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Creating an information systems security culture through an integrated model of employees compliance

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CREATING AN INFORMATION SYSTEMS SECURITY CULTURE THROUGH AN
INTEGRATED MODEL OF EMPLOYEES COMPLIANCE

A Dissertation

by

MOHAMMAD I. MERHI

Submitted to the Graduate School of
The University of Texas-Pan American
In partial fulfillment of the requirements for the degree of

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INTEGRATED MODEL OF EMPLOYEES COMPLIANCE

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ABSTRACT

Merhi, Mohammad I., Creating an Information Systems Security Culture through an Integrated Model of Employees Compliance. Doctor of Philosophy (PhD), May, 2014, 263 pp., 32 tables, 21 figures, 341 references, 108 titles.

Employees' non-compliance with information systems security policies has been identified as a major threat to organizational data and information systems. This dissertation investigates the process underlying information systems security compliance in organizations with the focus on employees. The process model is complex, comprising many normative, attitudinal, psychological, environmental, and organizational factors. Therefore, the study of information security compliance requires a holistic assessment of all these factors. This dissertation seeks to achieve this objective by offering a comprehensive and integrated model of employee behavior especially focused towards information security compliance. The research framework is influenced by the Reciprocal Determinism Theory which explains individuals psycho-social functioning in terms of triadic reciprocal causation. Several theories explain the role of various factors forming the intellectual puzzle. These are: General Deterrence Theory, Social-Exchange Theory, Social Learning Theory, Expectation-Disconfirmation Theory, Rational Choice Theory, Cognitive Dissonance Theory, Reactance Theory, and Status-Quo Bias Theory. This dissertation makes several significant contributions to literature and to practitioners. Several new factors that influence compliance decisions by employees have been

proposed, namely task dissonance, self-policing, word-of-mouth, and habit. For the first time, top management support has been examined as a multi-dimensional construct which provides a better understanding of the phenomenon. Also for the first time, this dissertation constructs a process model to examine the interactions between punishment severity and certainty and top management support and normative factors. It also investigates the interactions between normative and psychological factors, namely resistance and self-policing on information security compliance. This dissertation emphasizes that the practitioners should consider all the relevant factors in order to manage the information security compliance problem. Therefore, it is more useful to think in terms of establishing a security culture that embodies all the relevant factors prevalent in an organization. The dissertation is guided by positivist paradigm. Hypotheses are tested and validated using established quantitative approaches, namely data collection using survey and structural equation modeling. Major findings were derived and most of the dissertation's hypotheses were supported. The findings are discussed, and the conclusions, significant theoretical and practical implications of the findings, limitations, and recommendations for future research are presented.

DEDICATION

This dissertation is lovingly dedicated to my father, mother, brother, wife, and children. Their support, encouragement, and constant love have sustained me throughout my life. To my father, the dream has come true.

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Foremost, I would like to express my utmost gratitude to Almighty Allah, the Most Beneficent, the Most Merciful, for all the blessings he has bestowed upon me.

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LIST OF ACRONYMS

AITP	Association of Information Technology Professionals
CDT	Cognitive Dissonance Theory
DoI	Diffusion of Innovation
EDT	Expectation-Disconfirmation Theory
GDT	General Deterrence Theory
IS	Information Systems
ISS	Information Systems Security
IT	Information Technology (ies)
PBC	Perceived Behavioral Control
PMT	Protection Motivation Theory
RCT	Rational Choice Theory
RDT	Reciprocal Determinism Theory
SEM	Structural Equation Modeling
SET	Social Exchange Theory
SLT	Social Learning Theory
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
CFA	Confirmatory Factor Analysis
GoF	Goodness-of-Fit
RMSEA	Root Mean Square Error of Approximation
NFI	Normed Fit Index
CFI	Comparative Fit Index
RFI	Relative Fit Index
IFI	Incremental Fit Index

CHAPTER I

INTRODUCTION

This chapter presents the relevance of the research topic, introduces and defines the research problem and sets up the research questions.

