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Hong Sheng

University of Nebraska - Lincoln

Fiona Nah

University of Nebraska - Lincoln

Keng Siau

University of Nebraska - Lincoln

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An Experimental Study on U-Commerce Adoption: The Impact of Personalization and Privacy Concerns

Hong Sheng

University of Missouri – Rolla
University of Nebraska – Lincoln
hsheng@unlnotes.unl.edu

Fiona Nah

University of Nebraska – Lincoln
fnah@unlnotes.unl.edu

Keng Siau

University of Nebraska – Lincoln
ksiau@unlnotes.unl.edu

ABSTRACT

U-commerce represents “anytime, anywhere” commerce, which is believed to be the ultimate form of commerce. U-commerce can provide a high level of personalization, which can bring additional benefits and values to customers. However, despite these promises and potential benefits, customers’ privacy is a major concern and obstacle to the adoption of u-commerce. As customers’ intention to adopt u-commerce is based on the aggregate effect of perceived benefits and risk exposure (e.g., privacy concerns), this research examines how personalization and context can impact on customers’ perceived benefits and privacy concerns, and how this aggregated effect in turn affects u-commerce adoption intention. As u-commerce is very new and visionary, the scenario-based method will be used to operationalize the two variables – personalization and context – through the use of an experiment. As one of the first research to empirically investigate personalization and privacy in u-commerce, this research contributes to an increased understanding of u-commerce and its adoption.

Keywords

U-commerce, personalization, privacy concerns, context, adoption intention

INTRODUCTION

The advancement of new technologies such as radio frequency identification (RFID) and sensor networks has initiated a trend towards ubiquitous computing, which is also called “anytime, anywhere” computing. In ubiquitous computing environment, computing devices, applications, networks, and data will be fully integrated and merged (Junglas and Watson, 2003). Almost any physical item can be embedded with computing powers 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 computing has enabled a new paradigm of commerce which goes over, above, and beyond any traditional commerce. This type of commerce is called “ubiquitous commerce”, or simply “u-commerce”, and is considered to be the ultimate form of commerce. U-commerce refers to the ability to interact and transact with anything and anyone, anytime and anywhere (Junglas and Watson, 2003).

Personalization is the key in u-commerce (Sheng et al., 2005). Technologies used in u-commerce, such as RFID and sensor networks, have the ability to identify, track, and trace objects automatically (Ohkubo et al., 2005). Therefore, u-commerce provides a higher degree of personalization, which can provide additional benefits and values to customers.

However, despite the promising future of u-commerce and the tremendous benefits it can bring to customers, customers’ privacy concerns appear to be the biggest social issue (Asif and Mandviwalla, 2005). In a recent study, it is found that more than 60% of customers who have heard of RFID are concerned about the issues of 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 these services. As customers’ intention to adopt u-commerce is based on the aggregate effect of perceived benefits and risk exposure (e.g., privacy concerns), this research examines how personalization can impact

on customers' perceived benefits and privacy concerns, and how this aggregated effect in turn affects u-commerce adoption intention.

LITERATURE REVIEW

Personalization

In general, personalization 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).

Advances in mobile and ubiquitous technologies have made personalization technically feasible in u-commerce. Personalization is one of the main characteristics of u-commerce (Junglas and Watson, 2003). Personalization in u-commerce enables: 1) services based on the identity and preferences of customers; 2) real-time access to information or alert to keep customers updated; and 3) location-based services (Sheng et al., 2005). Therefore, personalization is the key value driver of u-commerce.

Situation Dependency

The values of a specific technology to a particular customer vary according to the context where the technology is used. In general, context refers to the situation and environment in which humans perform their activities. Because a user's problems or needs vary with the context, services that can meet the user's needs at the specific context will provide best values to the user (Figge, 2004). Such phenomenon is called "situation dependency" (Figge, 2004). Situation dependency in u-commerce can be conceived to have three dimensions: identity (the identity of the user), spatiality (the place where the user is using the applications), and temporality (the time the user is using it).

