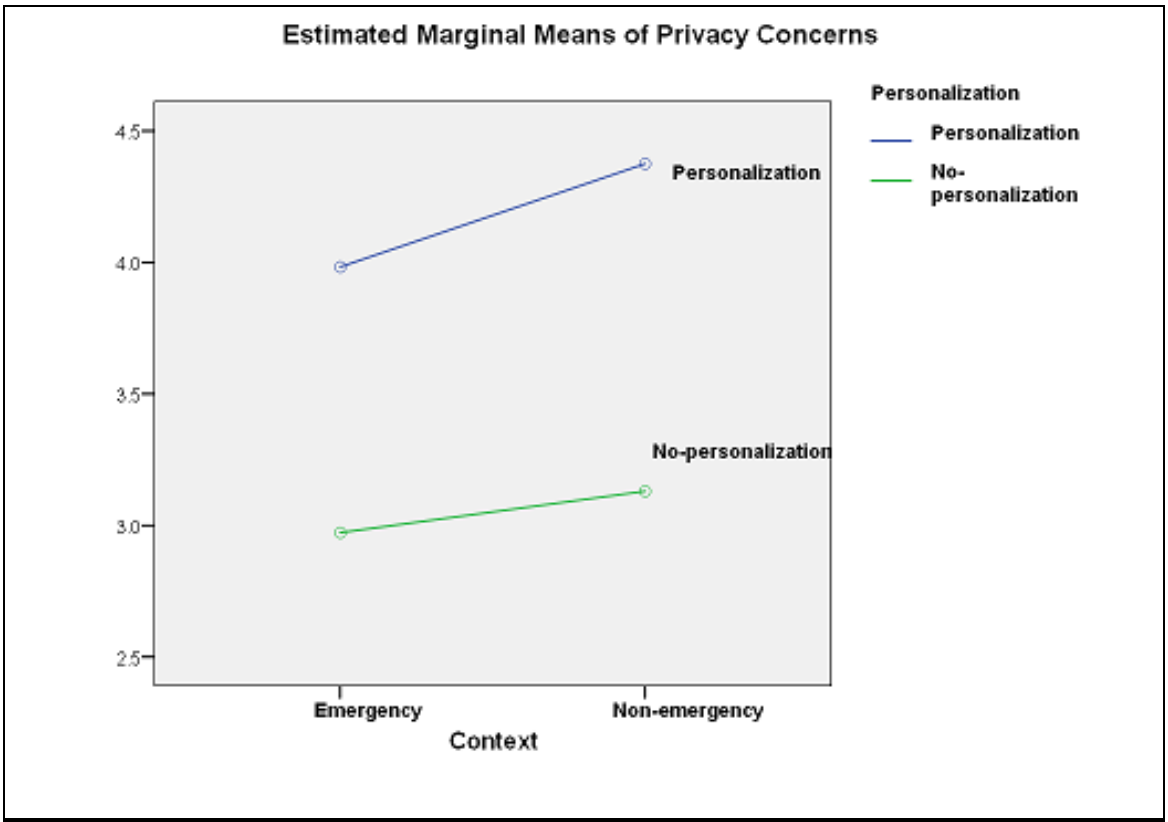

Figure 3: Interaction Effect of Personalization and Context on Privacy Concerns

Intention to Adopt

Data associated with intention to adopt was also analyzed using a repeated-measure ANOVA test with two within-subject factors as independent variables: personalization and context. Table 9 reports the mean values and standard deviations, while Table 10 reports the results of the ANOVA test. The results indicate that there is a significant interaction effect between personalization and context on intention to adopt (F=19.98, p<0.05).

Table 9: Means and Standard Deviations for Intention to Adopt

Within-Subject Factors		Intention to Adopt	
Personalization	**Context**	**Mean**	**Standard Deviation**
Personalized service	Emergency	4.25	1.71
	Non-emergency	2.41	1.50
Non-personalized service	Emergency	3.78	1.60
	Non-emergency	2.74	1.38

Table 10: Results for Repeated-Measure ANOVA for Intention to Adopt

Within-subjects factors	F	P-value	Observed Power
Personalization	0.27	0.604	0.08
Context	134.96	0.001	1.00
Personalization X Context	19.98	0.001	0.99

Figure 4 depicts the interaction effect of personalization and context on intention to adopt u-commerce services. It shows that customers are more willing to adopt u-commerce services when emergencies are expected. Customers' intention to adopt u-commerce applications (personalized or non-personalized) is significantly higher in the emergency than in the non-emergency context (t=11.60, p<0.05 for

