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THE ROLE OF CONTEXTUAL FACTORS IN ONLINE PRIVACY DECISION

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ABSTRACT

Innovation in information and communication technologies has enabled firms to collect information about individual customers and to use the information to understand their preferences at substantially low costs. Based on this understanding, firms can provide the customers with improved value such as products that fit best with individual customer needs. This ability is further enhanced by the rapid penetration of mobile devices, which are personal in nature. However, the collection and use of private information have caused widespread apprehension by consumers that their privacy is invaded. It has been well established that privacy risk is greater for more sensitive personal information and thus people are likely to refuse to provide sensitive information correctly. The main objective of this study is to explore moderating factors that influence the negative effect of information sensitivity on personal information disclosure. Specifically, this study focuses on two contextual factors in privacy decision, including the relevance of information and the intrinsic value of transaction, and investigates how the factors can change the impacts that information sensitivity has on the disclosure of personal information. A central finding of an online experiment employing two scenarios of personal information disclosure is that disclosure of sensitive information is responsive to the contextual factors in such a way that the negative impact of information sensitivity can be attenuated by the contextual factors. This study contributes to understanding of online users' privacy decision by suggesting the interplay between an inherent attribute of information (i.e., information sensitivity) and contextual factors in formulating users' privacy decision.

Keywords: Privacy decision, information sensitivity, information relevance, intrinsic value of transaction

INTRODUCTION

Innovation in information and communication technologies offers firms great opportunities to build new relationships with customers and to treat different customers differently. These technologies enable firms to collect information about individual customers and to use the information to understand their preferences at substantially low costs [16]. Based on this understanding, a firm can improve its value proposition for consumers, enhance their loyalty to the firm, and increase the operational efficiency and profitability [17] [19]. This ability is further enhanced by the rapid penetration of mobile devices, which are personal in nature. This strategic importance and enhanced technological capabilities have made effective collection and use of personal information an imperative for competitive advantage.

However, the collection and use of private information have caused widespread concerns by consumers that their privacy is invaded. Recent growth of social networking services and progress in cloud computing technologies and services have further increased consumers' privacy risk perception. Faced with the concerns, consumers usually make decisions about personal information disclosure based on "privacy calculus"—an assessment of the costs and benefits related to information disclosure [3] [5] [11]. Therefore, it is a critical challenge for firms to reduce consumers' privacy risk related to their personal information disclosure.

Accordingly, a lot of research effort has been made to investigate factors that influence Internet users' privacy decisions regarding personal information disclosure. Previous empirical literature on information privacy has identified various determinants including personal characteristics (e.g., information privacy concerns, privacy intrusion experience, demographics, etc.), institutional factors (e.g., privacy statements, privacy seals, privacy regulation, etc.), and contextual factors (e.g., benefits from information provision such as personalization or rewards, attributes of information, etc.) [1] [3] [5] [13] [21] [25].

It is widely accepted that users perceive a higher level of risk when they disclose more sensitive personal information [10] [13] [18]. As such, the sensitivity of information has been a focal information attribute that has drawn a lot of research effort. The main objective of this study is to explore moderating factors that influence the negative effect of information sensitivity on personal information disclosure. Specifically, this study focuses on two contextual factors in privacy decision, the relevance of information and the intrinsic value of transaction, and investigates how the factors can change the impacts that information sensitivity has on the disclosure of personal information.

While information relevance has been proposed as an antecedent in privacy decisions [22], there exists little empirical research on the impact of information relevance. This study contributes to the privacy literature by suggesting the relevance as another critical attribute of information to be considered in privacy research and by investigating empirically the impact of relevance in personal information disclosure.

Based on the privacy calculus perspective, researchers have tried to examine the effect of rewards offered in return for information disclosure [8] [25]. Although the reward can be a benefit factor in the calculus, it is essentially extrinsic in that it is not related to the user's purpose of interactions with a firm. This study contributes to deeper understanding of the role of the intrinsic value by examining its interaction with information sensitivity in formulating privacy decisions.