In u-commerce, the purpose is to amplify human activities with new services that can adapt to the circumstances in which they are used. Therefore, context is the key in u-commerce applications. The three dimensions (e.g., identity, spatiality, and temporality) of context portray the customers of u-commerce in a certain situation or circumstance (Cousins and Robey, 2005).

There are many ways of categorizing the context. In this research, we categorize u-commerce context into two broad categories: emergency context vs. non-emergency context. According to Shen and Shaw (2004), emergency is any natural or man-caused situation that results in or may result in substantial harm to the population or damage to property. Using the three dimensions of the concept "situation dependency", we are interested in studying emergency context where time is critical, location is important, and user identity is needed.

There are two main reasons for using such a categorization of context: first, as u-commerce is still very new, there are no established taxonomies to categorize the contexts of using u-commerce applications. Second, previous literature has suggested that mobile and wireless technologies are particularly suitable in emergency situations (e.g., Thomas et al., 2003).

HYPOTHESES DEVELOPMENT

Values of U-commerce

Customers' perceived values of u-commerce are based on the trade-offs between benefits and costs (Teas and Agarwal, 2000). For example, personalization in u-commerce can bring benefits to customers (Sheng et al., 2005), but it also often raises privacy concerns (e.g., Ohkubo et al., 2005). For customers, privacy concerns are the negative side of using personalized services in u-commerce, which is considered the cost of using u-commerce.

Privacy Concerns

Privacy concerns may be the biggest barrier to the long-term success of u-commerce applications. Customers' perception concerning loss of privacy in u-commerce arises mainly from two aspects: (1) customers' information could be accessed or tracked continuously; and (2) the information can be easily disseminated or used (Ohkubo et al., 2005; Gunther and Spiekermann, 2005).

However, customers' privacy concerns may vary depending on their purpose or context of using the technology. For example, when you are lost in an unfamiliar city, u-commerce service providers sense your location and needs, and provide a personalized map or directions via your mobile devices. Personalized services delivered under such situations probably will not trigger your privacy concerns. On the other hand, if you are walking in your hometown and the service provider of your

mobile devices keeps track of your movement and continuously send you information about where you are such as maps and advertising coupons available in the area, this could be a concern to you when your information is continuously being “tracked” or “accessed”. Therefore, we argue that customers’ privacy concerns are “situation dependent” (Figge, 2004). When customers are in an emergency context, personalization in u-commerce is less likely to trigger customers’ privacy concerns when compared to a non-emergency context.

H1: The effect of personalization on privacy concerns is greater in non-emergency than emergency contexts.

Perceived Benefits

According to Sheng et al. (2005), personalization is the means to achieve customers’ fundamental objectives in u-commerce, such as convenience, time saving, individualization, and safety, which dictate what customers want and desire in u-commerce. Therefore, the aforementioned fundamental objectives represent customers’ perceived benefits of u-commerce.

Since ubiquitous technologies have the capability to identify the location of users, their identities, and associated preferences, u-commerce applications are especially suitable and useful in emergency situations. For example, when you are walking on the street in your hometown, a local map that has been sent to you from your mobile devices will not be of much use; but if you are lost in an unfamiliar city, personalized direction services offered by the service provider could pinpoint your location and provide maps or directions, which would be very helpful.

Therefore, we hypothesize that the effect of personalization on perceived benefits is greater in emergency than non-emergency context.

H2: The effect of personalization on perceived benefits is greater in emergency than non-emergency context.

Intention to Adopt

For any rational decision maker, decisions are made based on an evaluation of perceived benefits or costs. Along 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 behavioral intention. Therefore, we expect a similar negative relationship between privacy concerns and customers’ intention to adopt u-commerce. Similarly, perceived benefits will have positive effects on customers’ adoption intention in e-commerce.

H3: Perceived benefits have positive impact on intention to adopt.

H4: Privacy concerns have negative impact on intention to adopt.

Control Variables

Control variables considered in this study include customers’ general attitude toward u-commerce, customers’ innovativeness (Xu and Teo, 2004), customers’ educational background (Gunther and Spiekermann, 2005), and trustworthiness of service providers or merchants (Xu and Teo, 2004).

