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Recommended Citation

Lin, Yan-Ye; Hsu, Hui-Mei; and Hsu, Shih-Chieh, "A study of the Effects of Information Security Advocacy" (2019). *PACIS 2019 Proceedings*. 58.

<https://aisel.aisnet.org/pacis2019/58>

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A STUDY OF THE EFFECTS OF INFORMATION SECURITY ADVOCACY

Research-in-Progress

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Abstract

This study adopted protection motivation theory, construal-level theory, and regulatory focus theory to build a model to understand the effects of information security advocacy. The purposes are as follows: first, understand the impacts on the threat/coping appraisals that different construal-level of security warning messages have. Second, understand the impacts on the information security compliance intention that threat/coping appraisals have. Lastly, understand the moderating effects of different regulatory foci on the relationship between different construal-level of warning messages and the threat/coping appraisals or between the threat/coping appraisals and the compliance intention. In this study, the experimental method and survey are employed. Eight different scenarios related to mobile phone authority setting are designed to proceed with the experiments. At the beginning of this experiment, the participants will be manipulated to a particular regulatory focus (prevention or promotion), then be assigned to one of eight scenarios randomly.

Keywords: Information security advocacy; Protection motivation theory; Construal-level theory; Regulatory focus theory

Introduction

Human life becomes more and more convenient because apps for a smartphone are developed continually, thus people depend on smartphones. However, the security issues of smartphones are noticed and warned by anti-virus software company, especially malware for apps (Clay 2015; Snell 2016). Although Google reported there were less than 0.5% android devices which had in-installed potentially harmful app (PHA), and less than 0.15% if they downloaded apps only from Google play (Trend Micro 2016). According to the report of McAfee in Q3 2015, the malware grew 72% amounts and became far more complicated (Snell 2016). Personal data that stored in the smartphone might be stolen because of poor authority setting causing privilege-access issues (Jain and Shanbhag 2012) or social engineering if one does not keep in mind on this matter then personal information might leaks (Enck et al. 2009).

Previous studies in the information security field focus on the hardware and the software mostly, however, the researcher discovered that human behavior is also playing an important role recently. Protection motivation theory (PMT) (Rogers 1975; Rogers 1983), which explains the process of compliance intention that will be influenced by threat appraisal and coping appraisal, was a major theory to study information security issues (Boss et al. 2015). In the previous research, the researchers concluded that high-level of threat appraisal and coping appraisal would promote the intention of compliance (Rippetoe and Rogers 1987).

Some researches pointed out the variables in threat appraisal are the main factors to affect protection motivation behavior (Burns et al. 2017; Siponen et al. 2006). However, other researches had different results that the key factors affected protection motivation behavior were in coping appraisal (Hanus and Wu 2016; Herath and Rao 2009; Tsai et al. 2016). In addition, a research showed that coping appraisal had a greater impact than threat appraisal on compliance intention of information systems security policy (Ifinedo 2012). Therefore, the inconsistent results may indicate that there are existing moderating effects.

Despite researchers understand that coping appraisal and threat appraisal are important factors for compliance intention, however, the design of information security advocacy contents and its effects are unclear. Thus the purpose of this study is to clarify the process of information security advocacy impacts on people.

Regulatory focus theory (RFT) is a theory that explains the way that people go about to achieve their goal. In this theory, people's characteristics have two types, which are promotion individual and prevention individual. A promotion aspect focuses on accomplishment, growth, and advancement. A prevention aspect focuses on responsibility, safety, and afraid to loss (Crowe and Higgins 1997). Under these two different regulatory foci, we can examine that whether different personalities truly influence the appraisal processes toward the compliance intention.

Except for the factor of people's characteristics, the presentation of information security advocacy message is another important factor we consider. The construal-level theory (CLT) has expounded the relation between psychological distance and the range of people's thought is concrete or abstract (Trope and Liberman 2010; Trope et al. 2007). While the message of information security advocacy is presented in different construal-level, human will have different reactions to the compliance intention.

Therefore, through integrating PMT, RFT, and CLT, we would like to understand the effects on the information security compliance intention under the different situations constructed by different construal-level messages with different regulatory foci. The research purposes are listed as follows:

1. Understand the impacts on the threat and coping appraisals that different construal-level of security warning message have.
2. Understand the impacts on the information security compliance intention that threat and coping appraisals have.
3. Understand the moderating effects of different regulatory foci on the relationship between different construal-level of warning messages and the threat/coping appraisals or between the threat/coping appraisals and the compliance intention.

