

# Understanding Subscription Switching Behavior in the Context of Campus Emergency Notification Services: An Extended Privacy Calculus Model

Research-in-Progress

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## Abstract

This paper adapts the privacy calculus model while considering the impact of informational trust and subjective norm, to investigate the factors impacting subscription switching behavior. The results of the study indicate that privacy concern, perceived benefits, and subjective norms significantly impact users' intention to subscribe, while their intention to unsubscribe is significantly impacted by informational trust and privacy concern.

**Keywords:** Security, Privacy/information privacy, Location based service, Emergency management

## Introduction

As mobile telephones become increasingly common as handheld computing platforms, location tracking enables targeted services based on customers' locations. More specifically, emergency notification services often benefit from knowing the location of the user. For example, they can send notifications to customers within certain geographical regions, and track customers' locations when accidents happen to them. As these services represents a special type of service where the location of the device (or the user) is very important, users can benefit from providing the service providers access to their locations. However, along with the increasing popularity of location-based mobile services, privacy concerns become an important issue and might influence customers' intentions to use certain services.

Despite this importance, little research has investigated the impact of customers' concerns about providing location information on their intention to subscribe or unsubscribe from an emergency notification service. This paper aims to fill that research gap by adapting the extended privacy calculus model, while incorporating the impact of informational trust and subjective norms. In particular, it studies the context of campus emergency management. Many U.S. college campuses have implemented emergency notification systems (ENS) via e-mail, text messages, Short Message Service (SMS), voice messages, and websites to promote campus safety, to adhere to the mandates established as part of the Clery Act, and to respond to both the pressure from the government and their own deep desire to make campuses safe places for students. With the advancement of mobile technology, location-based services have the potential to greatly improve the effectiveness, accuracy, and relevance of the alerts. Understanding students' intention to switch subscriptions to this type of services, and their concerns about providing location information, will help university administrators and service providers improve campus safety.

The paper is organized as follows. In the next section, we briefly review the relevant literature. Next, we present the research model. In the subsequent section, we detail the instrument development. We then test the research model and describe the data analysis and the results, followed by a discussion of the focus groups conducted to extend the analysis. Finally, we discuss the findings, their implications, and future research directions.

## **Literature Review**

Consumer switching behavior has been widely studied in the e-commerce area. Hellier, Geursen, Carr and Rickard (2003) developed a service sector model to describe the extent to which customer repurchase intention is influenced by six important factors: service quality, equity and value, customer satisfaction, past loyalty, expected switching cost, and brand preference. Shin and Kim (2008) suggested that customer satisfaction, switching barriers, and demographics significantly affect subscribers' intent to switch mobile services. Han et al. (2011) investigated switching intention in the hotel industry, and suggested that both core service and service encounter performances significantly affected customer satisfaction, and that satisfaction completely mediated the effects of service performances on switching intention.

In the context of our study, the service providers collect users' location information. Location information is often considered private, so the switching behavior might be affected by factors different from those in traditional contexts. Some studies in the IS field have looked at the impact of privacy concerns on intention to use. For example, Barkhuus et al. (2003) found that even though location-tracking services (where other parties track the user's location) and position-aware services (which rely on the device's knowledge of its own location) have similar perceived usefulness, location-tracking services generate more concern for privacy than position-aware services do. In our study, location-based emergency notifications rely on other parties tracking the users' locations. Some other studies have investigated ways to increase consumers' trust beliefs and mitigate their privacy risk perceptions on location based mobile services (Heng et al., 2005; Heng et al., 2009). Building on their findings, we investigate the most impactful factors in the context of emergency notifications on mobile phones.

## **Theoretical Model Development**

The dependent variable of this study is intention to switch. This variable is measured in terms of users' intention to subscribe and of their intention to unsubscribe. We believe that these two intentions are different behaviors, thus the relevant factors and their importance might be different.

