

FACTORS ASSOCIATED WITH BEHAVIORAL INTENTION TO DISCLOSE PERSONAL  
INFORMATION ON GEOSOCIAL NETWORKING APPLICATIONS

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Information privacy is a major concern for consumers adopting emerging technologies dependent on location-based services. This study sought to determine whether a relationship exists among factors of personalization, locatability, perceived playfulness, privacy concern and behavioral intention to disclose personal information for individuals using location-based, geosocial networking applications. Questionnaire responses from undergraduate students at a 4-year university provide insight into these relationships. Multiple regression results indicated that there was a statistically significant relationship between the four significant predictor variables and the dependent variable. Analysis of beta weights, structure coefficients, and commonality analysis shed light on the variance attributable to the predictor variables of the study. Findings provide understanding of the specific factors examined in the study and have implications for consumers, businesses, application designers, and policymakers. The results from this study contribute to an understanding of technology acceptance theory and offer insight into competing beliefs that may affect an individual's behavioral intention to disclose personal information. Knowledge gained from the study may be useful for overcoming challenges related to consumer adoption of location-based services that require disclosure of personal information.

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## CHAPTER 1

### INTRODUCTION

The emergence of information technologies that become ubiquitous to users presents significant challenges for consumers trying to safeguard personal information. The topic of information privacy addresses the claim of individuals to be able to determine what personal information should be known to others (Westin, 1967). While individuals have come to expect some degree of personal control over how personal information is acquired, used, and protected (Culnan & Bies, 2003; Xu, Teo, Tan, & Agarwal, 2009), emerging technologies allow simple and inexpensive access, transfer, and storage of massive tidbits of personal data, confounding any semblance of personal control. Within the public arena, there is much debate over the need to balance marketplace access to consumer information against an individual's ability to contain and control access to personal information.

#### Background

Advances in computer and telecommunication technologies now provide opportunities for affordable Internet access. Internet connectivity has reached large numbers of users in both developed and developing countries, with over one billion global users now connected to the Internet, and the total user number expected to reach two billion by the year 2011. In addition, mobile telephone access is now available to over 90% of the global population (International Telecommunication Union, 2010). The focus of this study is positioned within the context of global positioning systems (GPS) technology and software applications that capitalize on

ubiquitous user accessibility, namely location-based services (LBS) and geosocial networking (GN) applications.

### *Information Privacy*

Across behavioral research disciplines, the idea of privacy has been examined and debated extensively (Altman, 1975; Laufer & Wolfe, 1977; Westin, 1967), with little agreement on a universal definition. The concept of privacy was perhaps first addressed by Justice Brandeis (Warren & Brandeis, 1890) in an era when emerging technologies and business methods were allowing journalists to integrate the publishing of photographs with news stories, and without obtaining personal consent. Brandeis offered a legal response for the “right to be let alone” as a necessary foundation for protecting the individual, and central to free society (p. 193). Since that seminal response, an examination of the privacy notion has come to include information privacy, including concepts related to personal control over disclosure of personal information (Fusilier & Hoyer, 1980; Laufer & Wolfe, 1977; Margulis, 1977), specifically due to expanded capabilities of new and emerging information technologies (see Culnan, 1993; Culnan & Bies, 2003; Margulis, 2003; Westin, 1967).

### *Global Positioning Systems and Location-Based Services*

Over the past forty years, the U.S. Department of Defense has developed GPS technology that uses satellites to provide reliable location and time information for items on the earth’s surface (Global Positioning System, 2010, Vaughan-Nichols, 2009). Civilian accessibility to GPS location data has been made available, and is now widely used on consumer

navigation systems and mobile devices. The U.S. Federal Communications Commission has stipulated that all activated cell phones be 9-1-1 locatable by 2012, prompting mobile device manufacturers to include GPS receiver chips on all new U.S. devices (Vaughan-Nichols, 2009). By imposing this directive on the U.S. cell phone market, GPS integration and technology adoption has accelerated.

Because users have ready-access to GPS chips across widely-available mobile communication devices, consumer software applications are being developed that utilize location-related information in innovative ways. An LBS is an information system (IS) that utilizes accurate real-time GPS user-data to connect users to nearby points of interest (Geospatial Information & Technology Association, 2002; Junglas & Watson, 2008). Consumers equipped with GPS-enabled devices may use LBS to locate timely information related to needed sites or services. In addition, functional service entities, such as taxis or retail establishments, can locate users. The salient aspects of an LBS include support for “here and now” services associated with everyday activities (Virrantaus et al., 2002). LBS help consumers locate sites and services, such as gas stations or restaurants, with minimal time and effort.

To be able to use GPS-enabled devices and LBS, information must flow between the device and multiple content-providers. The initiating device (i.e. mobile phone), sends geographic data associated with the user’s current location across a mobile network to a location service. The location service computes an estimated location, and passes this information as GPS-coordinates to an LBS-providing entity. The LBS can then use the coordinates as a connecting link to other data sources, such as a digital map or a database of locations. By connecting user data with a variety of information providers, an LBS can deliver

personalized, relevant, and timely information (Junglas & Watson, 2008; Virrantaus et al., 2002).

### *Geosocial Networking*

Social network applications, commonly known as social network sites (SNS), are Web-based applications that allow users to construct profiles, establish connections, share postings of information, and then navigate information shared by others within the social networking system (Boyd & Ellison, 2007). GN applications refer to a specific type of social network application that uses location-sensitive data provided by GPS-enabled devices to assist in delivering services and connecting system users (Ionescu, 2010). GN system users interact with other users in similar fashion as participants within an SNS: by constructing profiles, determining and using connections, and navigating through the information shared by others within the system (Lowensohn, 2007). Categorically, GN applications are a specific type of LBS that allows users to report location data, associate GPS coordinate data to personally identifiable locations, allowing for sharing and receiving of personalized information above and beyond what is available on a SNS. Current popular GN applications include Foursquare and Gowalla.

### *Benefits and Risks of LBS*

The emergence of GPS technologies for reliable location tracking and LBS offer benefits and risks to the varied participants (Duckham, Mokbel, & Nittel, 2007). Consumers benefit by having timely access to personalized services. But while consumers expect to retain control

over personal information usage, geospatial technologies and LBS may present a scenario offering individuals limited information control, subsequently causing increased concern over limited information privacy. The issue of information privacy has been identified as a primary concern and potential inhibitor for consumers participating in Internet transactions (Dinev & Hart, 2006; Malhotra, Kim, & Agarwal, 2004; Metzger, 2007; Miyazaki & Fernandez, 2001). Concern for personal information collected as part of an LBS transaction typically falls into three areas, including failure to (a) use information in an ethical manner, (b) use information for its originally collected purpose, or (c) secure and protect information (Armstrong & Ruggles, 2005; Duckham et al., 2007). Issues associated with unauthorized resale and use of personal information, theft of organizational databases, or consumer fraud all present threats to consumer adoption of emerging Internet technologies (Junglas, Johnson, & Spitzmüller, 2008; Rao & Minakakis, 2003).

A wide variety of organizations are positioned to reap benefits associated with the adoption of LBS. Cellular carriers and mobile network operators have opportunities to increase revenue streams utilizing previous investments in telecommunication infrastructure. Hardware vendors have opportunity to develop and produce specialized handsets and other positioning devices. Businesses with well-established databases have opportunities to use existing data in parallel with location-based data for creating new products and services that in turn produce new revenue streams based on prior investments. Aggregation and analysis of location data presents opportunities for organizations to utilize mobile marketing strategies as well as establish and strengthen business-to-consumer ties. Geospatial technologies and GN applications offer companies additional social media channels in which to interact with

customers. But while location data provides a powerful infrastructure for emerging mobile applications, its collection feeds the information privacy debate due to potential abuse of real-time or historical positioning data. Such data pools provide companies and advertisers, as well as disreputable entities with additional opportunities to mishandle or misuse private information.

While organizations engaging in LBS information exchanges hope to reap adequate financial rewards, the LBS market has come under government scrutiny concerning unaddressed hurdles associated with acquisition and use of personal information. Because of high interest in the topic of online privacy, the U.S. Federal Trade Commission has identified consumer privacy as one of the top issues emerging from the growth of online commerce (Federal Trade Commission, 2000, Miyazaki & Fernandez, 2000), and over the past few years has hosted a number of public events designed to discuss consumer privacy challenges (Federal Trade Commission, 2009; see also Federal Trade Commission, 2011). Resulting conversations strongly encourage responsible organizations, industry leaders, and government entities to develop offensive strategies and policies to protect individual interests and avoid high-publicity privacy breaches.

### Research Problem

Because emerging LBS applications may use application design features and enhancements that offer services, engage users, and collect personal information, individuals may be tempted to offer personal information without considering the long-term consequences of providing that information. The Internet provides individuals with numerous methods for

sharing, saving, and accessing data. Those who adopt LBS technologies may be at risk because the information revealed may be used in unforeseen ways by other individuals or organizations (Milberg, Smith, & Burke, 2000; Stone & Stone, 1990). Individual exposure to risk is compounded by the extreme quantities of personal data collected, the long-term persistence of data, improper access to data, or unauthorized transfer of the disclosed information.

Software application designers can easily include elements of entertainment and play in the designing of systems that are pleasing to the eyes, encourage users to explore, or use gaming theory to engage users in playful activity. These designs may offer the potential for quick adoption of the mobile application without the user balancing any existing concern felt over the necessary collection of personal information or personal apprehension related to unforeseen risk.

Although Brandeis' initial response for protection of individual privacy was posited as necessary for and central to a free society (Warren & Brandeis, 1890), a current-day examination of an individual's privacy concern rests on a functional understanding of what constitutes the personal transaction boundaries between self and others. Concern for privacy has implications for technology adoption and presents problems for consumers, businesses, and government entities. While companies may be tempted to quickly adopt emerging location-based services in order to reach consumers in non-traditional ways, collection of sensitive consumer information also raises concern among governmental agencies and legislators seeking to protect consumers against fraudulent use or unanticipated consequences related to personal information collection. As a proponent of technologies that allow free information sharing, Mark Zuckerberg, founder and CEO of Facebook, has argued publicly as

well as to congressional and commissioned hearings that sociologically, privacy as a social norm is changing (Richter, 2011, Vargas, 2010). While some would argue that it would be advantageous for both Facebook and Zuckerberg for this to be the case, there is need to examine the relationship between features that engage individuals or offer benefits, individual levels of concern for personal privacy, and behavioral intention to adopt LBS technologies.

While previous research has examined user BI to disclose personal information (Malhotra et al., 2004; Phelps, Nowak, & Ferrell, 2000; Xu, Zhang, Shi, & Song, 2009), there is little study regarding consumer privacy concern (PC) associated with disclosure of personal information when using applications specifically designed for social interaction. GN applications have been designed not only to deliver services associated with location, but also to collect location-sensitive data useful for targeted advertising, data mining and location analytics. Research results from this study can provide insight into the cognitive complex processes that influence individuals to provide personal information when engaging with mobile technologies and possessing varied and competing cognitive beliefs.

This study is designed to examine the relationship between specific factors that may affect user adoption of GN applications. While these applications may be useful and fun, location-based personalization services and social engagement features may engage users to such a degree as to affect individual privacy-invasive perceptions or directly influence technology adoption. Insight into the interaction of factors at work in GN applications can offer an understanding into how the development and design of emerging technology affects user adoption. Within the field of information science, a longitudinal examination of these factors would be of interest in understanding the potential for LBS applications to engage users and



alter social norms for the collection and marketplace-use of private information. Attitudes toward privacy play a key role in societal attempts to develop and implement information privacy policies.

### Theoretical Framework

The theoretical framework for this study comes from the social sciences, focusing on factors that assist in understanding human behavior. Within the arena of IS technology acceptance, there are numerous principal models that have been used in explaining determinants of usage behavior, as well as varied attempts to combine models or present parsimonious alternatives. A brief overview of models applicable to this study follows.

#### *Theory of Reasoned Action*

From the social psychology field, Ajzen and Fishbein's theory of reasoned action (TRA; 1980) is a fundamental and widely-influential model examining an individual's attitudes and subjective norms in predicting behavior across a wide variety of domains. Examining consciously-intended behavior, TRA posits that an individual's beliefs influence his or her attitudes, which in turn lead the individual to form intentions, which will then generate behaviors.

#### *Theory of Planned Behavior*

Based on TRA, the theory of planned behavior (TPB; Ajzen, 1991) has been used extensively in modeling determinants of human social behavior. TPB examines an individual's

attitudes, subjective norms, and perceived behavioral control in predicting behavior. According to TPB, human action is guided by beliefs about likely consequences, beliefs about normative expectations of others, and beliefs about the perceived ease or difficulty of performing the behavior.

### *Technology Acceptance Model*

Emerging from this social science context, Davis (1989) introduced an adaptation of TRA, the technology acceptance model (TAM), as a theoretical basis for explaining user acceptance of IS. The intention of the model is to identify a reduced set of variables useful in predicting or explaining a user's BI as influenced by beliefs and attitudes (Davis, Bagozzi, & Warshaw, 1989). Based on this study of MBA students using a word processing application, Davis et al. found that the role of attitude was not significant in explaining BI, and suggested a more parsimonious TAM, removing the influence of attitude from the model. While early studies applied TAM in studying BI related specifically to technology acceptance and usage within a workplace context (Davis et al., 1989; Mathieson, 1991; see also Sun & Zhang, 2006), over the past twenty years the model has been widely used as the framework for explaining IS acceptance and usage in a variety of contexts (Venkatesh & Morris, 2000; see also Sun & Zhang, 2006).

When looking at beliefs specific to IS usage in the workplace, early TAM research identified two specific belief factors associated with BI, perceived usefulness, and perceived ease of use (Davis, 1989; see also Sun & Zhang, 2006). Perceived usefulness (PU) represents a measure of a user's belief that using an IS will enhance job performance, focusing on the system's utility. Perceived ease of use (PEOU) represents a measure of a user's belief that using

an IS will be effort-free. Consistent study results found PU to be the major determining factor in predicting intention to use technology (see Sun & Zhang, 2006), while finding the relationship between PEOU and BI to be erratic (Venkatesh & Davis, 2000; see also Lee, Y., Kozar, & Larsen, 2003; Sun & Zhang, 2006;).