THEORETICAL BACKGROUND AND HYPOTHESES

Attributes of Information and Privacy Decision

Various types of information are collected online including demographics, lifestyle information, shopping history and habits, financial information, and personally identifiable information such as names and social security numbers [7] [9] [16]. Attributes of the information may affect users' information disclosure behaviors in the course of their interactions with firms [2] [18] [20] [23] [24]. In this study, we consider two important attributes of information—sensitivity of information and relevance of information—that may influence privacy decision regarding the information.

Information sensitivity refers to the degree of discomfort an individual perceives in providing specific information to a firm [12]. In general, different pieces of information are related to different levels of sensitivity, and consumers perceive a higher level of risk when they disclose more sensitive information [15]. Therefore, from the perspective of privacy calculus, the sensitivity of information would negatively affect personal information disclosure.

The relevance of information refers to the degree to which the information requested appears relevant to the purpose of transactions with the firm [22]. This definition implies that the relevance of information is not an inherent attribute of specific pieces of information but a context-dependent attribute. Consumers' privacy decisions over the same piece of information may be different depending on the context of the decision. For example, when a consumer purchases a physical product from an Internet site, she would provide her address correctly to the site because the product should be delivered to her home, that is, the address is relevant information. On the other hand, if she buys a digital good (e.g., a music file) from the site, she might not be willing to provide her address because the file is delivered via the Internet and the address is not relevant to the transaction. For relevant information, a consumer would perceive that she could effectively achieve her purpose of transaction with the firm by providing the information. However, providing irrelevant information would just incur consumers' perceived risks without contributing to the achievement of the goals. Therefore, the relevance of information would have a positive effect on personal information disclosure.

While the negative impact of information sensitivity has been widely accepted, some empirical studies have found that the impact is not significant [8] [12]. This result implies a potential interaction effect between the sensitivity and relevance of information. For example, some personal information may be indispensable for fulfilling e-commerce transactions. Then, users may be willing to provide sensitive information such as credit card numbers or cellphone numbers when it is highly relevant. Therefore, we suggest that the negative effect of sensitivity is strong when the requested information has a low level of relevance while the effect is reduced for information with a high level of relevance.

H1: Information relevance reduces the negative effect of information sensitivity on personal information disclosure.

Intrinsic Value and Privacy Decision

The privacy calculus literature suggests that personal information disclosure is an increasing function of the user's benefit expected from the disclosure. Based on the reasoning, many empirical studies have examined the effect of rewards for information disclosure (e.g., [8] [25]). However, the rewards are essentially extrinsic in that they are not related with the user's purpose of interactions with a firm. In this study, we examine a user benefit factors that is intrinsic to user-firm interactions, the value users expect from the firm's product or service. The intrinsic value will be considered in the user's privacy calculus as a benefit factor of information disclosure, which, in turn, will facilitate disclosure of personal information.

A high level of transaction value from a firm is likely to increase the consumer's trust in the firm. Further, trust promotes risk-taking behaviors [14]. Thus, when intrinsic values are high, it is more likely that consumers are involved in risk-taking behaviors in their privacy calculus, that is, providing firms with sensitive information. Accordingly, intrinsic values are expected to moderate the effect of information sensitivity on personal information disclosure.

H2: Intrinsic value reduces the negative effect of information sensitivity on personal information disclosure.

RESEARCH METHODS

To test the hypotheses, we conducted a scenario-based online survey concerning hypothetical privacy decisions. As contexts of the decisions, we selected two real online services that operate in Korea. One is a part time job matching service and the other is an online dating service. Both matching services are similar in that they are targeting young people and based on the personal information users provide on the service sites. However, the two were different in the level of awareness at the time of the survey. The job matching service was well established while the dating service was newly launched. Therefore, the research design enabled us to examine possible difference of the effects depending on the level of awareness of the service. Participants were asked to suppose that they were considering the services and to decide whether to provide each information item requested by the firms.

