

# The Effect of Personal Information Management Tool Usage, Personal Information Sensitivity, and Information Ethics Awareness on Information Security Awareness

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## Abstract

*The purpose of this study is to forward suggestions regarding the efforts needed to improve information security awareness by examining the effects of Internet usage time, personal information management tools, personal information sensitivity, and information ethics awareness on personal information security consciousness. The results of the study found that the Internet usage time and personal information management tools did not have a significant effect on information security awareness, while the personal information sensitivity and information ethics awareness had a significant impact on information security awareness.*

**Keywords:** *Internet usage time, Personal information management tool usage, Personal information sensitivity, Information ethics awareness, Information security awareness*

## 1. Introduction

In the information age and smart age, personal information protection and security has become an important issue [1][2]. The management of personal information is called Personal Information Management (PIM) [3], which is regarded as an area where individuals need to be aware of, be responsible for themselves and protect themselves. However, the fast and efficient management of personal information and data are emphasized and in demand [4], regarding personal information security as the responsibility of the individual is highly risky. Furthermore, previous studies on the level of information ethics of university students reported that the information ethics awareness of university students was low [5], and these concerns are becoming increasingly prominent. However, current studies mostly introduce PIM concepts and research directions but lack interest in the usage of PIM tools, and it is difficult to find research on the relationship between information ethics awareness and information security awareness. Therefore, this study suggests the efforts needed to improve information security awareness by exploring the effects of Internet usage time, personal information management tools, personal information sensitivity, and information ethics awareness on personal information security awareness.

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## 2. Research content and method

### 2.1. Research target

The research targets for this study were 106 students attending N University in 2016 who were enrolled in two different general education classes. The general characteristics of the research targets are presented in [Table 1]. Data collection was conducted in the first week of October 2016.

Table 1. Characteristics of research target

Major	N(%)	Year	N(%)	Gender	N(%)
Humanities	35(33.0)	1	37(34.9)	Male	60(58.6)
Engineering	35(33.0)	2	28(26.4)	Female	46(43.4)
Health Sciences	14(13.2)	3	16(15.1)	Total	106(100.0)
Creative Arts	22(20.8)	4	25(23.6)		
Total	106(100.0)	Total	106(100.0)		

### 2.2. Research tools

#### 2.2.1. Method of measuring internet usage time and personal information management tool usage

Internet usage time includes Internet access using a smartphone, and targets recorded their Internet usage of one day. The personal information management usage measurement tool developed by Yong-seok Choi (2006), which was developed to measure personal information management behavior, was used [6]. Based on the measured results, a factor analysis was performed among 9 questions. The results of the rotated component matrix and its reliability are shown in [Table 2], and the factors are renamed.

Table 2. Results and reliability of factor analysis of personal information management tool usage

Question Number	Renaming	Cronbach $\alpha$
1, 2, 3	Analog Method	.844
4, 5	Digital Method	.857
6, 7, 8, 9	Web Method	.821

#### 2.2.2. Measurement Tool for Personal Information Sensitivity

In order to measure personal information sensitivity, Whiddett (2006) developed a questionnaire to measure the sensitivity of information subject to health information privacy [7][8]. Based on the measured results, factor analysis was performed among 12 questions. The results of the rotated component matrix and its reliability are shown in Table 3, and the factors are renamed.

Table 3. Results and reliability of factor analysis of personal information sensitivity

Question Number	Renaming	Cronbach $\alpha$
1, 2, 3	Non-Personally Identifiable Information	.829
4, 5, 6, 7	Personally Identifiable Information	.849
8, 9, 10, 11, 12	Academic Information	.873
Total(12 questions)	Personal Information Sensitivity	.881

### 2.2.3. Measurement tool for information ethics awareness

The measurement tool for information ethics awareness used in this study was modified from the test developed by Jae-un Lee, Kwon Han, Young-joon Lee and Sung-shik Kim (2007), which was based on Mason's (1986) foundation of the basic principles of information ethics and ethical behavior [9][10]. Based on the measured results, a factor analysis was performed among 16 questions. The results of the rotated component matrix and its reliability are shown in [Table 4], and the factors are renamed.

Table 4. Results and reliability of the factor analysis for information ethics awareness

Question Number	Renaming	Cronbach $\alpha$
1, 2, 3, 4, 5	Concerns about infringement of intellectual property rights	.850
6, 7, 8, 9, 12, 14	Concerns about the malicious nature of web information leverage	.869
10, 11, 13	Concerns about misuse of personal secrets	.893
Total(14 questions)	Information Ethics Awareness	.891

### 2.2.4. Measurement tool for information security

The measurement tool for information security awareness utilized was Rak-In Choi's (2012) information security awareness checklist [11][12]. Based on the measured results, a factor analysis was performed on 13 questions. The results of the rotated component matrix and its reliability are shown in [Table 5], and the factors are renamed.