### *TAM2*

Following initial consistent findings pertaining to the role of PU, Venkatesh and Davis (2000) introduced a theoretical extension to TAM named TAM2. This model served as the basis for examining additional external variables as causal antecedents to PU, including subjective norm, user experience, and voluntariness, referring to whether the context of IS usage is mandatory or voluntary.

Within the history of TAM, subjective norm was derived from TRA and TPB. Davis et al. (1989) explicitly omitted subjective norm from the original TAM model arguing that the construct is context-driven. This original intention was based on the idea that, while subjective norm may be important in some settings, in the empirical works validating TAM, subjective norm was not found to be an important predictor of intentions. Because TAM studies have examined personal or individual usage (use of technology is not dependent on others' use of the same technology), system usage was not likely driven by social influences. The subjective norm construct was subsequently added to TAM2 but findings indicated that subjective norm exerted significant direct effects on usage intentions only within mandatory (non-voluntary) systems (Venkatesh & Davis, 2000; Venkatesh & Morris, 2000).

### *Unified Theory of Acceptance and Use of Technology*

The unified theory of acceptance and use of technology (UTAUT) was introduced by Venkatesh, Morris, Davis, G. B and Davis, F.D. (2003) as an integrated theoretical model that condenses and captures the essential elements of eight previously established acceptance models. Models compared include TRA, TPB, TAM, motivational model, combined TAM and TPB, model of PC utilization, innovation diffusion theory, and social cognitive theory. UTAUT consists of three core determinants of BI as well as two determinants of use behavior (BI and facilitating conditions). In addition, the model suggests examination of moderators to account for dynamic influences related to organizational context, user experience, and demographic characteristics.

The core determinants of UTAUT include performance expectancy, effort expectancy, and social influence. Performance expectancy represents the degree to which an individual believes that using the system will help attain gains in job performance and is similar to the construct PU from TAM. Effort expectancy represents the degree of ease associated with use of the system and is similar to the construct PEOU in TAM. Social influence represents the degree to which an individual perceives that important others believe he or she should use the new system, and is similar to subjective norm in TAM2. The construct is derived from the explicit or implicit notion that an individual's behavior is influenced by the way in which he or she believes others will view the user as a result of having used the technology.

Using data from four organizations, the eight original models were empirically tested and compared to UTAUT, finding UTAUT to outperform all original models in explaining variance in user intention to use information technology within workplace settings. While

UTAUT has been used across a number of contexts, the explicit objective for UTAUT was to provide a useful tool to managers needing to assess likelihood of new technology acceptance within the workplace.

### *Present Study*

Based on applicability of the previous models to the context for this study, the theoretical framework for the present study comes from TAM. This theory was chosen because of its focus on belief factors that assist in understanding acceptance of IS across a wide variety of contexts, including IS usage outside of the workplace. In addition, a number of research studies based on TAM provide a research foundation for examining belief factors in non-mandatory adoption settings.

### Purpose and Significance of the Study

The purpose of this study was to explore the relationship and relative importance of factors that influence a user's BI to disclose the pieces of personal information required to adopt and use a GN application. The study contributes to the bodies of knowledge related to information privacy, information policy, LBS, and technology acceptance is extended.

As to theory, this study further developed the technology acceptance model, providing insight into the diminished importance of PU as an influence in adoption of GN applications within a non-mandatory setting. In addition, the study extended the model by relating the specific constructs of this study – locatability (LOC), personalization (PER), perceived playfulness (PP), and PC with BI to adopt technology.

Methodologically, the study instrument was assembled using questionnaire items adapted from previous studies. Individual survey items were refined and constructs were validated. The resulting survey instrument may be useful in further research.

As to practice, benefits of the knowledge from this study may be helpful in understanding consumer attitudes toward revealing personal information in emerging technological settings and may benefit policymakers concerned with protection of personal privacy. The study offers an understanding of consumer attitudes toward playful marketing techniques that require the revealing of location-based personal information and may benefit companies and marketing professionals. Mobile application developers may benefit from a more developed understanding of consumer attitudes toward location-based technological solutions.

### Research Question and Hypotheses

This study seeks to answer the following research questions:

1. To what extent does the inclusion of usability features associated with personalization (PER) influence a user's intention to reveal personal information and adopt location-based services (LBS)?
2. To what extent does the inclusion of usability features associated with locatability (LOC) influence a user's intention to reveal personal information and adopt location-based services (LBS)?
3. To what extent does the inclusion of entertainment and play features influence a user's intention to reveal personal information and adopt location-based services (LBS)?
4. To what extent does privacy concern (PC) act as an inhibitor for users in revealing personal information and adoption of location-based services (LBS)?

5. What is the relationship between personalization (PER), locatability (LOC), perceived playfulness (PP), and privacy concern (PC) for users in the adoption of location-based services (LBS)?

This study is intended to investigate the degree of relationship between PER, LOC, PP, and PC in relation to BI to disclose personal information for individuals using an LBS.

Relationships of the variables presented in Figure 1 reflect the following hypotheses:

- H<sub>0</sub>: There is no statistically significant relationship between personalization (PER), locatability (LOC), perceived playfulness (PP), and privacy concern (PC) toward behavioral intention (BI) to disclose personal information.
- H<sub>1</sub>: There is a statistically significant relationship between personalization (PER), locatability (LOC), perceived playfulness (PP), and privacy concern (PC) toward behavioral intention (BI) to disclose personal information.

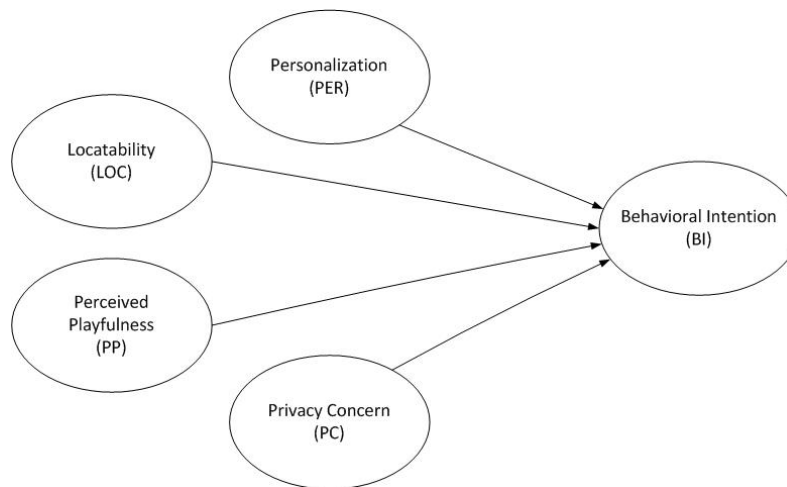


Figure 1. Relationships associated with behavioral intention to disclose personal information.

### Research Design

This study seeks to determine whether a relationship exists among factors of PER, LOC, PP, PC and BI to disclose personal information for individuals using location-based, GN applications. Two factors, LOC and PER, were studied as elements of utility that may motivate users to use LBS technology based on its usefulness. PP was conceptualized as a measure

involving the state of playfulness which may engage users in affective or cognitive episodes of play, encouraging system adoption and use. PC was conceptualized as a measure of a user's concern about opportunistic behavior related to the disclosure of personal information within the specific context of GN system adoption and usage. BI was conceptualized as the intention of an individual to disclose personal information within the context of GN system adoption and usage.

The sampling frame for the study was a volunteer sample of respondents from a population of undergraduate students at a single private liberal-arts 4-year university. After first watching a 2-minute web-video illustrating a GN application, each participant completed a survey questionnaire using a self-administered web-based survey tool. Collected survey data was analyzed using appropriate procedures that would address the research questions of this study.

#### Definition of Terms

Behavioral intention to disclose: a measure of a user's intention to provide pieces of personal information necessary to participate (Xu, Teo, et al., 2009).

Foursquare: a GN application. Users check-in at physical locations using GPS-enabled devices. Other distinct features of Foursquare include mayors, badges, tips, and shouts (Foursquare, n.d.).

Geosocial networking application: a specific type of social network application that uses information provided by GPS-enabled devices for the purpose of delivering services and connecting system users (Lowensohn, 2007).



Global positioning system: a U.S.-owned system that provides users with services for identifying location positioning, navigation, and time (Global Positioning System, 2010).

Gowalla: a GN application. Users check-in at physical locations using GPS-enabled devices. Other distinct features of Gowalla include trips, passports, stamps, and pins (Gowalla, n.d.).

Information privacy: “the ability of an individual to control the terms under which personal information is acquired and used” (Xu, Teo, et al., 2009, p. 138).

Locatability: a measure of the degree of perceived value related to “being able to access needed information and services at the right time and in the right place” (Xu, Teo, et al., 2009, p. 142).

Location-based service: service utilizing accurate real-time GPS user data to connect users to nearby points of interest (Geospatial Information & Technology Association, 2002).

Perceived playfulness: a measure of the degree to which a user experiences fun when using technology (Moon & Kim, 2001).

Perceived usefulness: a measure of a user’s belief that using an information system will enhance performance, with focus placed on the utility of the system (Davis, 1989).

Personalization: a measure of the degree of perceived value of an information system related its capability to offer personalized services or information access (Xu, Teo, et al., 2009).

Privacy concern: a measure of a user’s concern about opportunistic behavior related to the disclosure of personal information (Dinev & Hart, 2006).

Social network site: an online service that focuses on building networks or communities of people based on shared interests or activities (Boyd & Ellison, 2007).

## Summary

Advances in communication technologies provide opportunities for user engagement in activities provided as LBS. As LBS technologies and applications mature, challenges related to consumer system adoption and information privacy may emerge. Growing interest in this developing technology alongside governmental and consumer concern for information privacy provide the foundation for this study.

## CHAPTER 2

### LITERATURE REVIEW

The purpose of this study was to explore the relationship and relative importance of factors that influence a user's behavioral intention (BI) to disclose personal information when adopting and using a geosocial networking (GN) application. This chapter examines theoretical and empirical works addressing the factors examined in this study.

This overview is divided into the following sections: factors for the study, perceived usefulness, perceived playfulness, privacy concern, BI to disclose personal information, and a summary. Within the context of perceived usefulness, two factors, locatability and personalization, are studied as elements of utility that may motivate users to use LBS technology based on its usefulness. Both are examined in relation to BI following the relationship previously identified and assessed by Xu, Teo, et al. (2009). This study examined the relationship between perceived playfulness and BI previously identified and assessed by Moon and Kim (2001). This study also examined the relationship between privacy concern and BI previously identified and assessed by Dinev and Hart (2006). BI to disclose personal information is assessed using items identified by Xu, Teo, et al. (2009).

#### Factors for the Study

The theoretical framework chosen for this study is the technology acceptance model (TAM). While early TAM studies focused on both perceived usefulness (PU) and perceived ease of use (PEOU) as extrinsic motivational factors specifically related to outcome achievement within utilitarian contexts (Davis, 1989; Mathieson, 1991, Venkatesh, 1999), later studies

included an examination of intrinsic motivational factors, seeking to understand information system (IS) adoption for individuals engaging in activities with little apparent utilitarian purpose. The intrinsic factor, perceived enjoyment (PE), was first introduced by Davis, Bagozzi, and Warshaw (1992) examining the degree to which a computer activity is perceived to be enjoyable in and of itself, apart from any utilitarian value. A number of subsequent studies included PE or the closely related variable, perceived playfulness (PP), as an intrinsic variable, finding it to be a determinant of both PU and PEOU (Igbaria, Parasuraman, & Baroudi, 1996; Van der Heijden, 2003; Wakefield & Whitten, 2006).

Since location-based services (LBS) may be used functionally as well as for pleasure, this study examined user behavior in relation to both extrinsic and intrinsic technology beliefs. As an extrinsic motivator, usefulness is derived from LBS based on features that provide personalized, relevant, and timely information to users. As an extrinsic motivator, a user's concern for privacy is derived from the necessity to reveal personal information when using LBS. As an intrinsic motivator, playfulness is derived from a user's interactions with design features and capabilities of GN systems and is internal to the user. Within the context of user adoption of an LBS, the present study examined the relationship between BI to use the IS and four belief factors. Usefulness was examined based on the capability for the LBS to provide personalization (PER) and locatability (LOC). PP was examined as a belief factor depicting the capability for user activity to be enjoyable in and of itself. Privacy concern (PC) was examined as a belief factor depicting an individual's concern over disclosure of personal information when using the LBS.

## Perceived Usefulness

Numerous TAM studies have demonstrated that users are motivated to use technology based on the usefulness of the system. PU represents a measure of a user's belief that "using an information system will enhance job performance" (Davis et al., 1989, p. 320). While early TAM studies examined PU specific to job-related systems and functions (Davis et al., 1989; Davis et al., 1992; Igbaria et al., 1996), more recent studies have examined PU for system contexts unassociated with the workplace, including PU of the world wide web (WWW; Agarwal & Karahanna, 2000; Teo, Lim, & Lai, 1999), PU of e-commerce systems (Gefen, Karahanna, & Straub, 2003), and PU of social networking sites (SNS; Sledgianowski & Kulviwat, 2009).

Studies examining PU commonly measure user perceptions related to whether a system is useful, improves performance, increases productivity, or enhances effectiveness (Chen, Gillenson, & Sherrell, 2002; Gefen et al., 2003; Venkatesh & Morris, 2000). PU has been found to be the primary confirmatory factor for predicting BI of technology (see Sun & Zhang, 2006), with significant interaction effect associated with user attitude factors (Oh, Kim, Lee, Shim, Park, & Jung, 2009; Moon & Kim, 2001; Van der Heijden, 2003), and subjective norm (Venkatesh & Davis, 2000; Venkatesh & Morris, 2000).

