# Why do people share their context information on Social Network Services? A qualitative study and an experimental study on users' behavior of balancing perceived benefit and risk

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A B S T R A C T

Despite the rapid growth of context-aware systems and ubiquitous computing, the factors influencing users' decision to share their context information in a social setting are poorly understood. This study aims to clarify why users share their context information in social network service (SNS), even while they are concerned with the potential risk at the same time. Drawing on the diverse theories of self-disclosure, we take an approach that the consideration of benefit encourages users to endure the existence of risk, and that users actively adjust the way they share their information to optimize the level of benefit and risk. In a qualitative study, we examined what kinds of risks and benefits exist in context information sharing situations and how users control them. An experiment was conducted using stimuli that simulate the actual use of SNS to investigate the effect of various context types and control types on users' expected benefit and risk and their intention to share. The results showed that both expected benefit and expected risk influenced users' intention to share. More interestingly, the effect of expected benefit was found to be stronger than that of expected risk. Moreover, different privacy control strategies were found to have induced different effects on the expected benefit and expected risk. Implications and limitations of this study were proposed at the end of this study.

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## 1. Introduction

In recent years, ubiquitous computing technologies have rapidly grown, including one of the most representative technologies, mobile internet (Dong et al., 2009; Shilton, 2009; Wilson et al., 2011). It enables people to communicate with others whenever they want and wherever they are. Thanks to emergence of mobile communication technology, there are an increasing number of users sharing information about their situation in real-time, to share their experiences with others using social network service (SNS).

We examined users' pattern of SNS usage in the sharing of context information and found that most controversial phenomena, AB dichotomy, in the field of privacy studies is also present. The 'AB dichotomy' (Acquisti and Grossklags, 2005; Reynolds et al., 2011) refers to a user's contradictory actions when having a high level of privacy concern (Attitude) but sharing private context information actively (Behavior). Why do users share context information with other users that could result in an undesirable outcome of privacy intrusion? Clarifying factors that influence

users' decision making when they share their context information can shed light on the design of context information sharing systems.

Despite of a large amount of previous researches analyzing the risks and benefits of human behavior including self-disclosure (Coleman and Fararo, 1992; Kahneman and Tversky, 1979; Loomes and Sugden, 1982), relatively little research has been carried out on the context information sharing on SNS from the perspective of balancing process between expected benefit and expected risk. Most previous researches dealing with information sharing and social interaction on SNS had focused on analyzing risks (Al-Muhtadi et al., 2002; Hong et al., 2004; Lederer et al., 2003; Saponas et al., 2007), and few researches covering benefits and risks at the same time. We hypothesize that users may consider benefits as well as risks and they make an effort to reduce risks and increase benefits using various means to share their information strategically.

The purpose of this study is to investigate the benefit and risk factors that people consider when they share their context information with others and what kind of behaviors they enact to maximize benefits and to minimize risks in that process. Accordingly, our research questions are as follows: First, does intention to share context information in social situations depend on expected benefits and risks? We are especially interested in

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whether the benefit–risk approach is still valid even when it is highly unpredictable. Second, do the different types of context information induce different expected benefit and expected risk when people share context information? Third, does using various controls mechanisms to protect private information affect the expected benefit and expected risk of sharing context information? A qualitative study and controlled experiment that simulated the actual sharing of context information were conducted to answer our research questions.

The rest of the paper is organized as follows: Section 2 reviews the relevant research and theories. Section 3 sets up the hypothesis based on existing theories. Section 4 explains the procedure and the consequences of qualitative studies. Section 5 deal with the overall method, data analysis and procedure and result of the experiment. Section 6 includes discusses the implications and limitations of the study and Section 7 presents conclusion of this study.

## 2. Research background

### 2.1. Context information

As a comprehensive term, many researchers define 'context' differently. Dey et al. (2001) define it, referring to context as any information that can be used to characterize the situation of an entity. The term 'entity' includes a person, place or object. Similarly, others view context as the circumstances relevant to the interaction between a user and their computing environment (Abowd et al., 1999; Chalmers, 2002). Some researchers restrict the range of entities to only the users interacting with the application (Petrelli, 2000). Likewise, we defined the term entity as the users sharing their own context information with others.