### ***Privacy Calculus Theory***

Many studies investigating online purchasing intention have adapted expectancy theory. This theory suggests that individuals will behave in ways that maximize positive outcomes and minimize negative outcomes (van Eerde and Thierry, 1996; Vroom, 1964). Applying expectancy theory to online purchasing privacy, Culnan and Armstrong (1999) argued that individual decision processes prior to the disclosure of personal information necessary to complete a transaction involve a privacy calculus. Specifically, consumers are more willing to consent to disclose personal information when they are informed about the vendor's information practices, and when they perceive the business as fair.

In line with the same theory, Dinev and Hart (2006) proposed an extended privacy calculus model for e-commerce transactions. The extended privacy model proposed that Internet privacy concerns, Internet trust, and personal Internet interest are important factors that can influence the decision to disclose personal information when an individual uses the Internet. Similarly, Culnan and Bies (2003) equated a cost-benefit analysis with the

privacy calculus, and argued that individuals will disclose personal information if they perceive that the overall benefits of disclosure are not greater than the assessed risk of disclosure. Peter and Tarpey (1975) likewise noted that perceived risk and perceived benefit are fundamental aspects of consumer decision-making. The “perceived risk” perspective characterizes consumers as motivated to minimize any expected negative utility (perceived risk) associated with purchasing behavior. Similarly, it characterizes consumers as motivated to maximize the positive utility (perceived benefit) of purchasing the product. Finally, the “perceived value” or valence framework assumes that consumers perceive products as having both positive and negative attributes, and accordingly make decisions to maximize net value.

Drawing on the extended privacy calculus theory, this study aims to understand the impact of privacy concern, perceived benefits, and informational trust on the intention to switch subscriptions to location-based emergency notification services. When emergency notification service providers start to collect location information, consumers might be concerned about their privacy. Real-time location information is often considered more sensitive than other types of personal information, such as demographic and financial information. Thus, privacy concern might be higher in our research context. However, campus emergencies develop quickly, and can often be life-threatening. Providing location information will significantly improve the accuracy and relevance of the service, and in turn reduce the risk of being impacted by campus emergencies. Students might consider this a significant benefit. Thus, we have the following hypotheses:

*Hypothesis 1a, 1b: Privacy concern is negatively related to intention to subscribe to the service, and positively related to unsubscribe from the service.*

*Hypothesis 2a, 2b: Perceived benefit is positively related to intention to subscribe to the service, and negatively related to intention to unsubscribe from the service.*

### **Informational Quality Trust**

In a variety of online contexts, researchers have explicated the relationship between trust and behavior. For example, Pavlou and Gefen (2004) argue that information trust facilitates online exchange relationships. Further, consumer trust continues to be a key issue in the proliferation of Internet shopping (Gefen and Straub, 2003). In fact, various studies have suggested that trust has a positive influence on purchase intentions and actual buying decisions (Lim et al., 2006). We suggest that it is therefore rational that an individual’s trust of alerts would influence his or her subscription to the service.

Trust is a complex subject relating to belief in benevolence, integrity, competence, reliability, and other qualities of the trusted person or service (McKnight et al., 2002). The definition of informational trust depends on the research context. For example, prior research regarding online agency recommendations and consumer channel choices refers to informational trust as a person’s beliefs about the reliability, credibility, and accuracy of information (Choudhury and Karahanna, 2008; Dashti et al., 2010). In our context, trust toward the notification messages focuses on the quality of the information. Students need to believe that the messages are critical—that is, that the messages correctly convey the urgency, severity, and timing of the incident. They also need to trust that the instructions provided in the messages are actionable. Finally, for students to pay attention to the campus alerts, it is important for them to believe that the notifications are relevant. These properties of information are important aspects of information quality as it relates to fostering trust.

