

# Why did they share the security information knowledge on SNS?

[ Su-hwan Kim, Seok Kim, Se-yoon Ma ]

*Abstract*— Since the introduction of smart phones, people are now able to connect to the Internet anytime and anywhere. With the emergence of smart phones, the quality of life has greatly improved in a positive way, but it has also caused negative effects as well. The main problems are the increase of financial crimes such as Phishing and SMishing. At present, it is hard to find studies that proves the reduction of crimes through the security related knowledge sharing at SNS(Social Network Service). The purpose of this study is to find out factors that encourages people to actively share security-related information to SNS users via the Internet.

According to the result, people with knowledge provision self-efficacy has a greater degree of self-expression. It is also found that the awareness of information security and personal social factors (self-expression and sense of belonging) have a meaningful influence on the security related knowledge sharing intention on SNS. On the contrary, it showed that people hardly show any altruistic behaviors and share security related knowledge on SNS.

This study has limitations; the research subjects were limited to SNS users. Hence, it is hard to generalize and it performed a cross section research rather than reflecting a volatile nature of security. Nevertheless, this study is meaningful as it suggests a new direction for strengthening the awareness of security for users.

*Keywords*—SNS, Information Security, Knowledge sharing, Social identity, Security awareness

## I. Introduction

With the emergence of mobile convergence era, users have been enjoying more convenient life through smartphone and smart banking. But we are still exposed to security threats like leakage of personal information [11].

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Phishing is defined as the attempt to deceive internet service users to let them deliver their secret information to a person with no authority through technical manipulation[20]. SMiShing, the compound word of 'SMS' and 'Phishing', means that personal information or financial information is phished through Simple Message Service (SMS).

The recent studies of Phishing and SMiShing have focused on Phishing detection techniques, such as the method of detecting Phishing sites through target domain identification[28] and the method of detecting Phishing sites through text and data mining [26]. But, there is few research on resolution of social issues through humanistic efforts like knowledge sharing. It is necessary to make various efforts to lessen social damage caused by Phishing and SMiShing. One of the efforts is to use the influential power of knowledge sharing through SNS.

Considering the behavior of sharing knowledge about information security as social activity in a group, this study employed Social Identity Theory, which is mainly used to analyze psychological causes of collective behavior, to investigate how personal and social identity factors (self expression and a sense of belonging) affect the intention of sharing knowledge about information security. Also, it tries to look into how knowledge provision self-efficacy and altruism of knowledge offering based on personal characteristics and awareness of information security influence the intention of sharing knowledge about information security.

The suggestions of this study are made as follows: first, it is expected that this study will serve as a role of previous research in developing the systematic framework necessary to spread security recognition through knowledge sharing; secondly, by exploring the factors that affect the sharing of knowledge about information security, it will be used as a supporting material to find the characteristics of SNS users' knowledge sharing.

## II. Theoretical Background

### A. Knowledge sharing

Individuals who consider self-expression important do more extra-role behavior to improve their image [22]. Therefore, this study chose self-expression as a critical antecedent of knowledge sharing intention.

Information security awareness means one's cognition of the importance of information security and interest in information security activity [14, 10]. Based on Cognitive-Behavior Theory and Theory of Reasoned Action, the previous study revealed that information security awareness affect information security action [1]. According to the study by Min-jeong Baek [1], as persons have more interest in security,

their information security awareness becomes higher, and develops into their intention, fostering information security action. The researcher verified the argument by conducting an empirical analysis. For the reason, this study chose information security awareness as a critical antecedent.

### B. Social Identity Theory

Social Identity Theory explains self-concept and the structure and function of a social group to which one belongs [18]. This study focused on knowledge sharing activity of groups created in SNS, and approached the antecedent from the viewpoint of social identity theory.