The information items were selected through a separate online survey. We first reviewed the information items requested in the

two service sites and came up with thirty items after adding additional items. Then, we recruited business school students enrolling a university to rate the sensitivity and relevance of the information items. Forty-five students participated in the survey. When each respondent accessed the survey site, she was asked to rate the sensitivity of each of twenty items randomly chosen out of the thirty items (“Please rate the degree of discomfort you perceive in providing the information to a firm online.”). Then, after reading a description of one of the two matching services, she was asked to rate the relevance for each of randomly chosen twenty items (“Please rate the degree to which the information requested appears relevant to the purpose of transactions with the firm.”). Finally, the same procedure was repeated for the other service. A rating scale from 0 to 100 was used for all questions.

The sensitivity and relevance scores were averaged for each item. The averages for sensitivity ranged from 22.2 (favorite music genre) to 90.5 (bank account number) with a mean value of 53.3. The averages of the relevance scores for the job matching service ranged from 12.4 (bank account number) to 84.6 (highest level of education completed) with a mean of 41.9. The dating service had a similar range of 14.2 (bank account number) to 82.5 (age) with a higher mean value of 55.0. Based on the averages, we selected twenty items for each service that constitute four distinct groups in their levels of sensitivity and relevance, that is, Group_HH (high sensitivity and high relevance), Group_HL (high sensitivity and low relevance), Group_LH (low sensitivity and high relevance), and Group_LL (low sensitivity and low relevance). While some information items were common for the two services, the others were not. Each group included five information items. The mean values are summarized in Table 1.

Table 1. Mean Values of the Average Sensitivity and Relevance Scores

		Group_HH	Group_HL	Group_LH	Group_LL
Job matching service	Sensitivity	69.2	72.6	35.4	32.3
	Relevance	63.7	21.6	63.8	22.6
Online dating service	Sensitivity	70.4	75.2	38.2	38.7
	Relevance	67.7	32.5	74.8	45.0

As the main survey respondents, we recruited business school students from two universities other than in the above survey. Participants were randomly assigned to one of the two service contexts. After reading the description of the assigned service, each participant was asked to suppose that she was considering the services and to decide for each of the requested item whether to provide the information correctly (1), provide it incorrectly (2), or not provide it at all (3). Figure 1 shows a screenshot.

The dependent variable of this study (disclosure of personal information) was measured with the proportion of correct disclosure for each of the four groups, that is, the number of 1’s divided by 5. Thus, each respondent has four values of the dependent variable, one for each combination of sensitivity and relevance.

Please select what your choice would be for each information item requested.

	Provide it correctly	Provide it incorrectly	Not provide it at all
Age	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Occupation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Religion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hobby	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cellphone numbers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Weight	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
College major	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hometown	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bank account number	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 1. Screenshot of the Survey System (Translated in English)

Then, the respondent was asked to answer her willingness-to-pay for the service to measure the value of the service she perceived. Additionally, her previous knowledge of the service was also measured using a binary scale to measure the awareness. Finally, gender and age were asked.

Table 2 summarizes descriptive statistics of the two sub-samples assigned for the two services. The number of the respondents for each service was ninety-two, thus, one hundred eighty-four in total. There were no significant differences in gender and age between the sub-samples. Eighty-eight respondents (95.7%) were aware of the job matching service while only seven respondents (7.6%) were aware of the online dating service, which was consistent with our expectation. The willingness-to-pay was greater for

the dating service ($p < 0.05$). In the analysis, the log of the willingness-to-pay was used as a measure of the value.

Table 2. Sample Composition and Descriptive Statistics

		Job matching service sub-sample	Online dating services sub-sample
Size (persons)		92	92
Gender (persons)	Male	47 (51.1%)	51 (55.4%)
	Female	45 (48.9%)	41 (44.6%)
Age (years)	Mean	22.4	22.2
	St. Dev.	2.4	2.4
Awareness of the service (persons)	Aware	88 (95.7%)	7 (7.6%)
	Do not aware	4 (4.3%)	85 (92.4%)
Willingness-to-pay (Korean Wons)	Mean	3,464.2	8,248.2
	St. Dev.	4,994.4	13,451.6
Ln(Willingness-to-pay)	Mean	5.4	6.4
	St. Dev.	3.8	4.0

ANALYSIS RESULTS

Our study design includes two within-factors (sensitivity and relevance) each with two levels (high vs. low) for a randomly assigned service. So, it corresponds to a 2×2 repeated measure design, and a repeated measure ANOVA is applied for the analysis, where $\ln(\text{willingness-to-pay})$ is mean-centered. Table 3 summarizes the results.