Context information consists of various types of sub-constructs such as location, identity, activity, time and environment, etc. Many researchers have categorized context information (Abowd et al., 1999; Lee and Kim, 2005; Ryan et al., 1998; Villegas and Müller, 2010). Especially, Dey et al. (2001) emphasized that there are primary contexts which are more important than others: location, identity, activity and time. Through this paper, we apply Dey's categorization, except for identity context, restricting the definition of identity to that of co-located people. Identity context is classified into the identity of users and the identity of co-located people (Abowd et al., 1999). Generally, users' identities are not a target of context sharing, but are provided through their profiles. In this paper, we employed the term *relation context* indicating identity information for co-located people; *location context* indicates the information about the place and location where a user is present; *activity context* is the information describing what a user is doing at the time of sharing their information.

### 2.2. Self-disclosure

Self-disclosure is the behavior of revealing private information about oneself to others (Archer and Burleson, 1980), utilized in various field of computer-mediated communication, thanks to the development of communication technology (McKenna and Bargh, 2000; Rheingold, 1993). This paper considers context information sharing as self-disclosure behavior in that context information is closely related to its provider.

Self-disclosure is the main construct of Social Penetration Theory (SPT). SPT explains the procedure of how people reveal themselves to get intimate with others. The degree of self-disclosure is adjusted by controlling the depth and breadth of information. *Breadth* refers to the dimension covered by each type of information. It gets wider as the number of topics increases

(Omarzu, 2000). It can be assumed that different types of context information induce change in the dimensions of self it covers, in turn affecting the breadth of disclosure. *Depth* of disclosure describes the intimacy level of the disclosure, so the sensitivity of the revealed information affects the depth of disclosure (Griffin, 1997; Omarzu, 2000). By exchanging more sensitive and larger amounts of information, people are able to penetrate each other, thereby developing their relationship.

It is notable that people predict the cost and rewards before they disclose such information (Berg, 1984). Accordingly, we predict that people take into consideration expected benefit and expected risk when sharing their context information in a similar way to self-disclosure behavior.

### 2.3. Benefit and risk in social situations

Previous studies stated that the process of decision making about revealing private information contains an estimation of future risk (or cost) and benefit (Acquisti and Grossklags, 2005), and after contrasting the risk and benefit they reflect on the result of the comparison, called net-benefit (White, 2004). However, this approach mostly applied to transactional situations, such as e-commerce, rather than social situations (LaRose and Rifon, 2007; White, 2004; Youn, 2009).

The types of benefit and risk in social situations are quite different from those of a transactional situation. While using online commerce, we can anticipate the benefits such as monetary benefit (like the offering of discounts to members who provide personal information) or convenience of transaction. In contrast, we expect relational development and social capitals in social settings. Moreover, the characteristics of benefits and risk are different; in social contexts, both are much more ambiguous than in a transactional situation. It is unpredictable how much you can improve your relationship with others by disclosing certain information. We examined how existing related theory dealt with the types and properties of benefit–risk that can be acquired in a social context as follows.

#### 2.3.1. Types of benefit and risk

The types of risks and benefits of personal information disclosure in social situations are described in detail in Petronio (2002)'s Communicative Privacy Management (CPM) theory. CPM is an evidence-based theory concerning the management of private information with the trade-offs between the need to reveal oneself and protect privacy. According to CPM, information owners make a decision based on three rules. Permeability rule refers to the breadth, depth or amount of disclosure. Linkage rule is related to how people negotiate who else can know the private information. Lastly, ownership rule is concerned with the degree of control co-owners have to make independent judgments (Child et al., 2011; Petronio, 2002).

These rules are significantly affected by the benefit–risk ratio of sharing private information. Petronio (2002) proposed five types of benefit: expression, social control, relationship development, social validation and self-clarification. *Expression* is a reason to reveal because disclosure allows one to alleviate their stress and negative feelings by telling others. *Social control* is a desirable outcome of disclosure achieved by influencing others and changing their attitude or behavior. One might expect to get closer with others, *relationship development*, by opening private information. Disclosing information may lead to *social validation*: the validation of one's feelings or opinion by other people. *Self-clarification* is a self-oriented benefit, understanding oneself and clarifying one's situation and feelings by revealing private information.