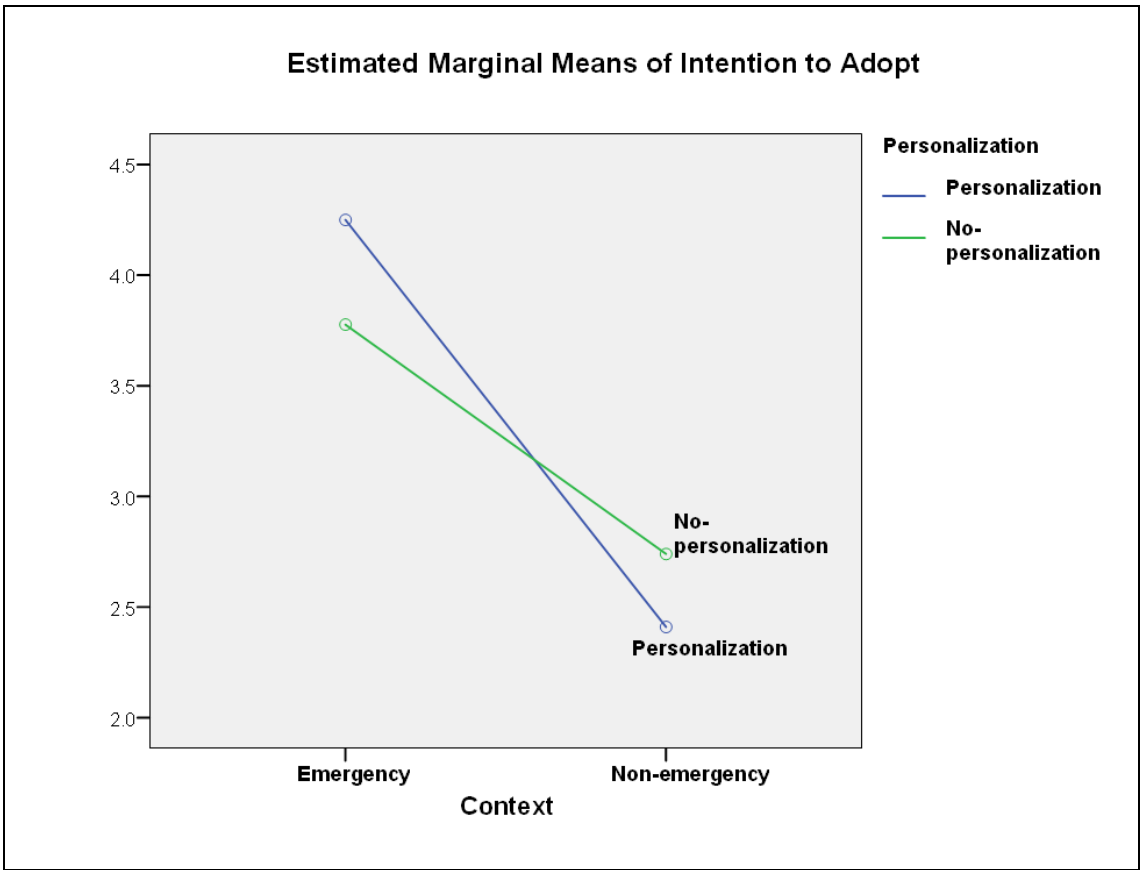

Figure 4: Interaction Effect of Personalization and Context on Intention to Adopt

personalized services; and t=7.04, p<0.05 for non-personalized services). In the emergency context, customers are more willing to adopt personalized services than non-personalized services (t=2.82, p<0.05). In the non-emergency context, customers are more willing to adopt non-personalized services than personalized services (t=-2.05, p<0.05). Thus, H2 is supported.

Privacy Concerns and Intention to Adopt

We analyzed the relationships between privacy concerns and intention to adopt for each scenario separately. As mentioned earlier, this is needed to satisfy the independence assumption.

In the personalization and emergency context scenario, privacy concerns negatively influence intention to adopt (B=-0.50, p<0.05), as presented in Table 11.

Table 11: Results of Regression in P-E Scenario

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	6.23	.40		15.59	.001
Privacy concerns	-.50	.09	-.475	-5.34	.001

In the personalization and non-emergency context scenario, privacy concerns negatively influence intention to adopt (B=-0.35, p<0.05), as presented in Table 12.

Table 12: Results of Regression in P-NE Scenario

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.94	.40		9.85	.001
Privacy concerns	-.35	.09	-.38	-4.08	.001

In the non-personalization and emergency context scenario, the effect of privacy concerns on intention to adopt is not significant (B=-0.08, P>0.05), as shown in Table 13.

Table 13: Results of Regression in NP-E Scenario

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.02	.35		11.46	.001
Privacy concerns	-.08	.11	-.08	-.78	.436

In the non-personalization and non-emergency context scenario, the effect of privacy concerns on intention to adopt is not significant (B=-0.09, P>0.05), as shown in Table 14.

Table 14: Results of Regression in NP-NE Scenario					
Model	**Unstandardized coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	3.02	.32		9.52	.001
Privacy concerns	-.09	.09	-.10	-.99	.325

As presented above, H3 is partially supported. The results suggest that privacy concerns have a negative impact on intention to adopt personalized services (i.e., in personalization in an emergency context and in personalization in a non-emergency context); however, there is no significant relationship between privacy concerns and intention to adopt non-personalized services (i.e., in non-personalization in an emergency context and in non-personalization in a non-emergency context). The results also provide evidence for the personalization-privacy paradox, that is, personalization triggers privacy concerns, which can, in turn, influence users' intention to adopt u-commerce applications.

6. Discussion

Although personalization offers added value to customers, it also requires that customers give up some of their personal information, which triggers privacy concerns and creates the personalization-privacy paradox On one hand, personalization provides greater value; on the other hand, customers are vulnerable to loss of privacy or potential disclosure or misuse of personal information. So, how do customers weigh and balance personalization versus privacy? Our research examines this trade-off and suggests that the personalization-privacy paradox can be better understood based on the concept of situation dependency, which is rooted in the literature on consumer research. In other words, the effects of personalization on customers' privacy concerns and intention to adopt vary according to the situation or context.

Consistent with prior literature that investigated context in consumer research (e.g., Belk, 1974; Belk, 1975; Cote et al., 1985; Grewal et al., 1996), evidence from this research provides empirical support indicating that the effects of personalization on customers' privacy concerns and intention to adopt are situation dependent. More specifically, significant interaction effects are observed on the impact of personalization and context on customers' privacy concerns and adoption intention.

