

A Study Using TAM on the Recognition of Individuals' Privacy and the Acceptance of Risk —The Case of Japanese Internet Users—

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Abstract. In this paper, a survey was conducted on the current status of social networking services (SNS) with an emphasis on privacy concerns, which are often deemed an obstruction factor in the use of such services on the Internet. Anxiety over personal privacy and other factors were analyzed based on the technology acceptance model (TAM). The results of the survey show that “perceived usefulness” scored highest with respect to SNS, although, on the demerit side, there were marked anxieties over privacy.

Keywords: TAM, privacy risk, SNS, Trust, SEM.

1 Introduction

There are a large number of Internet services related to social life and the economy. When users access these services, information such as purchase history and usage history may be accumulated by the service provider. The service provider uses these data to offer information that can improve convenience for the user; for example, by making recommendations. On the other hand, there are feelings of public unease when data on users are accumulated. If this uneasiness is not eliminated, the use of services that profit from such information may not advance, which in turn would hinder the creation of further new services and the development of a networked society. By clarifying attitudes and actions concerning the security and privacy of users, the Internet service environment can provide a sense of relief to users, and enhance the use of Internet services.

Privacy issues arise when information belonging to individuals (personal information) is used or provided to external entities in an undesired or unexpected way. The loss of privacy leads to the violation of three rights: “seclusion,” the right to be invisible (not to be recognized) to others; “solitude,” the right to be left alone; and “self-determination,” the right to control one’s personal information [1][2].

In Japan, the “Protection of Personal Information Act” was enacted in 2005. To comply with this law, many enterprises have imposed strict rules governing personal

information. As a result, some Japanese businesses have encountered difficulties in the appropriate use of personal information. In “Secure Japan 2008” by the National Information Security Center, it was stated that enterprises are exhausted by implementing and carrying out security measures [3]. Another aspect of privacy concerns is the recognition of the risks of providing personal data by the subject. This appears in the study on unease in the “White Paper on Telecommunications” published by the Ministry of Internal Affairs and Communications, which deals with consumers’ anxiety regarding Internet privacy. It was reported that, in terms of Internet usage, “There is uneasiness regarding the protection of privacy information,” and that this is a major concern (71.2%). Given this situation, it is essential to alleviate the privacy concerns of individuals, thereby enabling them to agree to the use of personal information. It is also very important for users and the service providers to trust each other, which could be achieved by clarifying the status of an individual’s perception and acceptance of risks related to privacy.

2 Related Studies

Many studies have been made concerning aspects of privacy, such as privacy enhancement technology, privacy from legal or economic perspectives, and sociology, as listed in documents from a prime life project [4][5][6]. Privacy protection is also described in research documents from the viewpoint of recognition by the individual when using the Internet. There are several studies such as [7], which conducted a survey covering four countries, including Japan, that revealed that, compared to people from other countries, Japanese people consider it more risky to disclose individual information. The privacy concern of individuals with regard to direct marketing has also been investigated [8]. In return for the reporting of financial news, the consumer may willingly offer demographic data. In addition, there are situations in which an individual may offer information with pleasure if it saves time. Another survey has indicated that the media flair of the Internet has a negative influence on the recognition of risks in online purchases and that the recognition of privacy influences online transactions [9]. The European Union [10] conducted an informative survey in terms of a user’s recognition of using new emerging services such as social networking services (SNS). This survey discusses four paradoxes: the privacy paradox, the control paradox, the responsibility paradox, and the awareness paradox. It is noted that paradoxes exist in cases in which individuals must select a service despite privacy concerns. Individuals solve such contradiction themselves and decide their preferences regarding privacy and other factors. This situation must be made clear for the efficient promotion of the use of personal data. To solve this issue, two main standpoints can be outlined: one focusing on personal interest, and the other on economic interest. Studies on privacy and economics have been conducted from the perspective of individual behavior, and research in this area, called privacy economics, has been performed [11][12]. [13] reveals the way in which people recognize risks by using the theories of time inconsistency, hyperbolic discounting, and self-control bias. In a case related to eID, the research [14] is an investigation of the relationship between the

level of authentication technology and economic value. There is a study in which people are classified into three categories: privacy guardians, information sellers, and convenience seekers [15]. Another study [16] is a survey of the attitudes of Internet users, in which people disclose personal information in a trade-off against economic value. Unfortunately, few research has been conducted that scientifically conducts an investigative analysis on the privacy concerns of individuals in the Japanese online environment, as far as the author knows[17]. It is necessary to have knowledge of the recognition of privacy concerns, which varies from country to country, to investigate the state of privacy concerns in Japan.