Literature Review

Protection Motivation Theory

Protection motivation theory (PMT) was originally created by Rogers (Rogers 1975). This theory evaluates the compliance behavior when an individual encounters a threatening event (e.g., smoking is linked to cancer)(Rippetoe and Rogers 1987). PMT is based on two appraisals. The process of threat appraisal consists of severity, vulnerability, and rewards in a situation. The severity refers to the degree of harm from the unfavorable behavior. The vulnerability is the probability that one will experience harm. The rewards refer to the positive aspects of starting or continuing the unhealthy behavior. The threat appraisal is different from the assessment of stress or impacts of the event. The

concept of the threat appraisal has been applied in the researches of health fields widely, such like the anti-smoking research (Pechmann et al. 2003) and the research of AIDS prevention (Van der Velde and Van der Pligt 1991). The process of coping appraisal consists of response efficacy, self-efficacy, and response cost. The response efficacy refers to the effectiveness of the recommendation to prevent or remove the possible harm. The self-efficacy refers to the belief that one can follow the recommendation successfully. The response cost refers to the cost of doing the recommended behavior.

Nowadays, protection motivation theory is not only applied in health fields but also adopted in IS field. Researchers in IS field employ protection motivation theory on the issues of information security policy compliance, they point out that employees refuse to comply the information security is a crucial issue for organizations (Vance et al. 2012). Additionally, employees are considered the vulnerabilities of information security. Thus, to understand the compliance behaviors of employees is important (Bulgurcu et al. 2010). Past studies displayed that the coping appraisal has impacts on the attitude of following the policy significantly, and with more detail content can enhance self-efficacy, which means it can increase policy compliance intention (Herath and Rao 2009). Recent studies show that security awareness influences on the threat appraisal and the respond cost. In addition, the coping appraisal impacts people to abide by the recommendations of security behaviors (Hanus and Wu 2016).

In conclusion, previous studies showed that factors in both threat and coping appraisals could influence individual compliance behavior toward information security, but the questions that the inconsistent results of both appraisals' impacts on compliance intention and whether there are moderators to affect the process are unsolved. Therefore, this study integrates construal level theory and regulatory focus theory to explore what factors and moderators affect protection motivation process.

Construal-level Theory

Construal level theory is a theory that origins from social psychology, it describes the relationship between psychological distance and how people thinking the event is abstract or concrete (Trope and Liberman 2010). In general, when the events are more distant or ambiguous, then more abstract they are. In contrast, the events are more detail and clear, then more concrete they are. When people's thoughts are in abstract states, it is high-level construal. In this level, people will not focus on details but on the bigger picture. For example, individuals are more likely to have a good negotiation when the task will start in a distant future and both of them will be satisfied the picture they imaged (Henderson et al. 2006). On the other hand, when people's thoughts are in concrete states, it is low-level construal. In this level, individuals focus on details and the feasibility. For instance, the employees will not put the desires at the initial proposal until it could be introduced in the near feature (Eyal et al. 2004).

Some researches pointed out that participants can enhance the capacity of self-control in a low-level construal rather than a high-level construal, which means people can better resist the negative attitude toward aspirations and temptations in a low-level construal (Fujita and Han 2009). In addition, a construal level also affects the strategies that individual introduced themselves to others. The strategies can be divided into two types: indirect and direct. In general, when individuals apply direct concrete strategies, they emphasize their achievements. They might highlight their accomplishments. In contrast, when individuals utilize indirect abstract strategies, they often emphasize their connections with somebodies or something (Cialdini and Richardson 1980). Hansen and Wanke's study shows that the message with same content was considered to be true when it was written in concrete statements than abstract statements (Hansen and Wänke 2010).

Regulatory Focus Theory

Regulatory Focus theory explains how people pursue a goal or avoid a negative outcome. This theory introduces two regulatory foci, those are promotion focus and prevention focus (Higgins 1998). Both of them will influence people's feelings, thoughts, and motivations to the goals. In promotion focus,

an individual will concern about advancement, growths, and achievements. On the other hand, in prevention focus, an individual will concern about safety, security, and responsibility (Crowe and Higgins 1997). For example, people in the promotion focus, they will tend to be creative, trust their intuition and focus on the gains instead of losses. In contrast, people in the prevention focus, they will tend to be conservative, sensitive to distractions and afraid to lose.

The study of Förster and Higgins confirmed that individuals in promotion focus put their attentions on a big picture and abstract concepts; and individuals in prevention focus put their attentions on a small area and concrete details. This experiment of the study showed that a person who is manipulated to tend to promotion focus will detect the large letter straight; on the contrary, a person who is manipulated to tend to prevention focus will detect the smaller letter straight (Förster et al. 2005).

Lee's study indicates that prevention focus individuals prefer to receive concrete information (low-level construal) than abstract information (high-level construal); in contrast, promotion focus individuals prefer to receive abstract information (high-level construal) than concrete information (low-level construal)(Lee et al. 2010). Therefore, according to this point of view, we argue that the concrete messages have more influence on prevention focus individuals than promotion focus individuals; on the contrary, abstract messages are proper for promotion focus individuals. In addition, prevention focus individuals concern about safety, security, and responsibility promotion, on the other hand, promotion focus individuals pay attention to the advancement, growths, and achievements (Crowe and Higgins 1997; Higgins 1998). Hence, we argue that prevention focus individuals will concern about the threat appraisal, and promotion focus individuals care about the coping appraisal.