In both the emergency and non-emergency contexts, customers' privacy concerns increase when personalized services are provided, which suggests that personalization in u-commerce triggers privacy concerns. However, the difference in customers' privacy concerns between no-personalization and personalization is greater in a non-emergency than in an emergency context. This indicates that customers' privacy concerns or the degree to which they are willing to give up their personal information is contingent on the situation. Even when customers are provided with the same personalized u-commerce services, they are more concerned about the potential loss of privacy in utilizing such services in a non-emergency than in an emergency context. This suggests that privacy is a perception that is influenced by situational factors. Therefore, the results of our study are consistent with the findings from studies on privacy calculus.

Also, the results of this study suggest a very interesting interaction effect of personalization and context on customers' adoption intentions. In an emergency context, customers' intentions to adopt personalized services are significantly higher than their intentions to adopt non-personalized services. However, in a non-emergency context, customers' intentions to adopt non-personalized services are much higher than their intentions to adopt personalized services. The results confirm that situational factors greatly influence customers' attitudes, perceptions, and decisions. In other words, customers' adoption intentions are situation dependent.

This study also examines the relationship between customers' privacy concerns and intentions to adopt. Customers' privacy concerns significantly influence their intentions to adopt personalized services in u-commerce. When we analyzed the relationships between privacy concerns and adoption intentions in each of the four scenarios separately (i.e., personalization in an emergency context, personalization in a non-emergency context, no-personalization in an emergency context, and no-personalization in a non-emergency context), we found that relationships between privacy concerns and intentions to adopt depend on whether personalization is involved. In scenarios involving personalization (i.e., personalization in an emergency context and personalization in a non-emergency context), privacy concerns significantly influence customers' adoption intentions. However, in scenarios involving no personalization, there is no significant relationship between privacy concerns and adoption intentions. One explanation is that non-personalization does not require customers to be tracked and does not require customers to give up more than basic personal information. Therefore, the relevance of privacy concerns in adoption intention of non-personalized services is significantly mitigated. Under these circumstances, privacy concerns become non-issues when customers make adoption decisions. Hence, the results provide support for the personalization-privacy paradox.

The results of our study are also in line with previous literature suggesting that use intention is influenced by the trade-off between privacy concerns and the expected value derived (Phelps et al., 2000; Chellapa and Sin, 2005). Since the subjects of our study are relatively young (majority of them are below the age of 38), the results of this study are largely consistent with the argument put forth by Sheehan (2002) that young people (below the age of 45) tend to be more pragmatic about privacy concerns, that is, young people are concerned about their privacy, but are more willing to trade it off.

7. Theoretical and Practical Implications

U-commerce is believed to be the next wave in commerce, and personalization is the key in u-commerce. This study examines the effect of personalization on customers' privacy concerns and adoption intentions, and how these effects are moderated by context. The results of this study also offer both theoretical and practical implications.

7.1. Theoretical Implications

This research adopts the definition of u-commerce from Junglas and Watson (2006) in which u-commerce is defined by four u-constructs: ubiquity, uniqueness, universality, and unison. By focusing on the "uniqueness" dimension of u-commerce and examining the personalization-privacy paradox in u-commerce, this study enhances our understanding of factors influencing its adoption.

This research provides empirical evidence on the importance of context in assessing customers' privacy concerns and intentions to adopt u-commerce services and illustrates the importance of situation dependency in u-commerce. When studying users' attitudes, beliefs, and perceptions toward new technologies or information systems, it is important for IS researchers to take into account the context of use.

From the perspectives of theoretical development and advancement, we suggest that u-commerce adoption models should take into account the context of adoption, as it moderates customers' privacy concerns and intentions to adopt u-commerce services. Privacy concerns of users are substantially higher in personalization of u-commerce to the point where they can hinder adoption decisions. Thus, privacy concerns and context are key components in theoretical development on u-commerce adoption.

Prior research on technology innovation has pointed out the importance of fit between information technologies and the tasks to be supported, as a precursor to technology use and its subsequent benefits (Dennis et al., 2001; Goodhue & Thompson, 1995). The task-technology-fit (TTF) model, which was proposed by Goodhue and Thompson (1995), suggests that a fit between the features and functions provided by the technology and the tasks to be supported will result in increased use intentions and better performance. Our research examines the interaction effect of personalization and context on customers' intention to adopt u-commerce services and suggests that users are more likely to adopt u-commerce applications if there is a fit between the dimensions of the context (e.g., identity, spatiality, and

temporality) and the dimensions of the u-commerce applications (e.g., personalization in u-commerce is characterized by three dimensions: identity, location, and time). Therefore, a fit between these dimensions is very important in u-commerce. Further, the results of the study not only enhance our understanding of factors influencing customers' intentions to adopt an innovative technology/application, but also extend the task-technology fit model and suggest that context-technology fit can determine users' adoption intentions. As the concept of context-technology fit is grounded in situation dependency, which is an established theoretical perspective from consumer research that is also supported by empirical evidence from this study, it provides a theoretical foundation for future research on u-commerce adoption and acceptance.

This study also demonstrates the use of scenario-based methods in MIS research to study future states (Pitkanen et al., 2003). In studying emerging IT/IS, the use of scenario-based methods can provide researchers the freedom to examine some "uncertain, complex, and fast developing situations" (Camponovo et al., 2004). The scenario-based approach makes it possible for researchers to study emerging MIS phenomena without being constrained by time and the state-of-the-art of technology. It can also benefit practitioners, as the results derived from such academic studies can provide useful guidelines and insights for both current development and future applications. This is in line with the call to link MIS research to practice and produce results of relevance to practice (Benbasat and Zmud, 1999). Because u-commerce is anytime, anywhere commerce, it is difficult to simulate it in laboratory settings. Given that control is important in experimental designs such as our study, we adopt the scenario-based approach to attain the necessary control for the study. Furthermore, the use of scenarios allows us to study this emerging phenomenon without the constraints/biases/limitations imposed by the state-of-the-art of technology. The use of scenarios is also recommended by Gray and Hovav (2007) for studying socio-technical phenomena involving emerging or future use of IS services or IT applications.