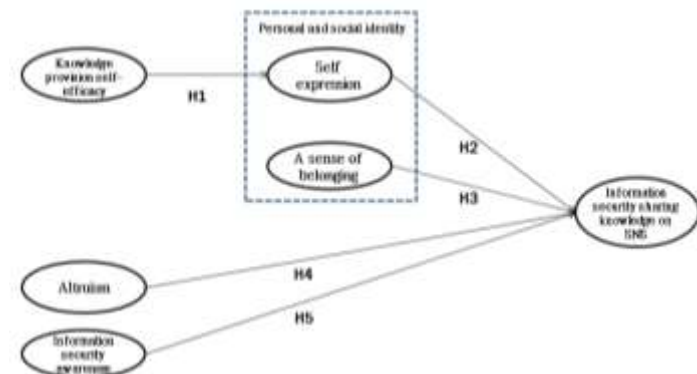
In the social identity theory, it is assumed that it is possible for human beings to satisfy the motivation for keeping or improving self-assessment through positive social identity [9, 13, 30]. Accordingly, people prefer positive self-assessment, and try to differentiate themselves from others in the positive direction [15]. At this time, the relative social status of a group which individuals belong to or identify themselves with is the main root of self-assessment [24]. Therefore, social identity is an important antecedent of raising civil action [21].

Considering the studies above, this research drew personal and social identity factors as the antecedents affecting the activity of sharing information security knowledge in SNS.

## III. Study Model and Hypothesis

### A. Study Model Setup

Based on the social identity theory, this study drew personal and social identity factors as the antecedents of the information security sharing knowledge on SNS. In addition, since this study focused on the sharing intention of information security knowledge among users, it drew altruism and information security awareness as an antecedent through the literature analysis on users' personal characteristics and set up the following study model <Figure 1>.



<Figure 1> Research framework

### B. Study Hypothesis Deduction

#### 1) The effect of the knowledge provision self-efficacy on self-expression

Knowledge provision self-efficacy is considered to be self-confidence in concrete situations that affect individuals' motivation and behavior [2, 3]. Knowledge provision self-efficacy, one of the features of self-efficacy, is defined as one's belief in personal ability to offer valuable knowledge to others [12]. As users' self-confidence becomes high, their motivation for certain behavior also becomes high, which can improve self-expression [29].

#### 2) The effect of self-expression on the information security sharing knowledge on SNS

Self-expression is the behavior of expressing one's value to others, and is the process in which a person who makes an expression exposes its identity and thereby lets others more carefully and accurately understand the person [6, 23]. Individuals who consider self-expression important do more extra-role behavior to improve their image [22]. The behavior of self-expression is the basis of the tool to find one's identity in an organization. Therefore, based on the social identity theory, this study drew self-expression as a personal identity factor [27].

#### 3) The effect of a sense of belonging on the information security sharing knowledge on SNS

A sense of belonging is defined as the feeling that one considers the issue of its on-line group to be its own one, and its on-line group members to be as friendly as its off-line friends [7]. In terms of actual behavior, a person who has a high sense of belonging shows active participation, whereas a person who has a low sense of belonging shows passive participation [16]. A strong sense of belonging encourages on-line users to join knowledge contribution behavior[4]. Accordingly, a user with a strong sense of belonging will more lively take the activity of sharing information security knowledge in SNS.

#### 4) The effect of altruism on the information security sharing knowledge on SNS

Altruism is referred to as one's discretionary behavior of willingly helping out others [25]. People feel their inner pleasure by sharing their own knowledge with others on internet communities, or helping to solve others' problems [5, 12]. Altruistic behavior is considered to be one's knowledge sharing without any expectation in the virtual environment, and members with high altruism try to voluntarily share their knowledge, information and experience with others [17].

#### 5) The effect of information security awareness on the information security sharing knowledge on SNS

Information security awareness is a user's awareness of information security, and is referred to as a information system user's interest in information security and cognition of its importance [14]. The important factor of inducing organizational members to take information security action is their cognition of information security [19]. There is a study proving that information security awareness positively affected information security action [8]. <Table 1> shows hypotheses

<Table 1> Experiment Hypotheses

	Hypotheses
H1	Knowledge provision self-efficacy (KPSE) positively influences self-expression (SE).
H2	Self-expression (SE) positively influences the information security sharing knowledge on SNS (ISSK).
H3	A sense of belonging (SB) positively influences the information security sharing knowledge on SNS (ISSK).
H4	Altruism positively influences the information security sharing knowledge on SNS (ISSK).
H5	Information security awareness (ISA) positively influences the information security sharing knowledge on SNS (ISSK).