While PU is a commonly studied determinant associated with BI to adopt technology, few TAM studies exist that examine PU within the LBS context (Junglas, 2007; Kwon, Choi, & Kim, 2007). Literature specific to LBS reveals an examination of usefulness related to context-specific characteristics. The unique value (i.e. usefulness) of an LBS system lies in its capability to offer users relevant and timely information or service based on the user's location. GPS-enabled devices equipped with LBS offer users the capability to have access to information

services due to (a) portability of the device, (b) continuity of connection at all hours of the day, (c) accessibility to network services at any time and from any place, (d) localization services based on geographical coordinate recognition, and (e) user identification by means of the attached SIM (subscriber identity module) card (Watson, Pitt, Berthon, & Zinkhan, 2002; Junglas & Watson, 2009).

While the convergence of these elements offers the necessary technological infrastructure, an LBS offers value associated with situational dependency whereby the individual takes advantage of technological infrastructure within personalized context. An LBS offers personalized service that has been identified in the literature as linked to situational context associated with three components: time, location, and identity (Figge, 2004; Junglas & Watson, 2009; Sheng, Nah, & Siau, 2008). The first situational component, time, refers to capabilities of the LBS to offer immediate services, irrespective of time or location. The second situational component, location, refers to capabilities of the LBS to offer services based on location information provided by a unique location identifier, i.e. a GPS coordinate. The third situational component, identity, refers to capabilities of the LBS to offer services unique to the identity of the user. Personalized LBS offering user benefits associated with time, location, and identity have been found to be a significant predictor of a user's BI to adopt or use LBS technology (Xu, Teo, et al., 2009; Xu, Zhang, et al., 2009).

In an LBS comparison study of mobile consumers and covert versus overt marketing techniques, Xu, Zhang, Shi, and Song (2009) found consumer willingness to use an LBS to be influenced by marketing delivery approach. Context-specific delivery marketing messages and advertisements were used to take advantage of time, location, and identity, delivering

advertising messages based on geographic location, and offering personalized marketing when and where consumers are most likely to purchase. Findings indicated that consumers responded positively to both covert and overt marketing message delivery techniques that presented opportunities to personalized services and deepen relationships between customers and marketers.

Consumers have been found to be willing to relinquish personal information in exchange for PER. In a study of varied methods for dissemination of personalized information access, Xu, Teo, et al. (2009) found that consumers respond in varied ways to push-based versus pull-based LBS systems. Capabilities of the LBS to offer financial compensation unique to the user offers benefits associated with identity. Providing consumers with financial compensation such as coupons or discounts, was found to be a more important consumer acceptance determinant for push-based services (proactively pushed to consumer devices based on time and location), than for customer acceptance of pull-based (consumer initiated) services. Capability of the LBS to protect personal information was also found to affect a consumer's willingness to adopt LBS services.

Context has been found to have a significant impact on consumer behavior and decision making. In a study of LBS usage across emergency versus non-emergency scenarios, Sheng, et al. (2008) found intention to adopt to be influenced by user context. Findings indicated that university student respondents were more likely to give personalized information to adopt personalized application services in emergency scenarios, suggesting that the effects of PER on customer PC and intention to adopt are situationally dependent.

While LBS utilize the localization capabilities of mobile-devices to offer users access to location-linked information in a timely manner, GN applications are uniquely designed to offer capabilities for users not only to access geospatial information from any location at any time (LOC), but also to access information unique to the identity of the user, and thus tailored to individual preferences or built on user social connections (PER). For this study, PU was conceptualized as a bi-dimensional construct, comprised of the system's capability to offer users value associated with its linkages to (a) locatability, and (b) personalization. It was hypothesized that there is a statistically significant relationship between LOC and PER toward BI to disclose personal information, based on characteristics of the GN system related to time, location, and identity.

### Perceived Playfulness

The study of playfulness as an attribute of technology acceptance has been explored as a contextual state or condition that is helpful in explaining how an individual behaves within a given situation. Derived from Csikszentmihalyi's flow theory (1975), playfulness emphasizes the role of context in explaining an individual's BI. Csikszentmihalyi defined flow as "the holistic sensation that people feel when they act with total involvement" (p. 36). Flow is characterized by enjoyable feelings, concentration, immersion, and intensive involvement. When in this mental state, a person is fully immersed within the context and process of the activity as an experience that is intrinsically interesting.

Within TAM research, a number of studies have included factors related to the role of flow in technology acceptance, focusing on how users are motivated to use technology based



on enjoyment, fun, and play. Davis et al. (1992) first introduced PE in an analysis of the impact that enjoyment plays on word processor usage in the workplace. This construct emphasized the degree to which interaction with the technology was perceived to be enjoyable in and of itself, apart from the proposed utilitarian value of the word processing system. A closely related construct, PP, was introduced by Webster and Martocchio (1992) representing a situation-specific characteristic associated with cognitive playfulness. The few studies using a third related construct, perceived fun (Igbaria et al., 1996; Igbaria, Schiffman, & Wieckowski, 1994), used a definition identical to that found for the PE construct (Hong & Tam, 2006; Van der Heijden, 2003) and the perceived fun construct subsequently disappeared from TAM literature. While both PE and PP have been studied in relationship to how technology adoption is affected by intrinsic motivation associated with enjoyment, the PP construct can best be differentiated by its emphasis on the role of context in explaining an individual's BI.

While the majority of TAM studies have found PU to be the major determining factor in predicting user intention to use technology (Davis, 1989; Davis et al., 1989; see also Sun & Zhang, 2006), researchers have found intrinsic motivation related to enjoyment or playfulness to be a significant contributing factor across a variety of contexts. These contexts include user intention to use computer systems in the workplace (Davis et al., 1992; Igbaria et al., 1994; Igbaria et al., 1996), varied usages of the WWW (Moon & Kim, 2001; Oh et al., 2009; Sledgianowski & Kulviwat, 2009), or user adoption of mobile technologies (Fang, Chan, Brzezinski, & Xu, 2005; Dickinger, Arami, & Meyer, 2008; Wakefield & Whitten, 2006).

PP refers to a determination of the degree to which a user experiences pleasure and enjoyment within a technological context (Moon & Kim, 2001). Two approaches have been

taken in the study of playfulness of technological systems: (1) playfulness as a personal *trait* (Davis, J., Lee, & Yi, 2009; Martocchio & Webster, 1992; Webster & Martocchio, 1992), and (2) playfulness as a situational *state* of interaction between the individual and the situation (Fang et al., 2005; Moon & Kim, 2001; Sledgianowski & Kulviwat, 2009). The general *trait* of playfulness relates to an individual's predisposition to draw satisfaction guided by internal motivation that is not driven by externally imposed rules but by personal inclination (Webster & Martocchio, 1992). Playfulness as trait places emphasis on varied measurements of spontaneity, joy, or humor for individuals interacting with varied systems. For example, an individual rating higher in computer playfulness may have higher tendency to become self-absorbed in searching the web, or have higher tendency to become caught up in a trail of hyperlinking activities. Within the workplace, trainees higher in the attribute of playfulness exhibited higher learning, positive mood, and had more positive affective outcomes than those lower in computer playfulness (Martocchio & Webster, 1992).

In contrast, the *state* of playfulness has been described as a situational characteristic related to the interaction between the individual and the unique situation under study (Fang et al., 2005; Moon & Kim, 2001). While an individual's general traits refer to comparatively stable characteristics, they are consequently reasonably consistent in relationship to situational stimuli. In contrast, states refer to affective or cognitive episodes that are experienced in the moment, and have a tendency to fluctuate over time. Unlike traits, states can be influenced by the interaction between the individual and situation. Playfulness as state places emphasis on the situation, and has most commonly been examined in contexts where the system does not exist purely for utilitarian value, but rather includes elements of entertainment and play

inherent in the system design. In the playfulness state, the context is the driving factor for producing enjoyable feelings or involving individuals to the point of immersion; the context produces playfulness due to its design or technological capabilities.

Based on flow theory, Moon and Kim (2001) identified dimensions of PP that might be applicable when examining user acceptance of technology. These dimensions include the extent to which the individual (a) is curious during the interaction with the technology; and (b) finds the interaction with the technology to be enjoyable or interesting. Technologies can encourage sensory curiosity by providing specific technological or design characteristics that encourage exploration or encourage the user to achieve varied levels of attainment. Likewise, when individuals are in a playfulness state, interaction with the technology will be intrinsically interesting and users will be engaged in activity for pleasure or enjoyment rather than for extrinsic reward. Based on the work of Moon and Kim (2001), studies that examine playfulness as state commonly measure user perceptions related to whether a system context is enjoyable and fun, and whether it leads to exploration or stimulates curiosity (Sledgianowski & Kulviwat, 2009).

The research work of Moon and Kim (2001) has been foundational to the study of PP within the context of Internet technologies. This study involved individuals who use the WWW for tasks, examining 152 graduate students from a management school who had prior experience using the WWW. Playfulness was studied as an intrinsic motivator, influencing the user's experience within the WWW environment. Their findings indicated that while PU had a direct effect on a user's BI to use the WWW for work purposes, PP had a significant effect on a user's BI to use the WWW for both entertainment and work purposes. Moon and Kim

suggested that although PU and PEOU have traditionally been significant factors in predicting BI in traditional information systems environments, PP would play an increasingly important role in understanding the usability of systems within the WWW environment.

Beyond the work of Moon and Kim, there have been a small number of studies that have examined PP as a situational state. These studies illustrate varied system designs and technological contexts for examining situations offering affective or cognitive episodes for play.

In an examination of user motivation to use the Internet for electronic commerce, Oh et al. (2009) surveyed Korean Internet users to determine causal relationships among constructs and intention to use a virtual store. The research identified PP, PU, PEOU, and perceived trust as influential in predicting BI to use a virtual store. The researchers suggested that examining the entertaining features of emerging technologies is especially beneficial in understanding the role that PP plays in BI, and that the design of virtual stores should be accomplished in such a way that users perceive the store as enjoyable and pleasant to use in its own right.

Sledgianowski and Kulviwat (2009) introduced the SNS adoption model to examine the effects of a number of factors associated with usage intention for SNS. In addition to PU, PEOU, and PP, other factors studied included critical mass, trust, and normative pressure. Among the 322 student respondents, playfulness was found to have a significant positive effect on intention to use a SNS, and was the strongest indicator of BI to use a SNS. The researchers suggested that SNS providers should continue to design features that promote playfulness and bring enjoyment to SNS participants.

Fang et al. (2005) examined the key determinants of user intention to adopt wireless handheld device technology. Study results gathered from a group of 101 working adults implied

that user intention to adopt wireless technology for differing task types has differing determinants. Task types studied included general tasks, transactional tasks, and gaming tasks. Results suggested that for individuals performing gaming tasks on handheld devices, PP was the key determinant of user intention to adopt; for individuals performing general or transactional tasks, PU was the key determinant of user intention to adopt. Fang et al. argued that within gaming tasks, playing the game is the outcome expectancy of the user, and that PP may more accurately measure extrinsic motivation, necessitating consideration of PP within the gaming context as a surrogate for PU.

While playfulness has been studied across a variety of contexts or situations, no TAM studies have been found that examine playfulness within the LBS context. As Internet capabilities expand and innovative devices provide increased opportunities for ubiquitous networked activity, there is an increased call for using TAM to understand the entertaining features associated with emerging technologies (Agarwal & Karahanna, 2000; Moon & Kim, 2001; Oh et al., 2009). It has also been suggested that designers should pay particular attention to potential value or system benefit that can be gained by adding playful context to otherwise utilitarian systems (Sledgianowski & Kulviwat, 2009).

The purpose of this study was to explore the relationship and relative importance of four specific factors posited to influence a user's BI to disclose personal information and use a GN application. For this study, PP was conceptualized as a measure involving the state of playfulness which may engage the user in affective or cognitive episodes of play, encouraging GN system adoption and use. It was hypothesized that there is a statistically significant

relationship between BI to disclose personal information and playfulness based on characteristics of the GN system related to entertainment and play.

### Privacy Concern

The study of PC as an attribute is helpful in explaining an individual's BI when adopting technology. PC is a risk belief measure of a user's concern about opportunistic behavior related to the disclosure of personal information (Dinev & Hart, 2006). Users possessing higher levels of PC are apprehensive over what may happen to personal information that has been disclosed, feeling vulnerability due to potential loss of control. Within technologically advanced scenarios, PC stems from advanced technological capabilities aligned with individual or business motives to use an individual's personal information to advance other strategic purposes. As technologies develop and as society objectives shift, new perspectives about the range of possibilities for PC emerge.

Privacy presupposes relationships between people. An individual's understanding of privacy as well as privacy invasion is strongly tied to or defined by interpersonal experiences and situations (Laufer & Wolfe, 1977). Management of privacy is often described as control over interaction of the boundaries between self and others (Altman, 1975; Margulis, 1977; Stone & Stone, 1990; Westin, 1967; Wolfe & Laufer, 1974). Privacy exists when individuals are able to control personal transactions by controlling boundaries (Culnan, 1993), specifically described as interaction management (Kelvin, 1973; Laufer & Wolfe, 1977; Stone & Stone, 1990; Westin, 1967) and information management (Laufer & Wolfe, 1977; Margulis, 1977; Stone & Stone, 1990). Interaction management refers to control or constraint that individuals

use to manage interaction or non-interaction with specified others. Individuals achieve interaction management by managed control over contact with other people. More specific to this study, the concept of information management refers to the disclosure or nondisclosure of personal information. Individuals achieve information management by controlling information about themselves. For instance, when working on the Internet, an individual may attempt to control personal information by controlling what pieces are collected, or who can collect, verify, modify and have access to individual pieces of information.