From Table 3, the interaction term between sensitivity and relevance is significant for both services ($p < 0.001$). The effect of information sensitivity is found significant for both job matching and dating services ($p < 0.001$). The relevance of information also has a significant effect on personal information disclosure for both services ($p < 0.001$). Figure 2 shows estimated marginal means for the sensitivity-relevance combinations. An examination of the pattern of the interaction reveals that when the relevance of information is high, the negative impact of the sensitivity of information is reduced, supporting H1.

Table 3. Results of Repeated Measure ANOVA

	Source	Job matching sub-sample	Online dating sub-sample
		<i>F</i> -value (<i>p</i> -value)	<i>F</i> -value (<i>p</i> -value)
Within	<i>Sensitivity</i>	31.95 (< 0.001)	459.59 (< 0.001)
	<i>Relevance</i>	167.52 (< 0.001)	77.34 (< 0.001)
	<i>Sensitivity</i> \times <i>Relevance</i>	16.11 (< 0.001)	39.26 (< 0.001)
	<i>Sensitivity</i> \times $\ln(\text{Willingness-to-pay})$	0.21 (0.651)	4.87 (0.028)
Between	$\ln(\text{Willingness-to-pay})$	2.16 (0.145)	0.60 (0.442)
No. of observations		368	368
R-squared		0.6270	0.7762
Adj. R-squared		0.4968	0.6980

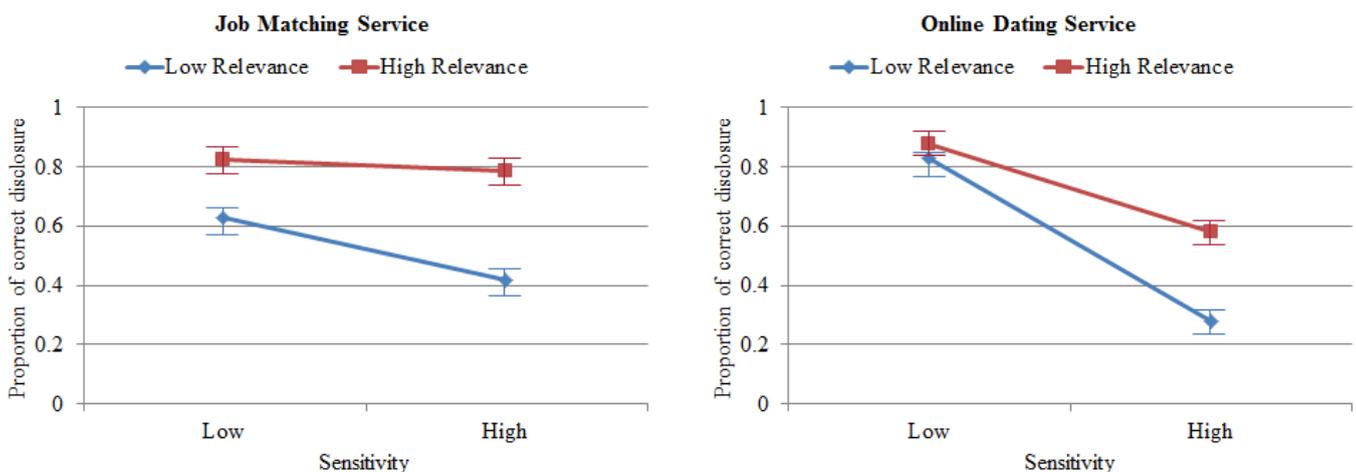


Figure 2. Estimated Marginal Means

Next, let's consider the simple effect of sensitivity. From Figure 2, one can find that sensitivity tends to decrease the proportion of correct disclosure. For the job matching service in the left panel, when relevance is low, the marginal mean for low sensitivity (0.6282) is significantly higher ($p < 0.05$) than that for high sensitivity (0.4174). However, there is no significant difference when

relevance is high (0.8217 vs. 0.7848). For the online dating service in the right panel, the sensitivity of information significantly reduces personal information disclosure regardless of the level of relevance (0.8261 vs. 0.2804 under low relevance, and 0.8761 vs. 0.5783 under high relevance).