Table 5. Results and reliability of the factor analysis for information security awareness

Question Number	Renaming	Cronbach $\alpha$
1, 2	Security related to user authentication	.840
3, 4, 5, 6	Compliance with device security policy	.870
7, 8, 9	Threat Management	.881
10, 11, 12, 13	Supplementing other media	.869
Total (13 questions)	Information security awareness	.941

## 2.3. Method of analysis

Internet usage time is a ratio measure, and personal information management tools, personal information sensitivity, information ethics awareness, and information security awareness are interval measures. A multiple regression analysis was used to determine the effect of independent variables such as Internet usage time, personal information management tool usage, personal information sensitivity, and information ethics awareness on information security awareness. The analysis was processed using SPSS 23.0 for Windows.

## 3. Analysis results

### 3.1. The effect of internet usage time and personal information management tool usage on information security awareness

[Table 6] shows the average and standard deviation of Internet usage time, personal information management tool usage, and information security awareness. The results of examining the correlation between the independent variables of Internet usage time and

personal information management tool usage, analog method showed  $-.030(p=.378)$ , the digital method showed  $.122(p=.016)$ , and the web method showed  $-.037(p=.355)$ , indicating there is no correlation and no issues in multicollinearity.

Table 6. Average and standard deviation of internet usage time and personal information management tool usage

Category		N	M	SD
Internet Usage Time		106	5.24	3.29
Personal Information Management Tool Usage	Analog Method	106	7.94	3.39
	Digital Device Method	106	8.87	1.47
	Web Method	106	11.98	3.92
Information Security Awareness		106	46.05	8.99

A regression analysis was conducted to verify the effects of Internet usage time and personal information management tool usage on information security awareness. First, the coefficient of determination ( $R^2$ ), which is one of the measures to determine how well the estimated regression line fits the observations from the sample data, is  $.017$ . In other words, the regression analysis shows that  $1.7\%$  of the variance of information security awareness is explained by independent variables such as internet usage time and the use of personal information management tools. However, the F value of the regression model of internet usage time and personal information management tool usage was  $1.444$  ( $p = .225$ ), which was found to be statistically insignificant.

### 3.2. The effect of personal information sensitivity and information ethics awareness of information security awareness

Table 7 shows the average and standard deviation of personal information sensitivity, information ethics awareness, and information security awareness. The correlation between personal information sensitivity, which is an independent variable, and the information ethics awareness was found to not have a correlation with  $.104$  ( $p = .058$ ).

Table 7. Average and standard deviation of sensitivity of personal information, information ethics awareness and information security awareness

Category	N	M	SD
Personal Information Sensitivity	106	42.81	8.10
Information Ethics Awareness	106	55.52	9.51
Information Security Awareness	106	46.05	8.99

A regression analysis was conducted to examine the effects of personal information sensitivity and information ethics awareness on information security awareness [Table 8]. First, the coefficient of determination ( $R^2$ ), which is one of the measures of how well the estimated regression line fits the observed value from the sample data, is  $.131$ . In other words, the regression analysis reveals that  $13.1\%$  of the variance of information security awareness, which is a dependent variable, is explained by the personal information sensitivity and information ethics awareness. The F value of the

regression model of personal information sensitivity and information ethics was 8.904 (p = .000) and judged to be statistically significant.

Table 8. Regression analysis results of personal information sensitivity, information ethics awareness, and information security awareness

Category	β Value	Standardized β value	F	Multicollinearity Statistic	
				Tolerance	VIF
Constant	21.476		3.622***		
Personal Information Sensitivity	.297	.268	2.884**	.958	1.043
Information Ethics Awareness	.213	.226	2.428*	.958	1.043
* p<.05 ** p<.01 *** p<.001					

As a result of this analysis, the multiple regression equation is expressed by the standardized β coefficient (standardized β value) as follows.

$$Y \text{ (Information Security Awareness)} = 21.476 + .268 X_1 \text{ (Personal Information Sensitivity)} + .226 X_2 \text{ (Information Ethics Awareness)}$$

Personal information sensitivity and information ethics awareness are significant when they are included with other variables in the regression equation. Also, since the sign is positive (+), it was found that the higher the personal information sensitivity and the information ethics awareness, the higher the personal information security awareness. If the other variable values are the same, personal information security awareness increases by .268 as personal information sensitivity increases by 1, and information security awareness increases by .226 as the information ethics awareness increases by 1.

#### 4. Conclusions

The objective of this study is to forward suggestions regarding the efforts needed to improve information security awareness by examining the effects of Internet usage time, personal information management tools, personal information sensitivity, and information ethics awareness on personal information security consciousness. The results of the study show Internet usage time and personal information management tools did not have a significant effect on information security awareness, while personal information sensitivity and information ethics awareness had a significant impact on information security awareness. As personal information sensitivity increased by 1, personal information security awareness increased by .268, and as information ethics awareness increased by 1, personal information security awareness increased by .226. In conclusion, we suggest it is necessary to provide an education program that enhances the attitude of responding sensitively to the exposure of personal information and strengthens the information ethics awareness in order to improve the information security awareness of university students in the future.

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