7.2. Practical Implications

U-commerce has attracted considerable attention in the industry and has shown significant potential and promise for future applications. The results of this study can provide guidelines and suggestions to u-commerce service providers and help them in identifying appropriate services for customers in different contexts. Personalization has been shown to be useful for emergency contexts (such as weather alerts). U-commerce applications that could provide personalized services to customers based on their needs or preferences in real-time will have greater promise and higher adoption rates in specific niche industries (such as personalized services in emergency response systems, law enforcement systems, or health care systems).

The results of this study demonstrate the personalization-privacy paradox in u-commerce. The results show that customers trade off privacy concerns for the benefits of personalized services. The u-commerce service providers should address customers' privacy concerns toward personalized services, as privacy concerns are the major inhibitors for customers to adopt personalized u-commerce applications. To attract customers, u-commerce service providers need to offer personalized services with benefits that outweigh the customers' privacy concerns. U-commerce service providers should also work on improving privacy protection in u-commerce, such as adopting privacy-enhancing technologies, self-regulations, and legislation (Xu and Teo, 2004).

8. Limitations and Future Research

Ubiquitous applications have been found to be especially useful in emergency situations where time is critical, location is important, and identity is needed (Thomas et al., 2003; Horan et al., 2003; Shen and Shaw, 2004; Curry et al., 2004; Yuan and Detlor, 2005). Therefore, this study focuses on emergency and non-emergency contexts, and examines the effect of personalization on customers' privacy concerns in these two different and extreme contexts. As in all other studies, this research is not perfect. The following are some limitations of the study that warrant further discussion and should be taken into account when interpreting the results.

This study categorizes context by dividing it into two mutually-exclusive categories: emergency versus non-emergency. Therefore, caution must be taken when generalizing the results of this study to other

categorizations of contexts in u-commerce. This categorization of context in terms of emergency versus non-emergency only represents one of the many possible ways to categorize context when customers are using u-commerce.

The complexity and diversity of u-commerce applications make it extremely challenging to differentiate and categorize contexts for u-commerce applications. For example, it is argued that u-commerce is the "ultimate form of commerce" and it encompasses the idea of e-commerce, m-commerce, voice commerce, and TV commerce (Watson et al., 2002; Junglas and Watson, 2003; Galanxhi-Janaqi and Nah, 2004). Categorizing context into emergency versus non-emergency, though somewhat simplified, makes the experiment possible and feasible.

In this study, we consider an emergency context as one where time, location, and identity are critical when the emergency occurs. Hence, the criticality of time, location, and identity defines emergencies in our research. Future research can extend our current study by providing deeper meaning or semantics of time, location, and identity to define different levels or degrees of emergencies.

Future research can also extend this study using different taxonomies of u-commerce context, and by focusing on specific types of u-commerce applications (e.g., voice commerce in particular) or tasks (e.g., shopping). Taking shopping as an example, one may propose a taxonomy to categorize the various shopping contexts in u-commerce and examine how customers' attitudes, beliefs, and behaviors differ in these different contexts.

Another possible limitation relates to the method used to operationalize personalization and context in the study. We used scenarios to manipulate the different conditions of personalization and context. Written scenarios were presented to the subjects before capturing their perceived privacy concerns and adoption intentions. One may argue that a real u-commerce application will provide a more realistic experience to subjects and produce more reliable and meaningful results. However, considering that u-commerce is still very new and not readily available, the scenario-based approach allows us to study this emerging phenomenon without the constraints of time and state-of-the-art technology (Gray and Hovav, 2007).

As technology evolves and u-commerce applications become more readily available in the near future, a longitudinal study can be conducted to observe how customers' attitudes and perceptions toward u-commerce change over time. It is plausible that customers' privacy concerns toward u-commerce are largely due to the immaturity of the technology and their unfamiliarity with u-commerce. With further advancement of u-commerce, it is possible that more effective privacy-enhancing features will become available, which can help to alleviate customers' privacy concerns in u-commerce. Therefore, we believe that a longitudinal study that examines customers' privacy concerns in different stages of u-commerce would be of interest to the IS community and of high relevance to practice.

Also, this study was conducted in the U.S. Therefore, care must be taken when one is trying to generalize the results of this study to other social, economic, and cultural environments. Privacy is a relative concept and may be related to cultural values (Xu et al., 2005) – what is considered private in one culture may not be considered private in another culture. For example, Europeans are more concerned about their privacy and are more likely to take the perspectives of "privacy fundamentalists." In Asia, Africa, and the Middle East, there may be a larger percentage of people who are unconcerned about privacy issues. People in the U.S. tend to take the perspectives of "privacy pragmatists" (Galanxhi and Nah, 2006).

Future research can replicate this study in other cultural environments to investigate the cultural effects of customers' privacy concerns on intentions to adopt u-commerce applications. Another logical extension of this research is to examine the moderating effects of user demographics (such as age, gender, education background, and technology experience) on customers' attitudes/perceptions toward u-commerce.