Figure 2 shows that relevance tends to increase the proportion of correct disclosure. For the job matching service, the relevance of information significantly increases personal information disclosure regardless of the level of sensitivity (0.8217 vs. 0.6283 under low sensitivity, and 0.7848 vs. 0.4174 under high sensitivity). For the online dating service, while there is no significant difference when sensitivity is low (0.8761 for high relevance vs. 0.8261 for low relevance), the marginal mean for high relevance (0.5783) is significantly higher than that for low relevance (0.2804).

In Table 3, the interaction term between sensitivity and willingness-to-pay is insignificant for the job matching service. However, it is significant for the online dating service ($p < 0.05$). The estimated derivative of proportion of correct disclosure with respect to $\ln(\text{willingness-to-pay})$ is larger for high sensitivity (0.0289) than that for low sensitivity (0.0181), which suggests a positive interaction effect. Thus, H2 is partially supported.

DISCUSSIONS AND CONCLUSIONS

In this study, we investigated the role of contextual factors in the Internet users' privacy decision. We considered two attributes of information, the sensitivity and relevance of information, and the intrinsic value of transactions. We conceptualized information sensitivity as an inherent attribute of specific pieces of information which does not depend on the context of information disclosure. On the other hand, information relevance was conceptualized as a contextual attribute of information rather than an inherent attribute. Based on this conceptualization, we examined the impacts of the two contextual factors (information relevance and intrinsic value of transactions) in facilitating disclosure of sensitivity information.

The research hypotheses were tested using data from a scenario-based online experiment concerning hypothetical privacy decisions in the contexts of two online services. Overall, the analysis results support the positive interaction effects between information sensitivity and the contextual factors, indicating that information relevance and value of transactions reduce the negative impact of information sensitivity on personal information disclosure.

The current study has several implications. First, this study contributes to online privacy research by suggesting an important attribute of information, the relevance of information, and empirically investigating its effect in the privacy decision. While information sensitivity has been a well-established information attribute which hinders personal information disclosure, information relevance has drawn little research attention. The results show that information relevance can be a critical factor in the privacy decision in that it facilitates disclosure of sensitive personal information by limiting the impact of information sensitivity.

Second, this study suggests that intrinsic value should be one of main constructs in the privacy calculus model. While it has been conceptualized as a key benefit component in the privacy calculus (Culnan and Bies, 2003), previous empirical studies have mostly considered extrinsic benefit components such as monetary rewards, which are costly in nature. Privacy calculus literature has been based on an implicit assumption that benefits and costs are independent of each other in the calculus, and thus a natural conclusion is that the relative magnitude of benefit and cost determines the privacy decision (Awad and Krishnan, 2006). However, our results indicate that benefit and cost should not be considered independently; rather, it may be crucial to understand the interplay between them in understanding the privacy decision.

Third, from the managerial perspective, this study implies that online firms need to effectively communicate with the user the relevance of information they request and the intrinsic value the user could expect in return for the information. In this regard, explanation could be an important measure to influence the user perception of the relevance and value. Explanations offered by an information system can contribute to users' understanding of how the system works and make the performance of a system transparent to its users (Gregor and Benbasat, 1999; Ye and Johnson, 1995). The role of explanations would not only be of interest to managers, but also be an important venue for future privacy research.

Although this study offers significant implications, there is a need for future research involving various online contexts of information disclosure. Further, scenario-based empirical studies, which have been frequently employed in the privacy literature (e.g., Malhotra et al., 2004), may be subject to insufficient validity compared to those based on information disclosure behaviors, which is another venue for future research.

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