Because technological advances provide increased challenges to controlling access to personal information, most current discussions of information privacy argue that information privacy involves controlled access of personal information collected in a virtual environment. PC reflects an individual's personal view toward fair use of information offered as part of a virtual transaction (Malhotra et al., 2004). Individuals attempt to exercise interaction management and information management with situations involving other individuals as well as organizations. Based on the Internet's technical capabilities for saving, sharing, and accessing data, individuals experience concern related to the potential for revealed information to be used in unforeseen ways by other individuals or organizations (Milberg, Smith, & Burke, 2000; Stone & Stone, 1990). Because individuals are concerned about privacy issues related to virtual contexts, privacy constructs have been included in TAM studies, addressing relationships that may exist between PU, user concerns for privacy, and BI (Belanger, Hiller, & Smith, 2002; Lallmahamood, 2007; Roca, Garcia, & de la Vega, 2009).

An individual's PC has been examined as a multidimensional construct, comprised of varied elements that an individual may consider as foundational to PC. Smith, Milberg, and

Burke (1996) examined numerous PC factors previously noted by scholars, privacy advocates, and corporate managers, identifying four primary dimensions of individual concern over organizational information privacy practices. The dimensions identified were (a) collection, referring to the excessive quantity of data being collected; (b) improper access, referring to a desire to understand organizational policy for who within the organization will have access to personal information collected; (c) errors, referring to an individual's perspective that collecting organizations do not take sufficient steps to protect collected data; and (d) unauthorized secondary use, referring to information being collected for one purpose but being used for another purpose without authorization from the individual. Commonly cited examples of secondary use relate to the sale of customer name, address, phone number, and purchasing history (Culnan, 1993; Smith et al., 1996). There is support for the notion that consumers would be more willing to disclose information to organizations if they felt more confidence in relation to improper access and unauthorized secondary use (Culnan & Armstrong, 1999). While secondary information use may be legal and common business practice, an individual may view the practice as an invasion of privacy.

When examining information privacy as a social issue, an individual's decision to manage information disclosure has been described as a "calculus of behavior" (Laufer & Wolfe, 1977). Within this decision process, an individual approaches information disclosure circumstances as a tradeoff between what information will be necessary to share versus the future benefits and consequences for disclosing personal information. Situational constraints contribute to an individual's decision whether to disclose. An individual's decision to manage information disclosure has been examined as a "social contract" (Culnan & Armstrong, 1999,



Phelps et al., 2000) or “privacy calculus” (Dinev & Hart, 2006; Xu, Zhang, et al., 2009) with studies finding that individuals are willing to disclose personal information in exchange for some perceived economic or social benefit balanced with an assessment that personal information offered will be used fairly, and that the user perceives little or no negative consequences will be linked to disclosure (Dinev & Hart, 2006; Laufer & Wolfe, 1977; Xu, Zhang, et al., 2009)

Numerous studies have examined individual factors affecting PC levels (Laufer & Wolfe, 1977). PC levels have been found to be affected by differing personality traits such as conscientiousness, neuroticism, and openness to new experiences (Junglas et al., 2008). PC has been found to be influenced by outside entities such as parents or peers (Chai, Bagchi-Sen, Morrell, Rao, & Upadhyaya, 2009) and significantly affected by an individual’s personal belief in privacy rights (Yao, Rice, & Wallis, 2007). PC has been described as being a function of previous privacy-related experiences, with higher PC levels shown to be significantly influenced by the existence of a prior privacy-invasion circumstance (Fusilier & Hoyer, 1980; Laufer & Wolfe, 1977; Yao et al., 2007).

PC beliefs are influenced by psychological dispositions such as a need for or expectation of privacy as well as generalized self-efficacy (Yao et al., 2007). However, privacy self-efficacy (an assessment of an individual’s ability to cope with risk when disclosing personal information) has been found to not be significantly related to BI within the context of disclosure of information (Larose & Rifon, 2007).

PC beliefs have been described as being situationally-dependent or context-sensitive. PC levels vary based on the type of information being managed, the manner in which an

organization collects personal information or the amount of information control offered during the information sharing situation. For individuals engaging in e-commerce transactions which demand organizations to collect credit card and other contact information pieces, higher levels of PC have been found to be related to lower levels of willingness to provide personal information to transact on the Internet (Dinev & Hart, 2006; Larose & Rifon, 2007). In a marketing study examining consumer willingness to provide information to marketers, Phelps et al. (2000) found that respondents most willing to provide demographic or lifestyle information were less willing to provide information concerning consumer characteristics or behaviors, and least willing to provide personal identification or financial data.

PC levels have been found to vary whenever innovative or unfamiliar technologies introduce new situations for disclosing information (Junglas & Watson, 2008). Individuals express varied PC levels based on the context for sharing personal information, such as whether information is requested during an emergency versus a non-emergency scenario (Sheng et al., 2008). PC levels rise when individuals are uncertain about the context for how information has been collected (Dinev & Hart, 2006), or as to the ultimate purpose for its use (Lanier & Saini, 2008; Youn, 2009). Proactive organizations can assist in mitigating potentially damaging effects to PC levels by explicitly revealing adherence to fair information practices (Culnan & Armstrong, 1999) or by informing consumers regarding privacy policies (Larose & Rifon, 2007; Meinert, Peterson, Criswell, & Crossland, 2006).

PC has been specifically addressed in a number of LBS studies. Junglas, Johnson, and Spitzmüller (2008) used an LBS context to examine personality traits that affect concern for privacy, finding that agreeableness, conscientiousness, and openness to experience all affect

PC. Because LBS technologies offer capabilities to collect personal consumer information and produce personalized marketing messages, marketing studies offer insight into ways that covert versus overt message delivery (Xu, Zhang, et al., 2009) as well as push versus pull marketing techniques (Xu, Teo, et al., 2009) affect consumer concern when using LBS technologies to interact with businesses.

Within a virtual environment, an individual that is willing to disclose personal information may receive benefits in the form of useful and pertinent information, or even financial reward such as promotional certificates and discounts. Scenarios may also include implies potential risk to the user associated with uses of information beyond the original offered intent. The calculus perspective emphasizes the influence of benefit and risk antecedent factors on BI. When an individual determines whether to disclose personal information as part of a privacy-calculus exchange, it can be expected that the decision will be based on the perceived net value of the tradeoff. Risks in the information exchange are balanced against inputs required to engage in systems activity (Chellappa & Sin, 2005; Sheng et al., 2008). Higher levels of PC have been found to be related to lower levels of willingness to engage in systems activity which require personal information disclosure (Dinev & Hart, 2006).

For this study, PC was conceptualized as a measure of a user's concern about opportunistic behavior related to the disclosure of personal information within the specific context of GN system adoption and usage. Individuals perceiving the benefits of information disclosure to be a fair exchange for any perceived risks can be expected to exhibit higher levels of BI to participate. It was hypothesized that there is a statistically significant relationship between BI to disclose personal information and PC.

## Behavioral Intention to Disclose Personal Information

Ajzen and Fishbein's (1980) theory of reasoned action and TAM (Davis, 1989) have been widely cited by researchers seeking to explain and predict a user's BI and consequent adoption of technology (Dinev & Hart, 2006; Moon & Kim, 2001; see also Sun & Zhang, 2006). Numerous studies have examined the relationship between BI and varied antecedent factors including PU, PEOU, subjective norm, and user attitude, with varied research outcomes. More recently, TAM studies have examined BI across a diversity of contexts including BI to use the WWW (McKnight, Choudhury, & Kacmar, 2002; Moon & Kim, 2001), SNS (Sledgianowski & Kulviwat, 2009), and more specific to this study, applications requiring disclosure of personal information (Malhotra et al., 2004). As the dependent variable associated with intention to adopt technology, BI-to-disclose has been found to be a reliable predictor for actual behavior, indicating that intention to release personal information is a good proxy for whether an individual will actually reveal personal information in moment of reality (Malhotra et al., 2004).

For studies examining BI, user perceptions are measured in relationship to whether they would intend to use or predict to use a technological system (Venkatesh, 2000; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000). More specific to information privacy contexts, BI has been examined in terms of willingness or intention to provide specific categorical types of personal information, (Larose & Rifon, 2007; Meinert et al., 2006; Phelps et al., 2000). In a study designed to identify information types or specific situations that contribute to PC, Phelps et al. (2000) examined four categorical types of personal information as well as beliefs regarding traditional catalog and mail advertising marketing channels, information practices, and information control. Survey results from 556 residential mail-out respondents indicated that

consumers were most willing to provide marketers with demographic and lifestyle information, and least willing to provide personally identifying or financial information. Findings revealed a strong relationship between PC and consumer belief about company information collection and usage policy.

In a more recent study examining the impact of privacy policy statements on consumer willingness to provide varied types of information to websites, Meinert et al. (2006) examined willingness to provide (a) contact information (email address, name, mailing address, telephone number), (b) biographical information (demographic data such as income, personal preferences and interests), and (c) financial information (credit card and bank account numbers) to websites exhibiting varied privacy policy statements. Survey results from 261 graduate and non-credit professional students indicated that the willingness to provide information was dependent on the type of information requested with respondents most willing to provide contact information, then biographical, and least willing to provide financial information. Results suggested that consumers concerned with disclosing information, be it financial or biographical, may opt to forgo providing information if disclosure is a requirement to participation, and that organizations should readily distinguish the difference between required and optional information in an effort to overcome e-commerce adoption obstacles.

BI has also been examined in relationship to whether users would be willing to provide generic information within specific technological contexts including the Internet (Chellappa & Sin, 2005; Malhotra et al., 2004) and LBS (Xu, Teo, et al., 2009; Xu, Zhang, et al., 2009). Xu, Zhang, et al. (2009) examined the utilization of LBS technology focusing on its awareness of user circumstance and capability to send marketing messages in both covert and overt ways. BI

was operationalized as the construct willingness-to-disclose-information, finding a statistically significant relationship to exist between BI and several factors. Within the LBS context, a relationship existed between BI and both perceived value (analogous to the concept of a privacy calculus) and an individual's tendency to be early to adopt an innovation (operationalized as personal innovativeness, see Agarwal & Prasad, 1998), for both covert and overt marketing techniques. In addition, BI was found to be influenced by a consumer's willingness to respond to a deal or coupon promotion (operationalized as coupon proneness; see Lichtenstein, Netemeyer, & Burton, 1990) for covert marketing techniques only.

Also within the LBS context and specific to this study, Xu, Teo, et al. (2009) examined BI as the construct intention-to-disclose-information, finding a statistically significant relationship to exist between BI and both perceived privacy benefits (regarding LOC and PER of LBS) and personal privacy risks (the "expectation of losses associated with the release of personal information to the LBS service provider", p. 143).

The purpose of this study was to explore the relationship and relative importance of four predictive factors posited to influence a user's BI to disclose personal information and use a GN application. BI was conceptualized as the intention of an individual to disclose personal information within the context of GN system adoption and usage. Within this study, the disclosure of personal information referred to all personal information that is disclosed when using an LBS, including static user identifier information associated with the individual or device including name, email address, SIM card ID, and cell phone number, as well as dynamic and real-time information associated with location.

## Summary

This chapter has provided a review of the literature that addresses the factors for this study. This study contributes to theory development by furthering the development of TAM and providing insight into the role of PU as an influencer in the adoption of GN applications within a non-mandatory setting. An examination of LOC and PER as capabilities of mobile-devices to provide users value associated with time, location and unique user identity builds upon the concept of PU within TAM. In addition, the study extends the model by relating the specific constructs of this study – LOC, PER, PP, and PC with BI to adopt technology. Chapter 3 presents the survey instrument and the methodology used to gather and analyze the data for this study.

## CHAPTER 3

### METHODOLOGY

This study investigated the degree of relationship between factors of personalization, locatability, perceived playfulness, and privacy concern in determining behavioral intention (BI) to disclose personal information for individuals using a location-based service (LBS). Data collected from an online survey of undergraduate students from a 4-year university assisted in addressing which predictors are most responsible for producing a significant effect on BI to disclose personal information. This chapter includes an overview of the research design for the study, as well as a description of the students who participated in the study, the instrument items, the methodology used to gather and analyze the data, and the statistical analysis methods.

#### Research Design

The purpose of this study was to explore the relationship and relative importance of factors that influence a user's BI to disclose the pieces of personal information required to adopt and use a geosocial networking (GN) application. The following hypotheses were proposed.

- H<sub>0</sub>: There is no statistically significant relationship between personalization (PER), locatability (LOC), perceived playfulness (PP), and privacy concern (PC) toward behavioral intention (BI) to disclose personal information.
- H<sub>1</sub>: There is a statistically significant relationship between personalization (PER), locatability (LOC), perceived playfulness (PP), and privacy concern (PC) toward behavioral intention (BI) to disclose personal information.

The general methodological approach for this research study was to conduct a



correlational study. The goal of the study was to observe natural variations among four determinants, identifying the degree of relationship between a criterion measure—BI to disclose—and the combination of determinant variables proposed.

The identified constructs studied included four determinants and one dependent variable. The four determinant independent variables were (a) PER, measuring the degree of perceived value of the LBS related to its capability to offer personalized services or information access, (b) LOC, measuring the degree of perceived value of the LBS related to its capability to access information and services at the right time and in the right place, (c) PP, measuring the degree to which a user experiences fun when using the LBS. and (d) PC, measuring the degree of an individual's concern about opportunistic behavior related to personal information shared when using the LBS. The dependent variable, BI- to-disclose, is a measure of an individual's intention to provide the pieces of personal information required to participate with the LBS.

#### Population

The population for this study consisted of 1054 undergraduate students at a 4-year private liberal-arts university in central Texas. The sampling frame was a volunteer sample of respondents from the population of undergraduate students enrolled in courses during the Fall 2011 term. The sample size ( $N = 309$ ) was ultimately determined by the number of individuals who responded to the email invitation to participate.

To generalize findings from the sample to the population, a sample size of 278 participants was planned for this study, as determined using the table developed by Krejcie and Morgan (1970). This sample size also meets the sample size requirements for statistical power,

to ensure that the sample size was large enough to be capable of detecting a significant effect. For this study, statistical power calculations were based on linear multiple regression analysis based on four predictor variables, a medium-sized effect of 0.15 standardized deviation units, alpha factor of .05, and .80 power as the threshold rate of Type 2 error. Calculation output indicated a minimum sample size of 85 was needed for power of 0.804, with a critical  $F = 2.486$ , indicating that a sample size of 85 would be necessary to maximize the likelihood that the null hypothesis would be rejected when it is, in fact, false. The sampling size for this study ( $N = 309$ ) exceeded the necessary requirements to generalize findings to the population as well as meet sample size requirements for statistical power.