References

Aaltonen, A., Huuskonen, P., and Lehikoinen, J. (2005) Context awareness perspectives for mobile personal media, Information Systems Management, 22(4), 43-55

Abowd, G. D., Hayes, G. R., Iachello, G., Kientz, J. A., Patel, S. N., Stevens, M. M., and Truong, K. N. (2005) Prototypes and Paratypes: Designing mobile and ubiquitous computing applications, Pervasive Computing, October–December 2005, 1-7

Accenture (2001a) The unexpected eEurope, available at: www.accenture.com/xdoc/en/ideas/eeurope2001/Full_Survey.pdf

Accenture (2001b) Are technical challenges holding back your wireless strategy? Available at : http://www.accenture.com/Global/Research_and_Insights/Outlook/By_Alphabet/AreStrategy.htm

Accenture (2002) The value drivers of uCommerce, available at: www.accenture.com/xd/xd.asp?it=enweb&xd=service%5Ctechnology%5Cvision%5Cucom_valuedrivers.xml

Accenture (2005) Autonomous Purchasing Object, available at: http://www.accenture.com/Global/Services/Accenture_Technology_Labs/R_and_I/AutonomousObject.htm

Ackerman, M. S. (2004) Privacy in pervasive environments: next general labeling protocols, Personal and Ubiquitous Computing, 8(6), 430-439

Adomavicius,G., and Tuzhilin, A. (2005) Personalization technologies: a process-oriented perspective, Communications of the ACM, 48(10), 83-90

Ajzen, I., and Fishbein, M. (1980) Understanding attitudes and predicting social behavior, Prentice Hall, Englewood Cliffs, NJ

Albert, T., Goes, P. B., and Gupta, A. (2004) GIST: a model for design and management of content and interactivity of customer-centric web sites. MIS Quarterly, 28(2), 161-182

Anckar, B, and D'Incau, D. (2002) Value creation in mobile commerce: findings from a consumer survey, Journal of Information Technology Theory & Application, 4(1), 43-64

Andrade, E. B., Kaltcheva, V., and Weitz, B. (2002) Self-disclosure on the web: the impact of privacy policy, reward, and company reputation, Advances in Consumer Research, 29, 350-353

Asif, Z., and Mandviwalla, M. (2005) Integrating the supply chain with RFID, a technical and business analysis, Communications of the Association for Information Systems, 15, 393-427

Awad, N. F., and Krishnan, M. S. (2006) The personalization privacy paradox: an empirical evaluation of information transparency and the willingness to be profiled online for personalization, MIS Quarterly, 30(1), 13-28

Basole, R. C. (2004) The value and impact of mobile information and communication technologies, 2004 IFAC, available at: http://www.ti.gatech.edu/docs/BasoleIFAC2004MobileEnterprises.pdf

Belk, R. W. (1974) An exploratory assessment of situational effects in buying behavior, Journal of Marketing Research, Vol. XI (May, 1974), 156-163

Belk, R. W. (1975) Situational variables and consumer behavior, Journal of Consumer Research, 2, 157-164

Benbasat, I., and Zmud, R.W. (1999) Empirical research in information systems: The practice of relevance, MIS Quarterly, 23(1), 3-16

Bria, A., Gessler, F., Queseth, O., Stridh, R., Unbehaun, M., Wu, J., and Zander, J. (2001) 4th-Generation wireless infrastructures: scenarios and research challenges, IEEE Personal Communications, December 2001, 25-31

Camponovo, G., Debetaz, S., and Pigneur, Y. (2004) A comparative analysis of published scenarios for m-business, Proceedings of the third International conference on mobile business

Careless, J. (2006) Datacasting kew to new emergency alert system, Government Video, http://governmentvideo.com/articles/publish/article_986.shtml

Cas, J. (2005) Privacy in Pervasive computing environments – a contradiction in terms? IEEE Technology and Society Magazine, Spring 2005, 24-33

Chellappa, R. K., and Sin, R. G. (2005) Personalization versus privacy: an empirical examination of the online consumer's dilemma, Information Technology and Management, 6, 181-202

Chen, L., and Nath, R. (2005) Nomadic culture: cultural support for working anytime, anywhere, Information Systems Management, Fall 2005, 56-64