2.1 Technology Acceptance Model

When a company deploys a new technology, it is important to analyze what kind of action is taken, and whether the action is regularity and modeled by users. The technology acceptance model (TAM) is widely accepted as being effective in this regard. "Perceived Usefulness" is the subjective expectation of the user who expects that use of a specific application system will raise the performance of work for a certain organization. "Perceived Ease of Use" means the extent of expectation not to take specific efforts regarding the use of the object system. "Intention" contains two factors, one is the extent to evaluate the willingness to use the system and the other is the intention to carry out the action.

Kim et.al conducted study of how a risk and a trust influence users' intention in e-commerce [18]. There, although a trust has influence of positive to intention, it is shown clearly that risk has influence with a negative as a result of investigation. In this paper, a hypothesis is built to unify a risk and a trust to TAM as shown Fig.1. In the hypothesis, we add confidence on the internet because it is considered that a new service such as SNS is influenced not by trust in specific service but by confidence on the Internet.

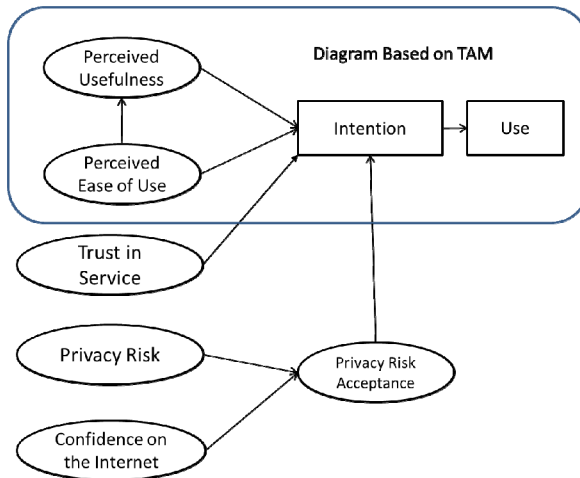


Fig. 1. Hypothesis Model and TAM

3 Survey on Recognition of Privacy Risk

According to TAM, it is necessary that a new technology has enough efficiency and ease of use to appeal to users. These factors mainly pertain to the user. However, environmental factors such as privacy risks and trust on the Internet are considered to influence a subject's use of new technology. This paper focuses on SNS, which are spreading throughout the Internet, and seeks to clarify the cognitive elements on using SNS by analyzing the results of a questionnaire conducted over the Internet.

3.1 Scenario and Questionnaire

Scenario

Following Scenario was shown to respondents before questionnaires.

Aoi, your friend, is 16 and always busy hanging out with her friends. A company offers her a service to keep in touch with her friends and get to know new people who are interested in the same things in her neighborhood (bars, clubs, gyms and high school). However, this service requires some personal data, such as age, gender and location. The service is accessible via her mobile phone, and if Aoi activates the service, her whereabouts and current activities are charted to match other people's whereabouts. What would you recommend she does?

Mock-Up Site

The mock-up of the site shown in Fig. 2 was prepared so that it was easier for respondents to understand the scenario.



Fig. 2. Mock-up site shown in questionnaire

Questionnaire

Respondents are asked questionnaire shown in Table 1 after reading the scenario .