We define information quality trust as students’ beliefs about the relevance, criticality, and actionability of emergency notification messages. Information relevance trust in our context relates to how germane the information is, so as to generate confidence in the information. Trust in information relevance also relates to the importance and congruity of the information, and the believability or confidence it fosters. Information actionability trust in our context relates to the confidence in the information to make decisions or act on the basis of the information. Information criticality trust in our context relates to how timely, urgent, and crucial the information is to make it believable. Hence, we propose:

*Hypothesis 3a, 3b: Informational trust is positively related to intention to subscribe to the service, and negatively related to intention to unsubscribe from the service.*

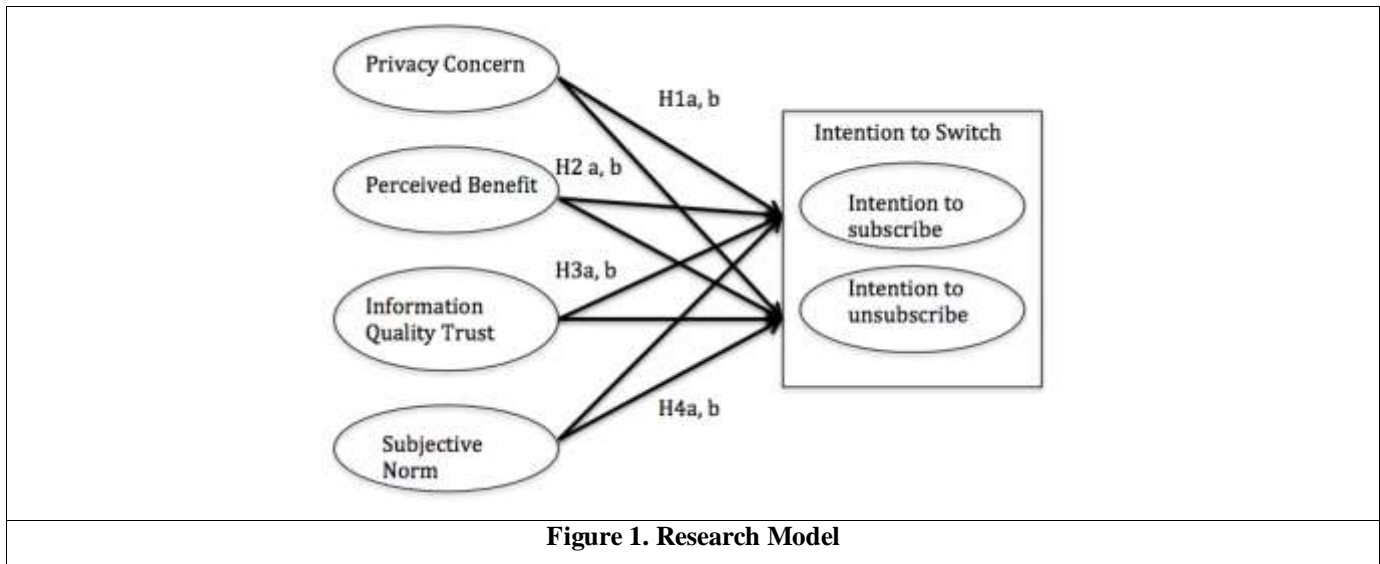
### **Theory of Reasoned Actions**

The theory of reasoned action (TRA; Ajzen, 1985) and the theory of planned behavior (TPB; Ajzen, 1991) are arguably the most resilient attitude theories in psychological research. Together, they provide a useful framework

for understanding how attitudes, subjective norms, and perceived behavioral control influence attitude and behavior. A subjective norm is the perceived social pressure to engage or not to engage in a behavior. In the IS domain, TRA has been widely adopted. The technology acceptance model (TAM; Davis, 1989) is one of the most influential extensions of TRA in the literature. TAM uses two technology acceptance measurements-- perceived usefulness and perceived ease of use-- to replace the measurements of attitude in the TRA. Some other scholars in the IS security area have followed TPB, such as Bulgurcu (2010) and Herath et al. (2009b). Researchers have also adapted the theory to understand switching behavior. For example, Bansal and Taylor (2002) examined customer service provider switching behavior using TPB with interaction terms. In line with the literature, we adapted the construct subjective norm in our research model. Students' behavior and choices are often influenced by other people. When deciding whether to subscribe to emergency notification services and provide location information, students might also be influenced by the norm. Hence we propose:

*Hypothesis 4a, 4b: Subjective norm is positively related to intention to subscribe to the service, and negatively related to intention to unsubscribe from the service.*

The research model is presented in the following figure:



## Instrument Development

Having proposed the previously described model (See Figure 1), we then developed and validated an instrument to measure intention to switch. We pre-tested this instrument, followed by a pilot test and technical validation of its reliability and construct validity. Finally, the full-scale survey was administered to students from universities in the northeastern part of United States.

### Item Creation

To improve the validity and reliability of the survey, we deployed several processes. (a) We adapted questions from prior validated research as much as possible. For variables that were not evaluated in prior research, we created items to measure the constructs in our study. All constructs besides information quality trust were modeled using reflective indicators on a seven-point Likert scale. Information quality trust was modeled as a second-order formative construct. (b) We interviewed four experts working in the field: the chief of the university police, the vice president of university communications, the emergency planning manager of the university, and the CEO of a company that offers emergency notification solutions. We had several rounds of meetings with them. The interviewees gave us suggestions on the research as well as the questionnaire. (c) We also asked several students' opinions on the instrument, such as who might influence their behavior intention (referent groups for the subjective norm). (d) We consulted with professors from the university who typically deal with survey instrument design, to ensure the way the questions were phrased was appropriate for eliciting a proper response on the factors being measured. (e) Finally, we created the instrument based on the literature review as well as the feedback from the field experts, students, and the instrumentation experts.

## **Results**

### ***Pre-tests and Pilot Test***

After the development of the first version of the instrument, four rounds of pre-tests were executed, with 15 students participating in each round, drawn from the target sampling frame. Comments regarding the survey's clarity, length, structure, and other aspects were collected during each round. Based on the feedback from the pre-tests, we modified and refined the survey questions by adding, rephrasing, or eliminating questions.

A pilot test was then conducted using the revised version of the instrument. In total, 110 students participated in the pilot survey, and the preliminary analyses from the measurement model led to further refinement of the survey instrument. Final data collection was conducted after the instrument was validated.

### ***Instrument Testing Results***

To test the psychometric properties of the measurement scales, we used the SmartPLS 2.0 software package (Ringle et al., 2005). SmartPLS is a component-based path modeling software based on the partial least squares (PLS) method. PLS-based applications readily handle both reflective and formative constructs. We felt this software package was appropriate, as our model included both reflective and formative constructs. We implemented measures consistent with the nature of the constructs (Boudreau et al., 2001; Gefen et al., 2000).

### ***Validation of Reflective Constructs***

We modeled information quality trust as a formative first-order and formative second-order construct; privacy concern, perceived benefit, and subjective norm were modeled as reflective first-order constructs. Many studies in different IS-related contexts have indicated that trust has many dimensions, and their authors have modeled trust as a second-order formative construct (Hsu et al., 2007; Vance et al., 2008). We likewise felt that trust regarding the information quality of emergency notifications is better defined as a formative construct.

We first analyzed the measurement properties of the reflective constructs. Individual item loading and average variance extracted (AVE) for each construct were examined to establish individual items' reliability and convergent validity. All of the item loadings were greater than 0.70 (Backhaus et al., 2003; Hair et al., 1995). It has been recommended that factors should have a Cronbach's alpha value that is greater than 0.7 in established studies, and greater than 0.6 in exploratory studies (Fornell and Larcker, 1981; Kahai and Cooper, 2003). Our results show that the Cronbach's alpha values were at an acceptable level in our study, and the AVE values were higher than the recommended value of 0.50. Therefore, we conclude that the convergent validity requirement was satisfied.