Cohen, J (1988) Statistics power analysis for the behavioral science, Lawrence Erlbaum Associates, Hillsdale, New Jersey
Cooper, D. R., and Emory, C. W. (1995) Business Research Methods, IRWIN
Cote, J. A., McCullough, J., and Reilly, M. (1985) Effects of unexpected situations on behavior-intention differences: a garbology analysis, Journal of Consumer Research, 12, 188-194
Cousins, K. C., and Robey, D. (2005) Human agency in wireless world: patterns of technology use in nomadic computing environments, Information and Organization, 15, 151-180
Coutaz, J., Crowley, J. L., Dobson, S., and Garlan, D. (2005) Context is key, Communications of the ACM, 48(3), 49-53
Culnan, M. J. (1993) "How did they get my name?" An exploratory investigation of consumer attitudes toward secondary information use, MIS Quarterly, 17(3), 341-363
Culnan, M. J., and Armstrong, P. K. (1999) Information privacy concerns, procedural fairness, and impersonal trust: an empirical investigation, Organization Science, 10(1), 104-115
Culnan, M. J., and Bies, R. J. (2003) Consumer privacy: balancing economic and justice considerations, Journal of Social Issues, 59(2), 104-115
Curry, M. R., Phillips, D. J., and Regan, P. M. (2004) Emergency response systems and the creeping legibility of people and place, The Information Society, 20, 357-369
Davis, F. D., Bagozzi, R., and Warshaw, P. R. (1989) Use acceptance of computer technology: a comparison of two theoretical models, Management Science, 35(8), 982-1003
Dennis, A. R., Wixon, B. H., and Vandenberg, R. J. (2001) Understanding fit and appropriation effects in group support systems via meta-analysis, MIS Quarterly, 25(2), pp.167-193.
Dinev, T., and Hart, P. (2004) Internet privacy concerns and their antecedents- measurement validity and a regression model, Behavior & Information Technology, 23(6), 413-422
Dinev, T., and Hart, P. (2006a) Internet privacy and social awareness as determinants of Intention to transact, International Journal of Electronic Commerce, 10(2), 7-29
Dinev, T., and Hart, P. (2006b) An extended privacy calculus model for e-commerce transactions, Information Systems Research, 17(1), 61-80
ExxonMobile (2002) Just released in test, Timex watch first ever to feature revolutionary system, available at: http://www2.exxonmobil.com/Corporate/Newsroom/Newsreleases/xom_nr_270202.asp
Fan, H., and Poole, M. S. (2003) Perspectives on personalization, Proceedings of the Ninth Americas Conference on Information Systems, 2123-2130
Fan, H., and Poole, M.S. (2006) What is personalization? Perspectives on the design and implementation of personalization in information systems, in Journal of organizational computing and electronic commerce, 16(3&4), 179-202
Fano, A. and Gershman, A. (2002) The future of business services in the age of ubiquitous computing, Communications of the ACM, 45(12), 83-87
Figge, S. (2004) Situation-dependent services – a challenge for mobile network operators, Journal of Business Research, 57, 1416-1422
Friedman, T. (2006) The World is Flat – A Brief History of the Twenty-first Century. Farrar, Straus and Giroux, New York.
Galanxhi-Janaqi, H., and Nah, F. (2004) U-commerce: emerging trends and research issues, Industrial Management and Data Systems, 104(9), 744-755
Galanxhi, H., and Nah, F. (2006) Privacy issues in the era of ubiquitous commerce, Electronic Markets, 16(3), 222-232
Gefen, D., Karahanna, E., and Straub, D. W. (2003) Trust and TAM in online shopping; an integrated model, MIS Quarterly, 27(1), 51-90
Gray, P. and Hovav, A. (2007) From hindsight to foresight: Applying delphi, cross-impact analysis and scenarios, Working paper, Claremont Graduate University, University of California-Irvine and Korea University Business School.
Greer, T. H., and Murtaza, M. B. (2003) Web Personalization: the impact of perceived innovation characteristics on the intention to use personalization, Journal of Computer Information Systems, Spring 2003, 50-55
Grewal, D., Marmorstein, H., and Sharma, A. (1996) Communicating price information through semantic cues: the moderating effects of situation and discount size, Journal of Consumer Research, 23, 148-155

Goodhue, D. L., Wybo, M. D., and Kirsch, L. J. (1992) The impact of data integration on the costs and benefits of information systems, MIS Quarterly, 16(3), 293-311
Goodhue, D. L., and Thompson, R. L. (1995) Task-technology fit and individual performance, MIS Quarterly, 19(2), pp. 213-236.
Gunther, O., and Spiekermann, S. (2005) RFID and the perception of control: The consumer's view, Communications of the ACM, 48(9), 73-76
Horan, T. A., Kaplancali, U., and Schooley, B. (2003) Devising a web-based ontology for emerging wireless systems: The case of emergency management systems, In Proceedings of the Ninth Americas Conference on Information Systems, 2977-2984
Hwang, J. H., Lee, M., Kwon, O., and Ryu, K. H. (2005) Context-based preference analysis method in ubiquitous commerce, in Proceedings of the 2005 International Workshop on Ubiquitous Data Management (UDM'05)
International Telecommunication Union (2005) Privacy and ubiquitous network societies: background paper, available at: http://www.itu.int/osg/spu/ni/ubiquitous/Papers/Privacy%20background%20paper.pdf
Junglas, I., and Watson, R. (2003) U-commerce: A conceptual extensions of e-commerce and m-commerce, Proceedings of International Conference on Information Systems, 667-676
Junglas, I. A., and Watson, R. T. (2006) The u-constructs: four information drives, Communications of the Associations of Information Systems, 17, 569-592
Keeney, R. L. (1999) The value of Internet Commerce to the customer, Management Science, 15(4), 533-542
Keppel, G. (1991) Design and analysis: a researcher's handbook, Prentice Hall, Upper Saddle River, NJ
Kramer, J., Noronha, S., and Vergo, J. (2000) A user-centered design approach to personalization, Communications of the ACM, 43(8), 45-48
Kirk, J (2006) Age gap hampers technology adoption, InfoWorld, available at: http://www.infoworld.com/article/06/05/23/78602_HNagegap_1.html?source=NLC-WS2006-05-24
Laudon K. C. and Traver C. (2001) E-Commerce: Business, Technology, Society, Addison Wesley, Boston, MA
Lessig, L. (1999) Code and other laws of cyberspace, Basic Books, New York, NY
Liang, Ting-Peng, and Wei, Chih-Ping (2004) Introduction to the special issue: Mobile commerce applications. International Journal of Electronic Commerce, 8(3), 7-17
Luo, X. (2002) Trust production and privacy concerns on the Internet: a framework based on relationship marketing and social exchange theory, Industrial Marketing Management, 31, 111-118
Lyytinen, K., and Yoo, Y. (2002) Research commentary: the next wave of nomadic computing, Information Systems Research, 13(4) 377-388
Lyytinen, K., Varshney, U., Ackerman, M.S., Davis, G., Avital, M., Robey, D., Sawyer, S., and Sorensen, C. (2004) Surfing the next wave: design and implementation challenges of ubiquitous computing environments, Communications of the Association for Information Systems, 31, 2004, 697-716
Mallat, N., Rossi, M., Tuunainen, V. K., and Oorni, A. (2006) The impact of use situation and mobility on the acceptance of mobile ticketing services, in Proceedings of the 39th Hawaii International Conferences on Systems Sciences, 2006
Malhotra, N. K., Kim, S. S., and Agarwal, J. (2004) Internet users' information privacy concerns (IUIPC): the construct, the scale, and a causal model, Information Systems Research, 15(4), 336-355
Murthi, B. P. S., and Sarkar, S. (2003) The role of management sciences in research on personalization, Management Science, 49(10), 1344-1362
Nunnally, J. (1978) Psychometric theory, McGraw-Hill, New York, NY
Ohkubo, M., Suzuki, K., and Kinoshita, S. (2005) RFID privacy issues and technical challenges, Communications of the ACM, 48(9), 66-71
Phelps, J., Nowak, G., and Ferrell, E. (2000) Privacy concerns and consumer willingness to provide personal information, Journal of Public Policy & Marketing, 19(1), 27-41
Pitkanen, O., Mantyla, M., Valimaki, M., and Kemppinen, J. (2003) Assessing legal challenges on the mobile Internet, International Journal of Electronic Commerce, 8(1), 101-120
Rao, B., and Minakakis, L. (2003) Evolution of mobile location-based services, Communications of the ACM, 46(12), 61-65