Table 1. Questionnaire

		Metrics
Ease of Use: To what extent do you agree with the following description of the service?		
Q1	Learning to use such a service would be easy for me	Strongly disagree (1) to Strongly agree (7)
Q2	I would find this service easy to use	
Usefulness: To what extent do you agree with the following description of the service?		
Q3	I show my profile to close friends by any method I like	Strongly disagree (1) to Strongly agree (7)
Q4	Using this system would fit my lifestyle	
Q5	The benefits of using this system are apparent to me	
Trust in the service		
Q6	I would trust the system	Strongly disagree (1) to Strongly agree (7)
Q7	I think the service would be reliable	
Potential Risks: What are the potential risks you would mention to your friend?		
Q8	Your activities may be monitored	Strongly disagree (1) to Strongly agree (7)
Q9	Information may be collected that could be used against you in future life	
Q10	Someone may hack into the system and steal your personal information	
Internet confidence: More generally, concerning the Internet, would you say that:		
Q11	The Internet has enough safeguards to make me feel comfortable giving my personal details online	Strongly disagree (1) to Strongly agree (5)
Q12	The Internet is now a robust and safe environment in which to conduct transactions	
Q13	The Internet is safe enough to preserve my privacy as I carry out leisure, business and personal activities	
Q14	I am confident that I can protect my privacy online	
Intention of Use: Overall, do you think that:		
Q15	Using this service would be:	A good idea (1) to A bad idea (5)
Q16		A wise idea (1) to A foolish idea (5)
Q17	The idea of using this service is:	Attractive (1) to Not attractive (5)
Q18	You like it (1) to You dislike it (5)	

3.2 Data Collection and Analysis

The survey titled “A survey of awareness on Internet Usage” was carried out from March 12 to March 16, 2010 by NTT Resonant. The age of the respondents was from 15 to over 60, split into age groups spanning 10 years. A total of 1000 valid responses was obtained.

In order to test how the proposed factors influence to the intention to use SNS, structural equation model(SEM) is used .We draw a path diagram using the observed variables shown in Fig. 3 based on a hypothesis model. The accuracies of the diagram are 0.957 and 0.930, GFI and AGFI respectively, which shows the path diagram, is highly representative. Red lines are paths those did not appear in the hypothesis.

Although "usefulness" and "ease of use" is defined as affecting use intention in TAM, "ease of use" did not form a path to the use intention.

The “Trust in Service” that this hypothesis defined, influenced the action intention a little, and influenced usefulness to a rather higher degree. We constructed a hypothesis that the concern of privacy risk drew a path from risk concern and acceptance to an action intention with trust on the Internet. However, the relation between privacy risk and trust on Internet is not recognized. The privacy risk had a negative influence on use intention. Confidence on the Internet affected strongly to perceived usefulness.

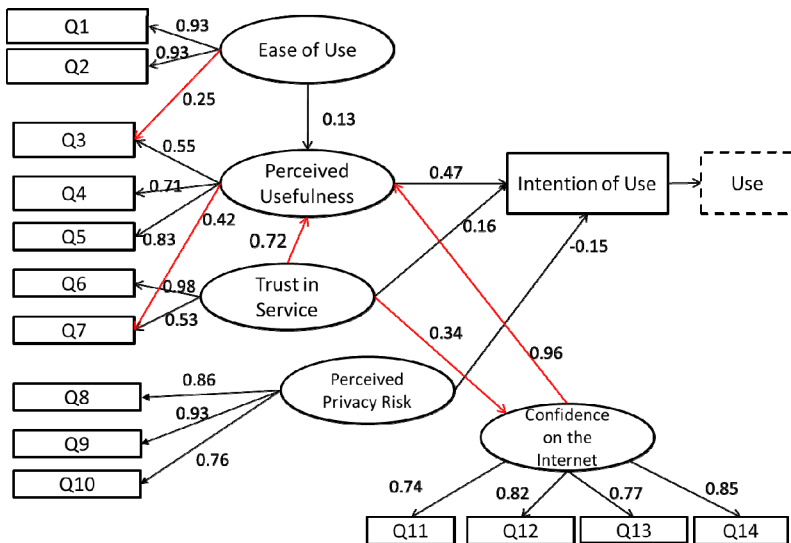


Fig. 3. Result of SEM

4 Conclusion

In this study, the privacy risk, trust on the service and confidence on the Internet are added to TAM, and the responses to a questionnaire were analyzed to determine what

elements influenced a user's intention to use SNS. A questionnaire was carried out and verification analysis was conducted by SEM. As a result, a part of TAM could be verified and it was found that usefulness affected use intention most highly. Moreover, although concern over privacy risk was significant, it was not a strong influence on the decision to use SNS.

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