### C. Operational Definitions of Variables

The operational definitions and measuring tools of the variables used in this study-self efficacy of knowledge offering, self expression, a sense of belonging, altruism, information security awareness, and the information security sharing knowledge on SNS-are presented in <Table 2>. Previous studies used the proved measuring tools in terms of reliability and validity. This study partially changed the measuring tools in line with its research background by developing the behavior of sharing information security knowledge into the SNS-based sharing behavior.

<Table 2> Operational Definition of Measurement Variables

Measurement Variable	Optional definition
KPSE	The extent or strength of one's belief in one's own ability to provide knowledge
SE	The expression or assertion of one's own personality
SB	The feeling of being connected and accepted within one's family and community
Altruism	When we act to promote someone else's welfare, even at a risk or cost to ourselves
ISA	The knowledge and attitude members of an organization possess regarding the protection of information
ISSK	The activities of sharing knowledge related with information security such as Phishing, SMishing, Pharming, etc.

### D. Sample Choice and Data Collection

The questionnaire survey in this research was based on Likert 7-point scale and was conducted with SNS users on internet.

Collected were a total of 262 questionnaire copies among which two copies with insincere answers were excluded, and as a result 260 questionnaire copies were analyzed.

## IV. Hypothesis Verification and Result Analysis

### A. Validity Examination of Measuring Tools

For construct validity of the measured questions, SPSS 18 was employed to conduct exploratory factor analysis. Principal Component Analysis was conducted to draw factors. As a factor rotation method, Varimax was used. Factors whose Eigen value is more than 1.0 were extracted. According to the factor analysis, factor loading was at least 0.708; cumulative variance was 80.9%; and explanation power was around 81% of the entire variance. Accordingly, the variables and measured questions suggested in this study model are considered reliable. The detailed results from exploratory factor analysis and reliability analysis are summarized in <Table 3>.

<Table 3> Exploratory factor and Reliability analysis

Variable	Measurement entity	Factor						Cronbach's alpha
		1	2	3	4	5	6	
ISSK	KS2	.918	.100	.113	.143	.166	.091	.946
	KS1	.874	.089	.137	.110	.240	.159	
	KS4	.863	.120	.227	.148	.144	.028	
	KS3	.794	.155	.296	.116	.213	.152	
SE	SX2	.139	.877	.113	.118	.014	.198	.896
	SX3	.091	.851	.182	.196	.063	.159	
	SX1	.093	.801	.158	.218	.081	.172	
	SX4	.111	.708	.200	.144	-.038	.229	
SB	MS2	.157	.191	.878	.185	.065	.179	.919
	MS3	.127	.170	.876	.170	.125	.195	
	MS1	.293	.124	.786	.280	-.016	.133	
KPSE	SE2	.096	.132	.167	.909	.061	.164	.912
	SE3	.125	.119	.175	.870	.091	.230	
	SE1	.137	.258	.250	.784	.072	.132	
ISA	SA2	.154	.057	.084	.056	.873	.072	.828
	SA1	.107	-.093	-.021	.114	.841	.000	
	SA3	.205	.104	.091	.006	.801	.195	
Altruism	AT3	.018	.098	.229	.162	.114	.794	.786
	AT1	.159	.280	.039	.122	.016	.778	
	AT2	.076	.150	.182	.204	.148	.760	
Eigen Value		7.73	2.70	1.70	1.64	1.27	1.12	
		4	6	8	5	1	6	
% of variance		38.6	13.5	8.54	8.22	6.35	5.62	
		88	30	1	6	3	8	
Cumulative %		38.6	52.1	60.7	68.9	75.3	80.9	
		68	98	39	66	19	47	

### B. Validity Analysis

In this research, the average variance extracted was at least 0.701, and construct reliability was at least 0.876. Therefore, the convergent validity of this study was in a significant level.