Resnick, M. L., and Montania, R. (2003) Perceptions of customer service, information privacy, and product quality from semiotic design features in an online web store, International Journal of Human-Computer Interaction, 16(2), 211-234
Riecken, D. (2000) Personalized views of personalization, Communications of the ACM, 43(8), 27-28
Roussos, G., Peterson, D., and Patel, U. (2003) Mobile identify management: an enacted view, International Journal of Electronic Commerce, 8(1), 81-100
Roussos, G., Koukara, L., Kourouthanasis, P., Tuominen, J., Seppala, O., Giaglis,G., and Jeroen, F., (2002) A case study in pervasive retail, In M. Viveros and H. Lei (Eds.) ACM MOBICOM Second International Workshop in Mobile Commerce, Atlanta: ACM Press, 90-94
Russell, D. M., Streitz, N. A., and Winograd, T. (2005) Building disappearing computers, Communications of the ACM, 48(3), 42-48
Sackmann, S., Struker, J., and Accorsi, R. (2006) Personalization in privacy-aware highly dynamic systems, Communications of the ACM, 49(9), 32-38
Sheehan, K. B. (2002) Toward a typology of Internet users and online privacy concerns, The Information Society, 18(1), 21-32
Shen, S. Y., and Shaw, M. J. (2004) Managing coordination in emergency response systems with information technologies, In Proceedings of the Tenth Americas Conferences on Information Systems, 2110-2120
Sheng, H., Nah, F., and Siau, K. (2005) Values of Silent Commerce: A Study Using Value-Focused Thinking Approach, In Proceedings of the Eleventh Americas Conference on Information Systems, 1869-1881
Shim, J., Varshney, U., Dekleva, S., and Nickerson, R. C. (2007) Wireless Telecommunications Issues: Cell Phone TV, Wireless Networks in Disaster Management, Ubiquitous Computing, and Adoption of Future Wireless Applications, Communications of the Associations for Information Systems, Volume 20, 442-456
Siau, K., Lim, E., and Shen, Z. (2001) Mobile commerce: promises, challenges, and research agenda, Journal of Database Management, 12(3), 3-12
Siau, K., Nah, F., and Sheng, H., (2006) Implications of wireless technology for mobile and ubiquitous commerce: A synopsis, Journal of Database Management, 17(4), i-iv.
Smith, H. J., Milberg, S. J., and Burke, S. J, (1996) Information privacy: measuring individual's concerns about organizational practices, MIS Quarterly, 20(2), 167-196
Stegeman, H. (2004) Who's afraid of the big bad wolf?, Market Wire, Oct 26
Stewart, K. A., and Segars, A. H. (2002) An empirical examination of the concern for information privacy instrument, Information Systems Research, 13(1), 36-49
Stone, E.F., Gardner, D. G., Gueutal, H. G., and McClure, S. (1983) A field experience comparing information privacy values, beliefs, and attitudes across several types of organizations, Journal of Applied Psychology, 68(3), 459-468
Taylor, H. (2003) Most people are "privacy pragmatists" who, while concerned about privacy, will sometimes trade off for other benefits, The Harris Poll, March 19, 23, available at: http://www.harrisinteractive.com/harris_poll/index.asp?PID=365
Taylor, S., and Todd, P.A. (1995) Understanding information technology usage: a test of competing models, Information Systems Research, 6(2), 144-176
Thomas, B. H., Quirchmayr, G., and Piekarski, W. (2003) Through-walls communication for medial emergency services, International Journal of Human-Computer Interaction, 16(3), 477-496
Ven, K., and Verelst, J. (2008) The impact of ideology on the organizational adoption of open source software, Journal of Database Management, 19(2), 58-72
Watson, R. (2000) U-commerce: the ultimate, available at: http://www.acm.org/ubiquity/views/r_watson_1.html
Watson, R., Pitt, L.F., Berthon, P., and Zinkhan, G.M. (2002) U-commerce: expending the universe of marketing, Journal of the Academy of Marketing Science, 30(4), 329-343
Weiser, M. (1993a) Some computer science problems in ubiquitous computing, Communications of the ACM, 36(7), 137-143
Weiser, M. (1993b) Hot topics: ubiquitous computing, IEEE Computer, 26(10), 71-72
Xu, H., and Teo, H. (2004) Alleviating consumers' privacy concern in location-based services: a psychological control perspective, In proceedings of the Twenty-Fifth International Conference on Information Systems, 793-806