#### Instrumentation

A self-administered web-based survey was constructed to capture data associated with each of the four determinants as well as the criterion measure associated with the hypotheses of this study. The various construct measurements used in this study were extracted from previous studies and reworded to suit the LBS context. Construct reliability was previously established on all measurements. Questionnaire items for measuring PP were adapted from and validated by Moon and Kim (2001). The items for measuring PC were adapted from and validated by Dinev and Hart (2006). Items for LOC, PER, and BI-to-disclose were adapted from and validated by Xu, Teo, et al. (2009). Internal consistency reliability was reported by Moon and Kim (2001) as 0.96 (PP), and by Dinev and Hart (2006) as 0.91 (PC). Xu, Teo, et al. (2009) reported internal consistency as 0.90 for LOC, 0.80 for PER, and 0.96 for BI.

## *The Questionnaire*

The survey questionnaire was developed to capture the data associated with each of the constructs shown in Figure 1. Measurement items for each construct, along with measurement scales, can be found in the questionnaire in Appendix A. All items used a 5-point Likert scale, which is a suitable scale for measuring perceptions (Lee, M. & Turban, 2001). The demographics section of the questionnaire consisted of seven items. In addition to personal information such as gender, ethnicity, and age, there were four items directly related to usage of mobile devices. Table 1 presents the four items for usage of mobile devices.

Table 1

### *Items for Usage of Mobile Devices (MD)*

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MD1:	How long have you owned a mobile phone? Do not own a mobile phone; Less than 12 months; 12-24 months; 25-36 months; More than 3 years
MD2:	How many text messages do you send each month? Less than 10 messages; 10-50 messages; 51-250 messages; 251-500 messages; More than 500 messages
MD3:	Over the past month, how many times have you used a mobile application? Never; Less than once a month; Once a month; 2-3 times a month; Once a week; 2-3 times a week; Daily
MD4:	Over the past month, how many times have you used a mobile application that uses GPS technology to identify your location? Never; Less than once a month; Once a month; 2-3 times a month; Once a week; 2-3 times a week; Daily

---

### *Measurements of Perceived Usefulness*

A review of LBS literature offered insight into two types of perceived value associated with LBS; a participant's perceived usefulness is associated with (a) locatability, and (b) personalization. The question set devised to measure perceived usefulness associated with LOC was comprised of four items assessing the degree of perceived value associated with accessing

needed information and services at the right time and in the right place. This question set was adapted from and validated by Xu, Teo, et al. (2009). These four items were measured using a 5-point Likert scale, ranging from *strongly disagree* to *strongly agree*, and are shown in Table 2.

Table 2

*Items for Locatability (LOC)*

---

LOC1:	An application like Foursquare would be useful in accessing relevant information at just the <i>right time</i> .
LOC2:	An application like Foursquare would be useful in getting up-to-date information <i>whenever</i> I need it.
LOC3:	An application like Foursquare would be useful in accessing relevant information at just the <i>right place</i> .
LOC4:	An application like Foursquare would be useful in accessing relevant information <i>wherever</i> I want.

---

The question set devised to measure perceived usefulness associated with PER was comprised of three items assessing the degree of perceived utility associated with accessing information that is uniquely tailored to the user. This question set was adapted from and validated by Xu, Teo, et al. (2009). The three items were measured using a 5-point Likert scale, ranging from *strongly disagree* to *strongly agree*, and are shown in Table 3.

Table 3

*Items for Personalization (PER)*

---

PER1:	An application like Foursquare would be useful in providing personalized services tailored to the context of my activities.
PER2:	An application like Foursquare would be useful in providing relevant information tailored to my personal preferences or interests.
PER3:	An application like Foursquare would be useful in providing information or services that I might like.

---

### *Measurement of Perceived Playfulness*

A participant's PP was measured by five items intended to assess the degree to which a user experiences fun when using the LBS, adapted from and validated by Moon and Kim (2001). The question set devised to measure playfulness was comprised of four items assessing whether use of a GN application gives a user enjoyment, stimulates curiosity, leads to exploration or arouses imagination. These four items were measured using a 5-point Likert scale, ranging from *strongly disagree* to *strongly agree*, and are shown in Table 4.

Table 4

#### *Items for Perceived Playfulness (PP)*

- 
- PP1: I would enjoy using an application like Foursquare.
  - PP2: Using an application like Foursquare would stimulate my curiosity.
  - PP3: Using an application like Foursquare would lead me to explore.
  - PP4: Using an application like Foursquare would be fun.
- 

### *Measurement of Privacy Concern*

A participant's PC was measured by four items intended to assess the degree of an individual's concern about opportunistic behavior related to personal information shared when using the LBS, adapted from and validated by Dinev and Hart (2006). The question set devised to measure PC was comprised of four items assessing whether information demanded or offered while using a GN application has the potential to be mishandled, misused, or used in unforeseen ways. These four items were measured using a 5-point Likert scale, ranging from *strongly disagree* to *strongly agree*, and are shown in Table 5.

Table 5

*Items for Privacy Concern (PC)*

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PC1:	I would be concerned that information I submit on an application like Foursquare might be misused.
PC2:	I would be concerned that a person would be able to find private information about me using information I submit on an application like Foursquare.
PC3:	I would be concerned about submitting information on an application like Foursquare because of what others might do with it.
PC4:	I would be concerned about submitting information on an application like Foursquare because it could be used in a way I did not foresee.

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*Measurement of Behavioral Intention to Disclose*

A participant's BI- to-disclose was measured by two items intended to assess a user's BI to provide the pieces of personal information required to participate with the LBS. The question set devised to measure BI to disclose information to the GN application was comprised of two items assessing the extent that a user is willing to reveal personal information to the application. This question set was adapted from and validated by Xu, Teo, et al. (2009). The two items are shown in Table 6, with each item using a differing 5-point Likert scale adjective assertion. Values for BI were reverse-coded to facilitate consistent interpretation of the data.

Table 6

*Items for Behavioral Intention to Disclose (BI)*

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Specify the extent to which you would reveal your personal information to use this type of application.	
BI1:	How likely would you be to reveal your personal information to use an application like Foursquare? Extremely likely, likely, neither unlikely nor likely, unlikely, extremely unlikely
BI2:	How willing would you be to reveal your personal information to use an application like Foursquare? Extremely willingly, willingly, neither willingly nor unwillingly, unwillingly, extremely unwillingly

---

### *Pilot Study*

The initial survey was pilot-tested to assess ease of understanding, consistency, item sequencing, and clarity. Ten individuals selected for convenience participated in the pilot study. Items were corrected and modified prior to data collection. Refinements to the instrument included word-use corrections for consistency, changes to item sequencing, and pagination between question sets. Data collected from the pilot study were not included in the study. The resulting refined instrument was administered to members of the target population who chose to participate in the survey.

### Data Collection

Approval to conduct the study was received from the university provost. Official permission to conduct the study based on guidelines set forth in the application was received from the Institutional Review Board at the University of North Texas.

The data collection method used for this study was a self-administered web-based survey. All members of the target population received an email invitation to participate in the study. This introductory email was sent to all undergraduate students, outlining the appeal for study volunteers, as well as welcoming respondents and explaining the study. Follow-up techniques such as reminder emails serve to offer positive assistance in increasing survey response rates (Gall, Gall, & Borg, 2003). For this study, a reminder email was sent one week and two weeks after the initial email invitation, thanking those who had already responded to the survey and encouraging non-responders to participate. Over the span of 17 days, the target

population received a total of three email reminders about the survey. Participation was voluntary, and participants could complete and submit the survey only one time.

The following items were included in the initial email: (a) an overview of the survey topic, (b) assurance that study results would be reported in aggregate, and that anonymity for participation was assured, (c) lottery details for four gift-certificate prizes offered as incentive for participation in the study, and (d) an electronic link to a web page with concise steps for taking the survey. This web page had two links: (a) a link to a 2-minute digital video illustrating a GN application, and (b) a link to the online survey. The 2-minute digital video, *How to Unlock Your World with Foursquare* (Foursquare, 2010), was created and produced by the Foursquare company to market the product across the Internet. Transcript for the video appears in Appendix B. At the conclusion of the video, each participant completed the survey questionnaire.

The survey was administered using an online survey tool named Qualtrics<sup>®</sup>. Once the survey administration time was complete, data for the study was pulled from Qualtrics<sup>®</sup>, and downloaded directly into SPSS<sup>®</sup> version 19.0 for analysis, eliminating the need for keying survey results and reducing the potential for introducing data entry errors and bias to the data.

### Data Analysis

The SPSS<sup>®</sup> version 19.0 statistical package was used for analyzing the coded survey instrument results. Data collected was assessed to provide an overview of the sample, to determine the reliability of the instrument, and to test assumptions related to multiple regression. Descriptive statistics of demographical data and mobile device usage were



calculated and reported. Frequency distributions were run for all demographic questions. Construct measures were tested using factor analysis to investigate the distinctions among construct items, providing further confidence in the validity of the measurement model. Internal consistency reliability was assessed by computing Cronbach's alpha for each study construct.

Multiple regression statistical assumptions were examined related to normality of the distribution, linearity of the distribution, and homoscedasticity. Normality of the distribution was addressed using dependent variable z-score values, Mahalanobis distance of the independent variables, skewness, and kurtosis. Linearity of the distribution and homoscedasticity were both examined using a scatterplot of standardized residual scores as a function of standardized predicted values.

Multiple regression analysis was conducted to examine the relationship between predictor variables and the dependent variable. Regression results included reporting of correlations among the variables, an ANOVA table to compare the regression to the residual,  $R^2$ -value explaining the percentage of variance in the dependent variable explained by the predictor variables, and beta weights and structure coefficients for each predictor variable. In addition, commonality analysis was used to assist in determining the predictive ability unique to each predictor variable, and common to each predictor set. With the four predictor variables for this study, commonality analysis analyzed fifteen total unique and common variance components associated with all possible combinations of the LOC, PER, PP, and PC predictors (Zientek & Thompson, 2006).

## Delimitations

Restrictions imposed on this study by the researcher include the following:

1. Data collection for this study was limited to undergraduate students at a single private liberal-arts 4-year university.
2. The sampling design for this study was a convenience sample composed of students from the selected university who chose to respond to an email solicitation and participate in the study.
3. To give a conceptual understanding of the topic, this study used a 2-minute marketing video which was published by an existing GN application provider and was available on the Internet. The context of the study was thus limited to one specific geosocial networking application, Foursquare.

## Limitations

Restrictions outside the control of the researcher include the following:

1. Participation in this study was dependent on the willingness of students to volunteer in response to the email solicitation and study questionnaire.
2. This study assumed that respondents would conceptually understand the topic to a sufficient level for responding to the questionnaire.
3. Survey respondents for this study may have been influenced by a previously developed conceptual understanding of the topic due to prior participation with an existing GN application.
4. This study relied on participants to provide honest and accurate responses.

## Summary

This chapter detailed the methodology used for this study and addressed the research design used in the project. The chapter gives a description of the sampling frame, details the instrumentation for the study, and gives an overview of data collection and analysis procedures required to address the study's research questions. Chapter 4 presents the results of the statistical analysis of data collected from the research questionnaire responses.

## CHAPTER 4

### RESULTS

The purpose of this quantitative study was to explore the relationship and relative importance of factors that influence a user's behavioral intention (BI) to disclose the pieces of personal information required to adopt and use a GN application. This chapter reports the findings of the study and is divided into two sections. The data assessment section provides descriptive statistics of the sample, the reliability of the instrument, and a description of multiple regression assumptions. The data analysis section reviews the results of regression analysis and commonality analysis in determining whether a relationship exists between the independent variables and the dependent variable.

#### Data Assessment

The following hypotheses guided this study:

- H<sub>0</sub>: There is no statistically significant relationship between personalization (PER), locatability (LOC), perceived playfulness (PP), and privacy concern (PC) toward behavioral intention (BI) to disclose personal information.
- H<sub>1</sub>: There is a statistically significant relationship between personalization (PER), locatability (LOC), perceived playfulness (PP), and privacy concern (PC) toward behavioral intention (BI) to disclose personal information.

#### *Descriptive Statistics*

All undergraduate students from the selected university who were enrolled during the Fall 2011 semester and were age 18 or older received an email survey invitation. Of 1,054

invitations sent, 309 participants completed the survey during the data collection period for a response rate of 29.3%.

Demographics. The survey presented three demographic questions to the participants related to gender, ethnicity and age. Table 7 summarizes the demographic data collected.

Table 7

*Demographics of Sample, N = 309*

Demographic	Items	Count	Percentage
Gender	Female	161	52.1%
	Male	148	47.9%
Ethnicity	Caucasian	233	75.4%
	African-American	11	3.6%
	Hispanic	49	15.9%
	American Indian	6	1.9%
	Asian	3	1.0%
	Other	7	2.3%
Age in years	18-19	148	47.9%
	20-21	102	33.0%
	22-24	33	10.7%
	25-29	5	1.6%
	30-34	5	1.6%
	35 or older	16	5.2%

As to gender, the total sample ( $N = 309$ ) consisted of 161 female and 148 male participants. For the gender category, the sample is representative of the selected population.

Of the total sample, 3.6% of the participants were African American, 15.9% were Hispanic, and 75.4% were Caucasian. Less than 3% of sample participants were identified as American Indian, Asian, or other ethnicity. For the ethnicity category, the sample is representative of the selected population.