Research Method

Research Model and Hypotheses

In this study, we integrated three theories (protection motivation theory, construal level theory, and regulatory focus theory) to clarify what factors will affect the effect of information security advocacy. Basing on the construal level theory, the messages information security advocacy are designed as high /low (abstract/concrete) level construal messages. If the message is in low-level construal, the threat and the response description message will be more detailed and complex. In contrast, when the message is in high-level construal, the threat and the response description message will be more ambiguous and less complex.

Additionally, the regulatory focus theory has claimed that personality can be distinguished into two types: the promotion individual and the prevention individual. We use regulatory foci as a moderator. According to the regulatory focus theory, a prevention individual will incline to the avoidance, thus we assume that the high-level construal of threat message will lead them to the threat appraisal. On the other hand, a promotion individual will be incline to the accomplishments, therefore we assume that the low-level construal of threat response message will lead them to the coping appraisal. When one kind of level construal message fits a person with a proper regulatory focus, it will lead people to make a threat appraisal or a coping appraisal. Both appraisals have impacts on the compliance intention. The research framework is displayed in figure 1.

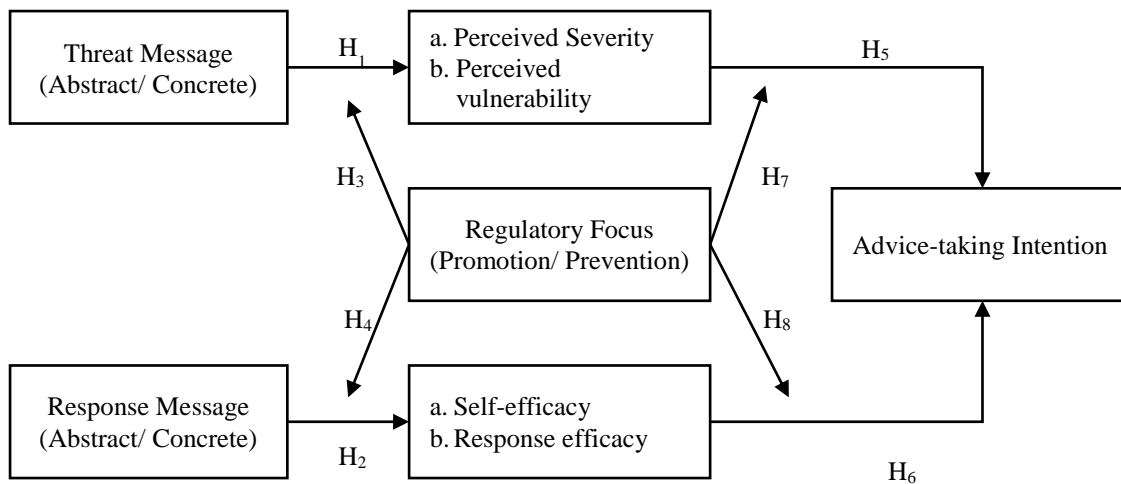


Figure 1. Research framework

According to our research framework, eight hypotheses are proposed as follows:

- H1: Concrete (low-level construal) threat message has a greater impact on the perceived severity and vulnerability in threat appraisal than abstract (high-level construal) threat message.
- H2: Abstract (high-level construal) response message has a greater impact on the response efficacy and self-efficacy in coping appraisal than concrete (low-level construal) response message.
- H3: The fit for the construal-level of threat message and an individual regulatory focus has a greater impact on the perceived severity and vulnerability than non-fit.
- H4: The fit for the construal-level of response message and an individual regulatory focus has a greater impact on the response efficacy and self-efficacy than non-fit.
- H5: The perceived severity and vulnerability have positive impacts on the compliance intention.
- H6: The response efficacy and self-efficacy have positive impacts on the compliance intention.
- H7: A prevention individual has stronger impacts on the relationship between the perceived severity/ vulnerability and the compliance intention than a promotion individual.
- H8: A promotion individual has stronger impacts on the relationship between the response efficacy/ self-efficacy and the compliance intention than a prevention individual.

Research Method & Data Collection

In this study, we used the experimental method and survey. According to our research model and the literature review, we proposed eight different scenarios (high/low construal-level x prevention/promotion regulatory focus x threat/response message, 2x2x2) to proceed the experiments. At the beginning of this experiment, the participants will be manipulated to a particular regulatory focus (prevention or promotion), then be assigned to one of eight scenarios randomly. After reading the messages in the scenario, participants will fill in a questionnaire. We plan to invite 400 college students to participate in our study.

Measurements

The measurements of five variables in this study are referred to previous research. The measurement items of perceived severity, perceived vulnerability, response efficacy, and self-efficacy are revised from the study of Johnston and Warkentin (Johnston and Warkentin 2010), and there are 3 items in each variable. The measurements of compliance intention are revised from Ifinedo's research (Ifinedo

2012), and there are 4 measurement items. The measure of each item will employ seven point Likert scale and anchored from “1” (strongly disagree) to “7” (strongly agree).

Data Analysis

SPSS 24 and SmartPLS 3 are applied to analyze data in this study. SPSS is used for calculating the descriptive statistics, and SmartPLS is used for validation of measurement model and path model.

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