We also established discriminant validity. We compared the square root of AVE values for each construct to the other correlations in the correlation matrix. All of the diagonal elements of the correlation matrix were greater than the off-diagonal construct correlations. In addition, we performed an exploratory factor analysis and reviewed the factor analysis table. Following the recommendations of Gefen and Straub (2005), discriminant validity was established, as all of the items loaded at least 0.10 less on other research constructs.

### ***Validation of Formative Constructs***

Information quality trust was modeled as a first-order and second-order formative construct. Formative constructs need to be validated in a different manner than reflective constructs (Diamantopoulos and Winklhofer, 2001; Petter et al., 2007). Specifically, internal consistency (reliability testing) of indicators is not relevant for formative constructs because the indicators are not reflections of the underlying latent variable. Formative construct indicators are not necessarily correlated; hence convergent validity was also not relevant in our study. However, discriminant validity can be tested for formative constructs (MacKenzie et al., 2005). To do so, we first examined the significance levels of the item weightings of the formative constructs (Diamantopoulos and Winklhofer, 2001). All of the weightings were significant at the 0.05 level. We then used the variance inflation factor (VIF) statistics to determine whether there was multi-collinearity among the items. The results show that the VIF value was less than 3, as recommended (Diamantopoulos and Sigauw, 2006).

### ***Preliminary Results***

The model was finally tested with 800 college student participants. The data was collected through online survey services in universities in the Northern United States. 51% of the participants are female, and 49% are male. The results of the model testing are presented in the following table:

	Intention to Subscribe		Intention to Unsubscribe	
	Coefficient	T statistics	Coefficient	T statistics
Privacy Concern	-0.10	2.01*	0.40	8.08**
Perceived Benefit	0.37	7.06**	-0.02	0.46
Informational Trust	-0.02	0.38	-0.17	1.98*
Subjective Norm	0.22	4.57**	-0.09	1.80

Note: \*p<.05, \*\*p<.01

The results of the study indicate that privacy concern, perceived benefit, and subjective norm significantly impact the intention to subscribe, while the intention to unsubscribe is significantly impacted by informational trust and privacy concern. This result indicates that intentions to subscribe and unsubscribe are two different concepts, with different motives. While privacy concern is an important factor in both subscribe and unsubscribe intentions, perceiving that there is a benefit to provide location information is positively related to subscribe intention. Lack of trust towards the notifications will lead to users' unsubscribing from the service. Students also seem more likely to be influenced by others if the norm is to subscribe to the service. However, intention to unsubscribe is less likely influenced by others, but more of a decision based on individual preference. We also tested the effect of gender on switching intention, but the result suggests that there is not a significant impact.

## Discussions

### *Theoretical contributions*

This paper makes several theoretical contributions. First, the dependent variable *switching intention* is measured in terms of subscribe intention and unsubscribe intention. The findings suggest that these two intentions are two different concepts. In the past, most studies only looked at intention to use/subscribe, but little research has investigated the differences between subscribe and unsubscribe intentions. Second, the study adapts the privacy calculus theory while considering the impact of informational quality trust and subjective norms. The results suggest that both of these constructs are important factors relating to switching intention. Thus we extended the privacy calculus theory.

### *Practical contributions*

This paper also makes important suggestions for practitioners. Campus administrators should understand that students' privacy concerns can significantly impact their intentions to subscribe or unsubscribe from emergency notification services. In order to improve the subscription rates, it is important to make sure that users' location information is protected and only used for the proper purposes. It is also important to improve the quality of the alerts, thus building trust in the notifications. Education about why the location information is needed, and how it can improve the accuracy of the notification, can help students see the value of the service. Finally, subjective norms are important in terms in motivating subscriptions. Perhaps involving parents and university officials in advertising for the service would be a good strategy to improve subscription rates.

### *Limitations and Future Research*

This paper adapts the privacy calculus model to investigate the switching behavior of campus emergency notification services. To better understand the research question, future research should include other context-specific variables such as past experience, and the characteristics of mobile phone enabled services.

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