The median age of the sample was 20. Of the total sample, 47.9% of respondents were 18-19 years of age, 33.0% were 20-21 years of age, 10.7% were 22-24 years of age, 1.6% were 25-29 years of age, 1.6% were 30-34 years of age, and 5.2% were 35 years or older. Nearly half of the participants were age 18-19 (47.9%) with another third of participants indicating age 20-21 (33.0%). Across three age categories, the sample was not representative of the population from whom the sample was selected. The numbers of respondents in the 18-19 years old category was over-represented, while the number of respondents in age categories 22-24 years old and 25-29 years old were both under-represented. Because the age of the sample was not representative of the population from which the sample was selected, generalization for this study is limited. Results from the study cannot be generalized across populations at similar universities unless their students possess the critical values of this sample. A comparison of age categorical percentages between the sample and population is shown in Table 8.

Table 8

*Comparison of Age Categories for Sample and Population*

Items	Sample	Population
18-19 years old	47.9% *	31.2%
20-21 years old	33.0%	34.9%
22-24 years old	10.7% *	21.5%
25-29 years old	1.6% *	4.3%
30-34 years old	1.6%	2.9%
35 years or older	5.2%	5.1%

\*  $p < 0.01$

Mobile device ownership and usage. The survey presented four questions concerning mobile device ownership and usage. Of the total sample, a majority (88.7%) of participants indicated they had owned a mobile phone more than 3 years. The majority of respondents

(59.5%) indicated they sent more than 500 text messages per month and used a mobile application at least once a day (70.2%). As to usage of a mobile application that uses global positioning system (GPS) technology to identify location, results were diverse with 24.6% of respondents indicating they had never used such an application. Table 9 summarizes the data collected concerning use of mobile devices.

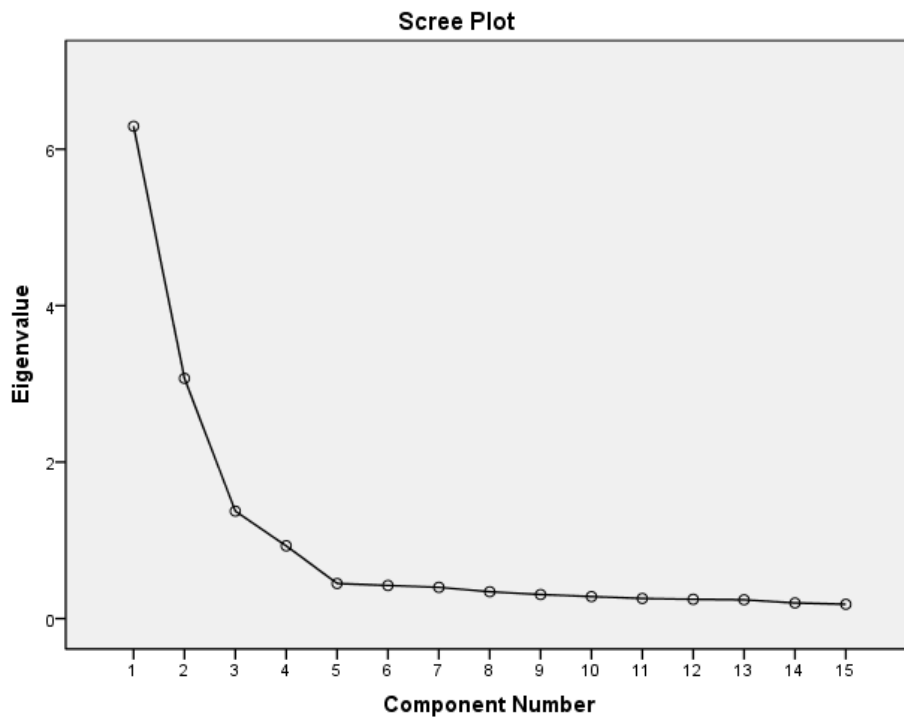
Table 9

*Mobile Device Ownership and Usage*

Measure	Items	Count	Percentage
Mobile phone ownership	Do not own a mobile phone	4	1.3%
	Less than 12 months	2	0.6%
	12-24 months	10	3.2%
	25-36 months	19	6.1%
	More than 3 year	274	88.7%
Monthly text messaging	Less than 10 messages	8	2.6%
	10-50 messages	12	3.9%
	51-250 messages	53	17.2%
	251-500 messages	52	16.8%
	More than 500 messages	184	59.5%
Mobile application usage	Never	38	12.3%
	Less than Once a Month	11	3.6%
	Once a Month	6	1.9%
	2-3 Times a Month	11	3.6%
	Once a Week	6	1.9%
	2-3 Times a Week	20	6.5%
	Daily	217	70.2%
LBS application usage	Never	76	24.6%
	Less than Once a Month	28	9.1%
	Once a Month	28	9.1%
	2-3 Times a Month	47	15.2%
	Once a Week	40	12.9%
	2-3 Times a Week	40	12.9%
	Daily	50	16.2%

### *Instrument Reliability*

To establish discriminant validity, a factor analysis was performed using SPSS® version 19.0 statistical package conducted to investigate the distinctions among construct items. A scree plot was created to plot eigenvalues against order of extraction, offering the capability to subjectively determine the number of factors in the instrument. Visually, the factor cut-off point or 'elbow' is judged from the shape of the curve by determining the point at which the curve straightens out. The scree plot shown in Figure 2 illustrates the fraction of total variance in the factors of this study, confirming four factors as the cut-off point for maximized contribution to variance.



*Figure 2.* Scree plot for study factors.

The primary criterion for discriminant validity is that each indicator must load more highly on its associated construct than on any other construct. A principal factor analysis



extraction with Varimax rotation based on four factors indicated that the hypothesized four-factor structure (PP, LOC, PER, and PC) were evident among the 15 items. All items loaded appreciably ( $> \pm 0.35$ ) on at least one factor, with only one item loading on two factors, and no items loading on more than two factors. All factors emerged with no cross-construct loadings above 0.50, indicating good discriminant validity (Fornell & Larcker, 1981). In addition, results of factor analysis indicated that 77.78% of variance in the dependent variable can be accounted for by the four factors defined and used in this study. Table 10 provides the factor pattern matrix that shows the loadings of each item on each factor.

Table 10

*Factor Structure*

Scale items	Factor 1	Factor 2	Factor 3	Factor 4
PP1	-.201	.323	<b>.772</b>	.234
PP2	-.056	.161	<b>.815</b>	.166
PP3	-.010	.152	<b>.828</b>	.162
PP4	-.133	.295	<b>.786</b>	.194
LOC1	-.003	<b>.778</b>	.274	.249
LOC2	-.001	<b>.850</b>	.199	.175
LOC3	-.014	<b>.827</b>	.259	.219
LOC4	-.053	<b>.796</b>	.166	.317
PER1	-.072	.308	.211	<b>.797</b>
PER2	-.026	.299	.204	<b>.845</b>
PER3	-.117	.324	.372	<b>.686</b>
PC1	<b>.882</b>	-.035	-.118	-.117
PC2	<b>.864</b>	.009	-.060	-.032
PC3	<b>.903</b>	.017	-.100	-.038
PC4	<b>.902</b>	-.068	-.028	.002
% of variance explained	21.59%	21.21%	20.17%	14.82%
Cumulative %	21.59%	42.79%	62.96%	77.78%

*Note.* Factor loadings are shown in boldface. PP1 – PP4, perceived playfulness items. LOC1 – LOC 4, locatability items. PER1 - PER3, personalization items. PC1 – PC4, privacy concern items.

Internal consistency reliability was assessed by computing Cronbach’s alpha for each construct used in the study. Based on 309 responses, Cronbach’s alpha coefficients for each subscale are shown in Table 11. Cronbach’s alphas ranged from 0.855 (PER) to 0.915 (PC). The number of items for each factor ranged from two (BI) to four (PP, LOC, and PC). Although BI was measured with two items, internal consistency reliability was high (.906). All values exceeded the desired threshold of 0.7 determined to meet the assumption of uni-dimensionality (Werts, Linn, & Joreskog, 1974), supporting the convergent validity of the measurement model.

Table 11

*Results of Factor Analysis*

Construct	Definition	Items	Cronbach’s $\alpha$
Perceived Playfulness	A measure of the degree to which a user experiences fun when using technology	4	0.883
Locatability	A measure of the degree of perceived value related to being able to access needed information and services at the right time and in the right place	4	0.900
Personalization	A measure of the degree of perceived value of an information system related its capability to offer personalized services or information access	3	0.855
Privacy Concern	A measure of a user’s concern about opportunistic behavior related to the disclosure of personal information	4	0.915
Behavioral Intention	A measure of a user’s intention to provide pieces of personal information necessary to participate	2	0.906

*Multiple Regression Assumptions*

Standard multiple regression analysis is an appropriate technique for examining the

relationship between one dependent variable and one or more independent variables. Multiple regression analysis requires that a number of statistical assumptions should not be violated (Osborne & Waters, 2002). Prior to analysis, the data for this study was examined to ensure that it did not violate statistical assumptions related to (a) normality of the distribution, (b) linearity of the distribution, and (c) homoscedasticity of errors.

In addressing normality of the distribution, skewness was calculated to assess the distribution of each construct. Skewness is a measure of the degree of asymmetry of a probability distribution (Hinkle, Wiersma, & Jurs, 2003). For a normal distribution, skewness is valued at zero, with positive values indicating that data is skewed right, and negative values indicate that data is skewed left. A distribution is considered to be approximately symmetric when skewness is between  $-\frac{1}{2}$  and  $+\frac{1}{2}$ , and considered to be moderately skewed when skewness is between  $-1$  and  $-\frac{1}{2}$  or between  $-\frac{1}{2}$  and  $+1$ . Most measures in this study tended to be negatively skewed, with the PC measure considered to be approximately symmetric, and measures for PP, LOC, and PER identified to be moderately skewed. The BI measure was identified as positively skewed and approximately symmetric.

As a second method for testing the assumption of normality, kurtosis was calculated to assess the distribution of each construct. Kurtosis is a numerical measure indicating the peakedness of a probability distribution (Hinkle, et al., 2003). The standard for kurtosis is a normal distribution, which has a kurtosis value of 3. Excess kurtosis is a measure of the amount of kurtosis difference from the standard (the normal distribution). Positive values describe distributions that are more peaked, and negative values describe distributions that are flatter. Positive kurtosis measures for PP, LOC, and PER indicate these values have distributions with

higher and sharper peaks, and tails that are longer and fatter. Negative kurtosis measures for PC and BI indicate these values have distributions with lower and broader peaks, and tails that are shorter and thinner.

As a final method for testing the assumption of normality, the data was examined to determine how closely the variables corresponded to a normal distribution, ensuring that there were no outliers. For the dependent variable, an examination of z-score values ensured that the variable had no values outside of three standard deviations from the mean. For the independent variables, Mahalanobis Distance scores were calculated to assist in determining whether there were multivariate outliers associated with the joint set of independent variables. The procedure for calculating Mahalanobis Distance is appropriate for identifying specific cases within the study that are located far from the center of the data distribution. Examination of Mahalanobis  $D^2$  scores indicated that at the  $p < 0.001$ , there were two of 309 (0.65%) cases identified as outliers.

The specific outlier cases were identified and examined more closely. A categorical variable was constructed to distinguish between the two outlier cases and the 307 non-outlier cases. An independent sample  $t$ -test was constructed to determine whether there was a significant difference between the independent variable scores for the two outlier cases and the 307 non-outlier cases. For the independent variable PP, the  $t$ -test succeeded in revealing a statistically reliable difference between the two outlier cases ( $M = 1.00, s < 0.001$ ), and the 307 non-outlier cases ( $M = 3.54, s = .787$ ),  $t(307) = 4.558, p < .001, \alpha = .01$ .

Table 12 shows the mean, standard deviation, skewness, and kurtosis measures for each of the independent and dependent variables of this study.

Table 12

*Descriptive Statistics of Study Variables*

Variables	Mean	SD	Skewness	Excess Kurtosis
PP	3.524	0.810	-0.884	+0.960
LOC	3.729	0.716	-0.857	+1.271
PER	3.832	0.702	-0.817	+1.395
PC	3.576	0.950	-0.274	-0.723
BI	2.458	1.011	+0.277	-0.844

*Note.*  $N = 309$ .

In addressing linearity of the distribution, a residual scatterplot was examined to determine whether the relationship between the dependent variable and the set of independent variables was linear in nature. Suggested by Osborne and Waters (2002) as a preferable method of detecting non-linearity, this scatterplot maps values of standardized residual scores as a function of standardized predicted values. For this study, a visual examination of the plot determined that the assumption of linearity was met based on a linear relationship between the residuals and the predicted scores for the dependent variable.

Homoscedasticity refers to the statistical assumption that the variance of errors is constant across all levels of the independent variables. A residual scatterplot of standardized residual (error) scores as a function of the standardized predicted values is useful in determining that this assumption of homoscedasticity is met. For this study, a visual examination of the plot determined that this assumption was met based on residuals randomly scattered yet relatively distributed around a horizontal line at position 0.

## Data Analysis

### *Correlational Analysis*

The data was analyzed with SPSS® 19.0. For each variable of the study, individual construct items were averaged to produce a mean score latent variable. The dependent variable for the analysis was BI, and the predictor variables were PP, LOC, PER, and PC.

A bivariate correlation was conducted to see if the variables of this study were correlated. In addition, collinearity diagnostics were computed to assess the effect, if any, of the correlation among the variables. Multicollinearity was suspected due to the notably large correlations among pairs of predictor variables. Variance inflation factors (VIF) are useful in quantifying the degree and severity of multicollinearity. While there is no formal VIF value for determining the presence of multicollinearity, VIF values as low as 4 or as high as 10 are commonly used to indicate excessive or serious multicollinearity (O'Brien, 2007). For this study, an examination of VIFs indicated acceptable VIF scores ranging from 1.056 to 1.944, far lower than generally acceptable threshold levels for VIF. Table 13 describes the correlation matrix among the variables of this study.

Table 13

### *Correlations Among the Variables*

	PP		LOC		PER		PC		BI
PP	0.883								
LOC	.546	**	.900						
PER	.570	**	.644	**	.855				
PC	-.211	**	-.078	**	-.160	**	.915		
BI	.391	**	.214	**	.272	**	-.431	**	.906
VIF	1.657		1.871		1.944		1.056		

*Note.*  $N = 309$ . Diagonal elements are Cronbach's alpha coefficients. Off-diagonal elements are correlations among constructs. \*\* Correlation is significant at the 0.01 level (2-tailed).