Yuan, Y., and Detlor, B. (2005) Intelligent mobile crisis response systems, Communications of the ACM, 48(2), 95-98

Zhang, D. (2003) Delivery of personalized and adaptive content to mobile devices: a framework and enabling technology, Communications of the Association for Information Systems, 12, 183-202

Zo, H. (2003) Personalization vs. Customization: Which is more effective in E-Services? Proceedings of the Americas Conference on Information Systems, 251-256

Appendix I: Scenarios

Scenario I: Personalization in Emergency situation:

You are living in an area where tornados occur very frequently. Tornados can be violent and are capable of tremendous destructions. This is the spring season and you know the chances of tornados happening in your area are even higher as spring will bring favorable tornado conditions. Tornados are unpredictable and can happen any time.

Recently, Company X is promoting a new weather service that is available to you. When you subscribe to this service, you will receive a wearable device from Company X. The wearable device is connected to the national weather database. Using this device, Company X is able to track your location and provide you with weather information based on your location. The device can simulate human voice and verbally inform you the localized weather information. For example, by pressing a button and saying "local weather" to your device, it can speak the weather information to you, such as:

> "[Your name], it is sunny with light breeze today. The current temperature is 70 degrees. The wind speed is 5mph with wind direction from the south."

Using the device, you can also set up alert notifications based on your choices of weather conditions (e.g., tornados, thunderstorms, pollen counts, or extremely high temperatures). When there is a serious weather condition, the device will alert you instantaneously. For example, if there is a tornado warning in your area, the device will alert you by saying:

> "Warning! [Your name], there is a tornado warning in your area. Please seek shelter immediately!"

Scenario II: Personalization in Non-emergency situation

You are living in an area that has perfect weather condition. You have never heard of any serious weather conditions, such as tornado, in your area. The chance of any serious weather condition happening in your area is close to null.

Recently, Company X is promoting a new weather service that is available to you. When you subscribe to this service, you will receive a wearable device from Company X. The wearable device is connected to the national weather database. Using this device, Company X is able to track your location and provide you with weather information based on your location. The device can simulate human voice and verbally inform you the localized weather information. For example, by pressing a button and saying "local weather" to your device, it can speak the weather information to you, such as:

> "[Your name], it is sunny with light breeze today. The current temperature is 70 degrees. The wind speed is 5mph with wind direction from the south."

Using the device, you can also set up alert notifications based on your choices of weather conditions (e.g., tornados, thunderstorms, pollen counts, or extremely high temperatures). When there is a serious weather condition, the device will alert you instantaneously. For example, if there is a tornado warning in your area, the device will alert you by saying:

> "Warning! [Your name], there is a tornado warning in your area. Please seek shelter immediately!"

Scenario III: No-personalization in Emergency situation

You are living in an area where tornados occur very frequently. Tornados can be violent and are capable of tremendous destructions. This is the spring season and you know the chances of tornados happening in your area are even higher as spring will bring favorable tornado conditions. Tornados are unpredictable and can happen any time.

Recently, Company X is promoting a new weather service that is available to you. When you subscribe to this service, you will receive a wearable device from Company X. The wearable device is connected to the national weather database. Using this device, you can retrieve the weather information by entering either the zip code or the city and state of your location.

For example, if you want to know the current weather of Lincoln, NE, you can choose the state "NE" from the drop down menu, select the city of Lincoln, and then click on "weather forecast." The weather condition of Lincoln will then be displayed on the device, such as:

> "It is sunny with light breeze today. The current temperature is 70 degrees. The wind speed is 5mph with wind direction from the south."

Scenario IV: No-personalization in Non-emergency situation

You are living in an area that has perfect weather condition. You have never heard of any serious weather conditions, such as tornado, in your area. The chance of any serious weather condition happening in your area is close to null.

Recently, Company X is promoting a new weather service that is available to you. When you subscribe to this service, you will receive a wearable device from Company X. The wearable device is connected to the national weather database. Using this device, you can retrieve the weather information by entering either the zip code or the city and state of your location.

For example, if you want to know the current weather of Lincoln, NE, you can choose the state "NE" from the drop down menu, select the city of Lincoln, and then click on "weather forecast." The weather condition of Lincoln will then be displayed on the device, such as:

> "It is sunny with light breeze today. The current temperature is 70 degrees. The wind speed is 5mph with wind direction from the south."

Appendix II: Instruments

Privacy Concerns (Smith et al., 1996; Dinev and Hart, 2004)
1. When faced with this scenario, it bothers me that the service provider is able to track information about me.
2. When faced with this scenario, I am concerned that the service provider has too much information about me.
3. When faced with this scenario, it bothers me that the service provider is able to access information about me.
4. When faced with this scenario, I am concerned that my information could be used in ways I could not foresee.

Intention to Adopt (Gefen et al., 2003, Xu and Teo, 2004)
1. When faced with this scenario, I intend to adopt this service.
2. When faced with this scenario, I predict I will use this service.
3. When faced with this scenario, I plan to use this service.

Manipulation Check – Personalization
1. In this scenario, Company X offers personalized services based on my location.
2. In this scenario, Company X offers personalized services based on my preferences.
3. In this scenario, to what extent has Company X personalized its weather service to you?

Manipulation Check – Emergency
1. In this scenario, I am living in an area where weather can cause emergency situations for me.

About the Authors

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Journal of the Association for Information Systems
ISSN: 1536-9323