RESEARCH METHOD

Research Model

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

Research Design

A laboratory experiment will be employed in this research because it allows the manipulation of variables and testing of causal relationships. A 2 (personalization vs. no-personalization) X 2 (emergency vs. non-emergency context) within-subject factorial design is planned for this study.

The scenario-based method will be used to operationalize the two variables – personalization and context. Scenarios are descriptions of possible futures states as well as hypothetical sequences of events that will lead the original or current situation to evolve towards the described future states (Camponovo et al., 2004). Since u-commerce is very new, scenario-based method is appropriate for this research.

A total of four scenarios will be created to represent: 1) Personalization in emergency context; 2) Personalization in non-emergency context; 3) No-personalization in emergency context; 4) No-Personalization in non-emergency context.

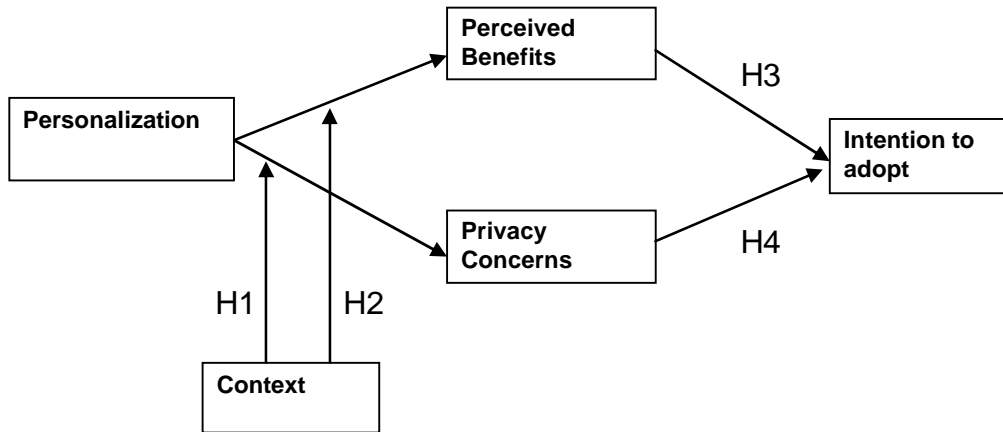


Figure 1: Research Model

Measurement

As privacy concerns and intention to adopt are established constructs, they will be measured using instruments adapted from previous studies to fit the u-commerce context (e.g., Malhotra et al., 2004, Xu and Teo, 2004).

Perceived benefits will be measured using an instrument that is developed based on the results of Sheng et al. (2005). Perceived benefits that are relevant to personalized applications in u-commerce include convenience, time saving, safety, and individualization.

Subjects

Subjects will be recruited based on two criteria: 1) they must have e-commerce experience; 2) they have experiences in using mobile devices. Previous studies have suggested that e-commerce users are more likely to adopt mobile commerce, and therefore, are potential mobile commerce users (Anckar and D’Incau, 2002). Using the same logic and arguments, e-commerce and mobile commerce customers are potential u-commerce customers. Demographic information of subjects will be captured.

Experimental Procedures

All subjects will begin the experiment by answering questions about their demographic information. Then the four scenarios (personalization in emergency context; personalization in non-emergency context; no-personalization in emergency context; and no-Personalization in non-emergency context) will be presented to subjects in a random order.

A questionnaire regarding subjects’ perceived benefits, privacy concerns, and intention to use u-commerce applications, will be administered to subjects after they finish reading each scenario. Manipulation checks on personalization and context will be carried out after each scenario is presented to the subjects to validate that the manipulations are effective.

DATA ANALYSIS

ANOVA and regression analysis will be employed for data analysis. ANOVA will be used to analyze the hypothesized interaction between personalization and context, and their impact on privacy concerns and perceived benefits. The relationships between perceived benefits, privacy concerns, and intention to adopt will be tested using regression.

CONCLUSIONS

U-commerce is believed to be the next wave in commerce. Personalization, as one of the main characteristics of u-commerce, is the key in u-commerce. This study examines the effect of personalization on customers’ perceived benefits and their privacy concerns, and how these effects are moderated by the context. This study also tests the causal relationships between perceived benefits, privacy concerns, and customers’ adoption intention.

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