The statistic used to test the research hypotheses was multiple linear regression analysis. In addition, squared structure coefficients were computed to assess the proportion of variance in the dependent variable that can be explained by the predictor variables. The results of the multiple linear regression analysis ANOVA is shown in Table 14. There was statistically significant interaction between the four independent variables and the dependent variable ( $F=29.787$ ,  $df = 4, 304$ ,  $\alpha = .01$ ). Based on the value for the regression effect size,  $R^2 (.282)$ , 28.2% of the variance in the dependent variable can be explained by the predictor variables in this study. Because there was a statistically significant relationship between the four predictor variables considered and the dependent variable, the null hypothesis for this study was rejected and the alternative hypothesis was accepted.

Table 14

*Regression Summary of PP, LOC, PER, PC on Behavioral Intention*

	SS	df	MS	F	R	$R^2$	Adj $R^2$
Regression	88.682	4	22.171	29.787*	.531	.282	.272
Residual	226.271	304	.744				
Total	314.953	308					

*Note.* Adj  $R^2$  was calculated using the Ezekiel (1930) formula. \* $p < .001$ .

Analysis of both standardized weights ( $\beta$  or beta weights) and structure coefficients ( $r_s$ ) was needed to identify which variables in the model contributed significantly to the effect identified by  $R^2$ , explaining the significance of the individual predictors in the model. Beta weights represent how many standard deviations the dependent variable will change per standard deviation increase for a given predictor variable. An analysis of beta weights and  $t$ -values indicated that significant correlations were found at the  $p < .001$  level for predictor variables PC ( $\beta = -.362$ ,  $t = -7.244$ ) and PP ( $\beta = -.287$ ,  $t = 4.584$ ), and that these two predictors

receive the most credit in the regression equation. Beta weights and *t*-values for LOC ( $\beta = -.007, t = -0.103$ ) and PER ( $\beta = .055, t = -0.814$ ) were statistically insignificant.

Structure coefficients ( $r_s$ ) represent the bivariate correlation between a predictor variable and a synthetic variable, predicted  $Y$  or  $\hat{Y}$ . Examination of structure coefficients indicated that PC and PP have sizable predictive power on the dependent variable, with both PC ( $r_s = -.812, r_s^2 = .659$ ), and PP ( $r_s = .737, r_s^2 = .543$ ) accounting for larger percentages of the variance in BI. In a case such as PER where a predictor has a near-zero beta weight and a large structure coefficient, the shared predictive power of the predictor may have been arbitrarily assigned to another predictor. Although PER and LOC have near-zero beta weights, both factors have decent-sized structure coefficients, indicating that the variables do indeed have predictive ability, and should not be ignored. An overview of regression results is shown in Table 15.

Table 15

*Regression Results*

Predictor ( $x$ )	$R$	$R^2$	$R^2_{adj}$	$\beta$	$p$	$r_s$	Unique	Common	Total	% of $R^2$
	.53	.28	.27						.282	
PC				-.362	<.001	-.812	.124	.062	.186	65.90%
PP				.287	<.001	.737	.050	.103	.153	54.29%
PER				.055	.416	.513	.002	.073	.074	26.30%
LOC				-.007	.918	.402	<.001	.046	.046	16.19%

*Note.* Unique =  $x$ 's unique effect. Common =  $\sum x$ 's common effects. Total = Unique + Common. % of  $R^2 = \text{Total}/R^2$ . PP=Perceived Playfulness; LOC=Locatability; PER=Personalization; PC=Privacy Concern

*Commonality Analysis*

Developed in the 1960s, commonality analysis is a method of partitioning or decomposing the variance accounted for in regression analysis into the percentage of variance that is unique to each independent variable, and common between independent variable sets



(Mayeske et al., 1969). Commonality refers to the shared contribution between two or more predictors on the dependent variable, and is useful in understanding the relative predictive power of regressor variables as well as in determining whether variables may be eliminated without sacrificing predictability of the regression model.

Commonality analysis was conducted in order to understand the relative contributions of the independent variables on the dependent variable, BI. To conduct the commonality analysis,  $R^2$  was computed for all possible combinations of predictors. In the present study with four independent variables, commonality analysis yielded 4 unique components and 11 combinations. Analysis was conducted using SPSS<sup>®</sup> 19.0 along with an SPSS<sup>®</sup> script file created for computing commonality (Nimon, 2010). Table 16 presents the proportion of variance in BI explained by unique and common components of shared variance between PP, LOC, PER, and PC. The total of the commonality coefficients (0.2815) is equal to the  $R^2$  from the regression analysis. Individual entries assist in determining how much of the total variance in BI is explained by the unique and common effects of the independent variables.

A notable portion (62.24%) of the explained variance in BI is associated with unique effects of the independent variables. The greater portions of this unique effect explained variance is attributable to PC (44.04%) and PP (17.63%). PER and LOC had negligible unique contributions, with only 0.56% uniquely attributed to PER, and <0.01% of  $R^2$  uniquely attributed to LOC.

Table 16

*Unique and Common Components of Shared Variance ( $R^2$ ) of Behavioral Intention*

Variables	Coefficient	% Total
Unique to PC	.1240	44.04
Unique to PP	.0496	17.63
Unique to PER	.0016	.56
Unique to LOC	<.0001	.01
Common to PC PP	.0313	11.13
Common to PC PER	.0031	1.12
Common to PC LOC	.0011	.38
Common to PP PER	.0122	4.33
Common to PP LOC	.0040	1.41
Common to PER LOC	.0002	.09
Common to PC PP PER	.0140	4.99
Common to PC PP LOC	-.0026	-.91
Common to PC PER LOC	-.0013	-.48
Common to PP PER LOC	.0284	10.07
Common to PC PP PER LOC	.0158	5.62
Total	.2815	100.00

Note. PP=Perceived Playfulness; LOC=Locatability; PER=Personalization; PC=Privacy Concern

A notable portion of the  $R^2$  effect size related to each predictor involves commonality. 11.13% of the  $R^2$  effect size can be attributed to a first-order partition effect between two predictor variables, PC and PP. 10.07% of the  $R^2$  effect size can be attributed to a second-order partition effect between three predictor variables, PP, PER, and LOC.

In the cases of LOC and PER, prior examination of near-zero beta-weights and yet sizable structure coefficients indicated that each had shared predictive power in the model and should be examined further. Commonality analysis indicated that both LOC and PER provided negligible unique contributions to the regression effect. As previously noted, LOC had a small beta weight (-0.007) and a sizable structure coefficient (.402). Commonality analysis revealed

that the unique contribution effect for LOC (0.00003) was negligible, indicating that excluding LOC from the regression model would result in only a small reduction in  $R^2$  (.28159 - .00003 = .28156). Similarly, PER had a small beta weight (0.055), a sizable structure coefficient (.513) and a minimal unique contribution effect (0.00157). Excluding PER from the regression model would result in a small reduction in  $R^2$  (.28159 - .00157 = .28002). Because LOC and PER shared a very small common effect (0.00024), a decision to exclude both LOC and PER from the regression model would result in an additional minimal reduction to  $R^2$  (.28159 - 0.00003 - .00157 - 0.00024 = .27975).

Special mention needs to be made related to the partitions that have negative signs. These negative commonality coefficients occurred for shared variances found common to PC, PP, and LOC (-0.0026), and for shared variances common to PC, PER, and LOC (-0.0013). These negative values can occur as a representation of suppression of one variable over another or as is the case in this study, when some of the correlations between predictors are positive and some are negative (Pedhazur, 1997). Correlation among the variables (see Table 13) show negative values for correlations between the PC variable and all other predictor variables, and positive values for correlations among all other predictor variable sets (PP, PER, and LOC). When the negative values are near-zero, they are traditionally treated as zeroes (Thompson, 2006). Because the negative variance partitions for this study are near-zero, no other investigation was necessary.

The commonality analysis results assisted in partitioning the relative contributions of unique and common components of shared variance between the four variables of this study. Across all 15 components (4 unique, 11 combination) the greater portions of effect size belong

to (a) unique effects attributable to PC (44.04%), (b) unique effects attributable to PP(17.63%), (c) common components of variance shared between PC and PP (11.34%), and (d) common components of variance shared between three components – PP, PER, and LOC (10.07%). The greatest percentage of  $R^2$  effect size associated with any one predictor can be attributed to PC (65.90%). In addition, PP was a major contributor to  $R^2$  effect size (54.29%). PER and LOC contributed minimally to the regression model and can both be excluded with minimal reduction in  $R^2$ .

### Summary

The purpose of this study was to explore the relationship and relative importance of factors that influence a user's BI to disclose the pieces of personal information required to adopt and use a GN application. The hypotheses examined the relationships between predictive factors and the dependent variable, BI, seeking to determine whether a statistically significant relationship existed between PER, LOC, PP, and PC toward BI-to-disclose personal information. This chapter reported the study findings concerning the data assessment including the descriptive statistics, instrument reliability, and multiple regression assumptions. In addition data analysis gave the results of regression and commonality analyses.

The study rejected the null hypothesis that there was no statistically significant relationship between PER, LOC, PP, and PC (independent variables) toward BI-to-disclose personal information (dependent variable). Consequently, the alternative hypothesis was accepted. The effect size was .282, indicating that 28.2% of the variance in the dependent variable can be explained by the four predictor variables in this study. An examination of

unique and shared variance shed light on the predictive value of factor subsets affecting BI-to-disclose. Of the four factors measured, PC and PP were shown to contribute the greatest percentages toward  $R^2$  effect size. LOC and PER provided negligible unique contributions to the regression model, and can both be excluded with only minimal reduction in  $R^2$ .

Chapter 5 provides a summary of and conclusions drawn from the study, contributions to the body of literature, and recommendations for future research.

## CHAPTER 5

### DISCUSSION

This study sought to determine whether a relationship exists among factors of personalization (PER), locatability (LOC), perceived playfulness (PP), privacy concern (PC), and behavioral intention (BI) to disclose personal information for individuals using location-based, geosocial networking (GN) applications. Study participants were made up of volunteer respondents from a population of undergraduate students at a single private liberal-arts 4-year university.

After first watching a 2-minute web-video illustrating a GN application, each participant completed the survey questionnaire using a self-administered web-based survey tool. The survey data was analyzed using frequency counts, multiple regression analysis, and commonality analysis. Frequency counts were helpful in assessing the demographic portion of the survey. Multiple regression analysis was helpful in examining the relationship between predictor variables and the dependent variable. Commonality analysis was useful in determining the predictive ability unique to each predictor variable and common to each predictor set.

#### Interpretation of Findings

Multiple regression and commonality analysis results compiled from survey responses addressed the hypotheses for this study.

H<sub>0</sub>: There is no statistically significant relationship between personalization (PER), locatability (LOC), perceived playfulness (PP), and privacy concern (PC) toward behavioral intention (BI) to disclose personal information.

H<sub>1</sub>: There is a statistically significant relationship between personalization (PER), locatability (LOC), perceived playfulness (PP), and privacy concern (PC) toward behavioral intention (BI) to disclose personal information.

Study results indicated that PER, LOC, PP, and PC did influence an individual's BI to disclose personal information. Because there was a statistically significant relationship between the four predictor variables and the dependent variable, the null hypothesis for this study was rejected and the alternative hypothesis was accepted. Based on the value for the regression effect size,  $R^2$  (.282), 28.2% of the variance in the dependent variable can be explained by the predictor variables in this study.

Significant relationships were found to exist between both PC and PP and the dependent variable, BI. In this study, PC had the greatest influence on an individual's attitude toward using a GN system. In addition, PP was also influential and is important to consider when designing GN applications. LOC and PER contributed minimally.

PC was examined as a measure of user concern over opportunistic behavior related to the disclosure of personal information within the specific context of GN system adoption and usage. Results from the study indicated that PC correlated negatively to and was the primary contributor to an individual's BI to disclose the personal information necessary for adoption and usage of a GN application. A higher level of PC was related to a lower level of willingness to disclose personal information. These findings are consistent with those reported by Dinev and Hart (2006) indicating that higher levels of PC are related to lower levels of willingness to engage in systems activity which requires personal information disclosure.

PP was examined as a measure involving the state of playfulness which may engage the user in affective or cognitive episodes of play based on characteristics of the GN system related

to entertainment and play. Results from the study indicated that playfulness correlated positively to and was a major contributor to an individual's BI to disclose the personal information necessary for adoption and usage of a GN application. Arguments made by Sledgianowski and Kulviwat (2009) were supported related to the significant positive effect of playfulness on intention to use social networking sites (SNS).

For this study, LOC and PER were examined as capabilities of a GN system to offer user benefits associated with time, location, and identity. While technology acceptance model (TAM)-related studies have emphasized the importance of perceived usefulness as a primary determinant of user acceptance (see Sun & Zhang, 2006), results from this study indicated that the proposed elements of usefulness examined in this study (LOC and PER) contributed minimally toward an individual's BI to disclose the personal information necessary for adoption and usage of a GN application.

Findings suggest that when an individual presumes that using a GN application would offer enjoyment, stimulate curiosity, lead to exploration, or arouse imagination, the individual will be more likely to disclose the personal information that is required to adopt and use the GN application. Conversely, when an individual has a higher level of concern about opportunistic behavior associated with whether information demanded or offered has the potential to be mishandled, misused, or used in unforeseen ways, the individual will be less likely to adopt and use the GN application.

#### Limitations

Since this was an exploratory study, the intent was to develop an understanding of the



specific factors that influence a user's BI to disclose personal information when adopting and using GN applications. Several research limitations need to be acknowledged.