As shown in <Table 4>, the correlation coefficient of the sense of belonging and the knowledge provision self-efficacy was the highest 0.504, which was compared with the AVE of sense of belonging and knowledge provision self-efficacy. As the result of the comparison, the AVE of all variables was more than 0.701, which means that discrimination validity is significant.

	<b>ISA</b>	.381	.064	.314	5.91 9	.000	.927	1.07 9
	<b>Altruism</b>	.037	.089	.025	.410	.682	.678	1.47 5
	<b>SE</b>	.144	.069	.128	2.10 0	.037	.702	1.42 5
R <sup>2</sup> = .335 Modified R = .325 F = 32.107								

<Table 4> Convergent and Discriminant validity verification

	SB	ISA	Altruism	ISSK	SE	KPSE	AVE	Construct reliability
SB	1						.860	.949
ISA	.196 **	1					.742	.896
Altruism	.442 **	.253 **	1				.701	.876
ISSK	.467 **	.403 **	.316 **	1			.880	.961
SE	.442 **	.130 *	.483 **	.331 **	1		.764	.928
KPSE	.504 **	.203 **	.454 **	.356 **	.448 **	1	.850	.944

### C. Hypothesis Verification

According to the analysis, the higher the sense of belonging was, the higher the intention of sharing information protection knowledge was. The higher the security awareness tended to be, the higher the intention of sharing information protection knowledge tended to be. The higher the self-expression was, the higher the intention of sharing information protection knowledge tended to be. However, altruism had no significant causal relationship with the intention of sharing information protection knowledge. R<sup>2</sup>, representing that self-expression, a sense of belonging, and information security awareness related to the sharing of information security knowledge explain the information security sharing knowledge on SNS, was .335. The result is also presented in <Table 5>.

<Table 5> The effect on self-efficacy to self-expression and on intention to share knowledge

Dependent variable	Independent variable	Nonstandardized coefficient (β)		Standardized coefficient β	t-value	p-value	Collinearity statistics	
		B	Standard error				Allownance	VIF
<b>SE</b>	<b>KPSE</b>	.376	.047	.448	8.05 6	.000	1.00 0	1.00 0
R <sup>2</sup> = .201 Modified R = .198 F = 64.892								
<b>ISSK</b>	<b>SB</b>	.329	.058	.338	5.64 9	.000	.729	1.37 2

## V. Conclusion

### A. Study Results

The study results are presented as follows:  
 First, personal and social identity factors (self-expression and a sense of belonging) significantly affected the activity of sharing information security knowledge in SNS. It indicates that people actively do the knowledge sharing behavior of preventing security accidents from others in order to create their own identity. Secondly, knowledge provision self-efficacy significantly affected self-expression. It indicates that the higher SNS users have self-confidence in knowledge, the higher their motivation for real action, or their intention of self-expression is. The result is equal to the result from previous research. However, the result was different. One of the reasons seems to be that although a user has altruism, the person is not able to actively share information security knowledge because of its lack of knowledge and information. Given the results, the reason why SNS users share information security knowledge in SNS is not altruism, but establish their image, or have a high sense of belonging to their own SNS groups, or recognize their high interest in information security and its importance.

### B. Suggestions

This study makes the following academic suggestions:  
 First, it defined and measured the knowledge sharing activity to prevent more diversified and intelligent security crimes. Secondly, it drew the antecedents of the activity of sharing information security knowledge in SNS through literature analysis. The previous studies of information security awareness showed that information security awareness affected one's own security behavior. However, this study revealed that the activity of sharing information security knowledge in SNS is not for one's own security behavior, but for preventing security accidents from others.

### C. Limitations and Future Study Direction

Although the perception of the necessity for sharing of information security knowledge changes because of a recent rapid rise in security accidents, this study focused on cross sectional research. Therefore, from a long-term perspective, it will be necessary to study how SNS users' intention of sharing information security knowledge changes with the lapse of time.

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