Several biases may exist. Data collection for this study was limited to undergraduate students at a single private liberal-arts 4-year university. While this sample was convenient and practical, it may not be representative of other populations and results should only be generalized across populations of other like universities for student populations possessing the characteristics of this sample. While the gender demographic for this study was not statistically different from the population from which it was selected, the male-female gender mix for this university is atypical, with a greater percentage of men than women, and is not representative of students of other universities in the U.S (U.S. Department of Education, National Center for Education Statistics, 2011). Volunteer bias may be present due to possible differences between those who volunteered to participate in the study and those not willing to participate. Social desirability or response bias may be present due to any respondent tendencies to answer the survey questions in ways that would be viewed favorably by others.

Another limitation of this study is that respondent ages for the sample were not representative of the university from which it was taken. Consequently, generalization for this study is limited. Two possible reasons might help explain the higher than expected response rate for 18-19 year old students. This study was conducted during the first six weeks of a fall semester with a large portion of students (35%) new to campus and most of these (89%) comprised of 18-19 year olds. It is possible that university policy regarding expectations for checking the official email account on a frequent and consistent basis may be more closely followed by newer (and consequently younger) students than by those who have been enrolled

for more semesters. If this group of students has higher adherence to this policy, it is probable that this group of students had higher exposure to the email solicitation to participate in the study. Secondly, this study offered four gift-certificate prizes as incentive for participation in the study. Of the 309 study respondents, 293 individuals (94.8%) chose to volunteer a student ID number in order to be entered in the prize lottery. Because prizes were offered as incentive for participation in the study, it is a possibility that younger, less financially established students may be more extrinsically motivated by the potential for winning a lottery prize, and consequently more apt to participate. Examination of motivational theories may offer basis for a substantiated explanation of the age discrepancy. Limitations related to gender and age can both be addressed by conducting the study with a more representative population.

Another limitation of the study relates to the difficulty of examining user adoption of a technology in a case where the respondent has limited knowledge or understanding. There exists a vicious circle related to adoption and usage of a GN application. To adopt the technology, a user must first create a user profile. As part of the creation of that profile, the user must offer pieces of personal information such as name and email address. To 'test-drive' the technology and experience the full effect, the user must then offer more pieces of information because use of a GN application involves data for SIM card ID and cell phone number, as well as dynamic and real-time information associated with location check-in. It is not possible to learn about user behavior by only surveying users who know about or have full understanding of the application because it would be expected that individuals with higher levels of PC would never venture far enough into the technology to take that test-drive. To learn about the specific variables of this study, the researcher incorporated the watching of a 2-

minute digital video illustrating a specific GN application, hoping that the marketing materials produced by the GN company would give sufficient knowledge or understanding to the participant to answer the survey questionnaire. The data collected for this study is effective in measuring BI only to the degree that respondents had a conceptual understanding of the topic to a sufficient level for responding to the questionnaire.

### Study Contributions

Despite the limitations of the study, results contribute to theory, methodology and practice. Findings provide understanding of the specific factors examined in the study and have implications for varied stakeholders.

#### *Contribution to Theory*

This study contributes to technology acceptance theory and contributes to understanding of TAM in non-mandatory use settings. The results of the study contribute an understanding of a specific factor set that has not been previously examined. The body of literature and theory is extended due to the examination of specific factors associated with system usefulness related to GN systems including (a) LOC, and (b) PER, along with (c) playfulness, and (d) the concern for privacy that individuals may experience when making a decision to adopt and utilize a location-based service (LBS).

While TAM studies have previously demonstrated that users are motivated to use technology based on the usefulness of the system, the results of this study indicated that the factors operationalized as useful—LOC and PER—contributed minimally to the understanding of

a user's intention to adopt GN applications. Examination of LOC and PER as capabilities of mobile-devices to provide users value associated with time, location and unique user identity builds upon the concept of perceived usefulness within TAM.

This present study contributes to TAM literature by examining constructs related to technological system adoption along with BI as an examination of a user's intention based on requirements for disclosure of personal information as antecedent and intention to adopt. In addition, since location-based services may be used functionally as well as for pleasure, the variables of this study also offer an understanding of user behavior in relation to both extrinsic (PER and LOC) and intrinsic (playfulness) technology beliefs. Understanding beliefs beyond those typically addressed with TAM offers potential for assisting companies address information privacy when designing applications that collect personal information and strengthen consumer ties.

The results of the study suggest that individuals are highly concerned about offering private information to use a GN application. Overall, the two factors most strongly related to willingness to disclose personal information were PC and PP. These factors represent competing beliefs where the strength of one may override the strength of the other, resembling the calculus of behavior described by Laufer and Wolfe (1977). While prior studies have examined PC as a predictor of willingness to disclose personal information (Dinev & Hart, 2006), this study contributes to the privacy calculus discussion (Dinev & Hart, 2006; Xu, Zhang, et al., 2009) and offers playfulness as a potential benefit that may offset an individual's PC to disclose personal information. Results from this study suggest that individuals approaching a

decision to adopt a GN application are balancing personal PC levels with whether the application will provide enjoyment.

#### *Contribution to Methodology*

The instrument used in this study was assembled using questionnaire items adapted from previous studies. Individual survey items were refined and constructs were validated. The resulting survey instrument may be useful in research that endeavors to examine similar constructs and answer similar research questions.

#### *Contribution to Practice*

Knowledge gained from this study will be useful in understanding consumer attitudes toward revealing personal information in emerging technological settings. Consumer concern toward adopting GN applications compels companies to find appropriate ways to use these types of applications for reaching consumers. By utilizing GN applications to reach consumers, companies can strengthen business-to-consumer ties by providing personalized services, coupons and discounts, and opportunities to participate in company promotions. The challenge related to convincing users to adopt a GN application lies in minimizing personal information collection to only necessary pieces, and convincing users that any personal information offered in using the GN application will be diligently protected against unauthorized resale, theft or fraud. As emerging applications and technologies develop, application designers should use diligence in designing systems that offer users easy and intuitive access to informed consent control settings for all required elements of personal information. In addition, companies

should endeavor to satisfy consumers that there is balance in the positives offered by the application and any potential risks associated with disclosure of personal information.

Results from the study offer insight into consumer attitudes toward playful marketing techniques that require the revealing of location-based personal information and that may benefit companies and marketing professionals. Knowledge of specific factors that influence a user's willingness to adopt and use a GN application can assist companies in determining whether to use GN services. Mobile application developers who must balance application design with collection and utilization of personal information may benefit from a more developed understanding of consumer attitudes toward location-based technological solutions. Examination of these results may offer support for the design of useful and playful applications that attract consumers.

Because issues of personalization and privacy as well as the uses of personal information involve civil rights and legal obligations, information privacy policymakers will find the results of this study to be of value. While information policy endeavors to examine privacy in response to societal concerns toward new and emerging technological capabilities, it is necessary to understand current attitudes toward PC. A better understanding of how users approach privacy when using LBS will be valuable.

#### Considerations for Future Research

This study examined undergraduate students at a 4-year private liberal-arts university. A broader study that includes individuals from other populations may provide additional insight into GN system adoption. This sample consisted primarily of young students with a median age

of 20. Individuals of this age are believed to be more comfortable with online interaction and less concerned with privacy issues pertaining to how information is collected and used (Campbell, 1997; Milne & Gordon, 1994; Milne, Rohm, & Bahl, 2009). Repeating this study among other groups may reveal potential differences across population demographics such as age.

Because this study rests on a functional understanding for the concept of what privacy is and what constitutes the personal transaction boundary between self and others, future research should include a longitudinal examination of privacy as a social norm. While Facebook executives may argue that privacy as a social norm is indeed changing, longitudinal study of the topic can assist in determining whether there is a societal shift toward what constitutes privacy and whether the concept of privacy is evolving.

For individuals who report privacy concern, it would be useful to understand whether they adopt other types of LBS and if so, how they attempt to manage associated risk by manipulating available device or application settings. Observation of individuals using their own devices and services would provide insight into user behavior that might extend knowledge or reinforce findings beyond findings based on surveys alone.

Fortuitously, it is interesting to note that while this study examined the role of play as a possible motivation for offering personal information, a large percentage of respondents (94.8%) were motivated to offer a piece of personal information (student ID number) in order to win a prize in the study lottery. This study examined competing beliefs resembling the calculus of behavior described by Laufer and Wolfe (1977). Further examination of the privacy

calculus might investigate prize as a potential benefit that may offset an individual's PC to disclose personal information

For this study, the capabilities of a GN system to offer user benefits associated with LOC and PER were posited as the elements that made it useful, and were found to not be significant in affecting a user's BI to adopt and use a GN application. One possibility is that LOC and PER are not dimensions that make a GN application useful. Future research might include an exploratory study of individuals who have already made a decision to adopt a GN application, seeking to determine the specific elements of the application that contributes to perceived usefulness. Once other possible dimensions for usefulness have been identified, the usefulness portion of the instrument can be modified, while retaining the elements related to playfulness and privacy concern.

### Conclusions

The purpose of this study was to explore the relationship and relative importance of factors that influence a user's BI to disclose the pieces of personal information required to adopt and use a GN application. Results of the study contribute to the body of literature by examining specific factors that have not previously been jointly examined, connecting constructs related to technological system adoption requiring disclosure of personal information to adopt. In addition, this study furthers the existing research into the functionality of LBS, and offers an understanding of user behavior related to extrinsic and intrinsic technology beliefs.



The results offer strong evidence that relationships exist between PC, PP and BI to disclose personal information when using a GN application. The study offers weak evidence that a relationship exists between LOC or PER and BI to disclose personal information when using a GN application.

Future areas for research including exploring other dimensions of GN applications that contribute to a user's perception of usefulness, observing individuals who report higher levels of PC to investigate distinctions among individuals in adoption and usage of other types of LBS, and examining the fundamental concept of privacy to determine if there is indeed a societal shift toward what constitutes privacy or whether the concept of privacy is evolving. In addition, alternative sampling methods could be useful in revealing potential differences across population demographics.

APPENDIX A  
SURVEY INSTRUMENT

Based on your understanding of the Foursquare application, rate the extent to which you agree with the following statements:

PP1: I would enjoy using an application like Foursquare.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PP2: Using an application like Foursquare would stimulate my curiosity.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PP3: Using an application like Foursquare would lead me to explore.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PP4: Using an application like Foursquare would be fun.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

LOC1: An application like Foursquare would be useful in accessing relevant information at just the right time.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

LOC2: An application like Foursquare would be useful in getting up-to-date information whenever I need it.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

LOC3: An application like Foursquare would be useful in accessing relevant information at just the right place.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

LOC4: An application like Foursquare would be useful in accessing relevant information wherever I want.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PER1: An application like Foursquare would be useful in providing personalized services tailored to the context of my activities.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PER2: An application like Foursquare would be useful in providing relevant information tailored to my personal preferences or interests.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PER3: An application like Foursquare would be useful in providing information or services that I might like.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PC1: I would be concerned that information I submit on an application like Foursquare might be misused.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PC2: I would be concerned that a person would be able to find private information about me using information I submit on an application like Foursquare.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PC3: I would be concerned about submitting information on an application like Foursquare because of what others might do with it.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

PC4: I would be concerned about submitting information on an application like Foursquare because it could be used in a way I did not foresee.

Strongly disagree       Disagree       Neither agree nor disagree       Agree       Strongly agree

Revealing personal information refers to all information that is disclosed to use an application like Foursquare. This may include static information such as your name, email address, and cellphone number, along with real-time information associated with your location.

BI1: How likely would you be to reveal your personal information to use an application like Foursquare?

- Extremely likely       Likely       Neither unlikely nor likely       Unlikely       Extremely unlikely

BI2: How willing would you be to reveal your personal information to use an application like Foursquare?

- Extremely willingly       Willingly       Neither willingly nor unwillingly       Unwillingly       Extremely unwillingly

Demographics:

D1: What is your gender?

- Female       Male

D2: What is your ethnicity?

- Caucasian       African-American       Hispanic       American Indian       Asian       Other

D3: What is your age?

- 18-19 years old       20-21 years old       22-24 years old       25-29 years old       30-34 years old       35 years or older

D4: How long have you owned a mobile phone?

- Do not own a mobile phone       Less than 12 months       12-24 months       25-36 months       More than 3 years

D5: How many text messages do you send each month?

- Less than 10 messages       10-50 messages       51-250 messages       251-500 messages       More than 500 messages

D6: Over the past month, how many times have you used a mobile application?

- Never       Less than once a month       Once a month       2-3 times a month       Once a Week       2-3 Times a Week       Daily

D7: Over the past month, how many times have you used a mobile application that uses GPS technology to identify your location?

- Never       Less than once a month       Once a month       2-3 times a month       Once a Week       2-3 Times a Week       Daily

APPENDIX B

VIDEO TRANSCRIPT: *HOW TO UNLOCK YOUR WORLD WITH FOURSQUARE*

Wish you were more aware of all the incredible things around you?

With Foursquare you can unlock your world and find happiness just around the corner.

You will need Foursquare, a cellphone, and a passion for exploration.

Step 1: Download the Foursquare app to your cellphone and instantly link to your address book, Facebook and Twitter accounts to discover where your friends are hanging out.

See if they are near you by looking at where they recently checked-in.

If your phone doesn't have Internet access and you live in the U.S., you can use Foursquare via text message.

Step 2: Tell your friends where you are by checking in at one of the thousands of places Foursquare lists automatically based on your GPS location.

Leave tips on special features you find around town, and don't skimp on the details.

Inside information is one of Foursquare's best features.

If the place you're at isn't listed, you can add it to Foursquare.

Step 3: Check out tips from your friends and from the hundreds of thousands of other users.

Find recommendations on your specific location or suggestions for things to do or avoid nearby.

Step 4: The more you use Foursquare, the more you'll get out of it.

Unlock badges and earn points based on where, when, and how often you check in.

See how many you can rack up in any given month, and check out your stats at [Foursquare.com](http://Foursquare.com)

Step 5: Check in at a location more than anyone else and become the mayor.

You don't get a key to the city, but you might get rewards from certain businesses just for being a loyal customer.

Even if you're not the Mayor, look out for specials offered to Foursquare users.

Step 6: Use Foursquare where ever you go. In museums, at airports, on public transportation, during concerts.

You never know when you might come across a little planned serendipity.

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