1.1 Relevance of Information Systems Security

The topic of Information Systems Security (ISS) continues to interest scholars and practitioners because organizations and individuals are becoming increasingly dependent on Information Systems (IS). This dependence greatly increases the risks of compromise of these systems (Thomson et al., 2006; Warkentin et al., 2011). Significant amount of evidence show that organizations all around the world are experiencing a wide range of incidents involving data loss or theft, computer intrusions, and privacy breaches (Ernst and Young, 2011; GAO, 2012; O'Dell, 2012; PonemonInstitute, 2009; PWC, 2012a; Richardson, 2010). These incidents can put sensitive information at risk incurring significant tangible and intangible costs for the affected organizations in terms of resources, management attention, and company reputation (PWC, 2012b; McNickle, 2012). Appendix-A summarizes few of these studies.

Securing data and information about external entities like customers, suppliers and about competitive value enabling processes is critical for organizations (Dillon and Lending, 2010). In a knowledge based economy, information is the most valuable asset for most organizations because information about an organization's products, services, and stakeholders enables its

competitive advantage (Iyengar, 2004). Organizations need to protect such information from falling into the hands of others especially the competitors. Thus, it is essential for organizations to protect their critical data and information from theft or loss and to ensure that only authorized personnel can access such information.

The topic of information assurance deals with securing information sources within businesses and is defined as the “reliability, accuracy, security and availability of a company’s information assets. This will typically define how these assets – data and/or information both within the tangible and the virtual bounds of the organization – should be secured to provide maximum benefit” (Ezingard et al., 2007, p.98). Failure to implement sound information assurance practices to protect data sources can put a firm’s sensitive and confidential information assets at risk.

The ISS problems can be broadly classified as technical and non-technical. Technical problems can be attributed to deficiencies in hardware, software, communication and other IT infrastructure technologies. Malfunctions in these devices increase the possibilities of malwares infringing vulnerable systems resulting in data leakage. These problems can be addressed by adopting suitable technological solutions. Examples include anti-virus software, firewalls, encryption, and disabling access to critical networks.

The non-technical problems are those that are attributed to organizational and environmental factors. In organizations, employees are considered as the most important assets because it is they who input, process, and make sense of the output of any IS. It is employees who must interact with IS. The problems arise when their undesired actions such as the misuse of the internet, e-mail, and data storage devices put critical information assets at risk by exposing organizational data to unauthorized “outsiders.” In order to address this problem, organizations

develop and implement ISS policies that explain how employees should interact with the IS (Baskerville and Siponen, 2002; Dlamini et al., 2009).

Several recent studies show that the incidents and violations of ISS policies are on the increase and that employees' behaviors are the main cause for these violations (Appendix-A). Eighty two percent of the sampled organizations in a recent study reported having experienced breaches caused by employees (PWC, 2012b). Ponemon Institute (2009) found that 78 percent of the organizations that participated in their study experienced data breaches as a result of negligent or malicious employees or other insiders. In the South Carolina Department of Health and Human Services, an employee caused a breach of approximately 22,600 Medicaid ID numbers, which were linked to their Social Security numbers, because he did not comply with the ISS policies and had emailed data of 228,000 people to his private account that was later hacked (McNickle, 2012). In another incident, due to a weak password set by an employee in violation of the ISS policy, personal information of approximately 780,000 Medicaid patients and recipients of the Children Health Insurance Plan was stolen after a hacker from Eastern Europe accessed the Utah Department of Technology Service's server (McNickle, 2012).

Ponemon Institute (2009) lists ten risky practices by employees that can cause ISS breaches (reproduced verbatim below):

- i. Connecting computers to the Internet through an insecure wireless network
- ii. Not deleting information on their computer when no longer necessary
- iii. Sharing passwords with others
- iv. Reusing the same password and username on different websites
- v. Using generic USB drives not encrypted or safeguarded by other means
- vi. Leaving computers unattended when outside the workplace

- vii. Losing a USB drive possibly containing confidential data and not immediately notifying their organization
- viii. Working on a laptop when traveling and not using a privacy screen
- ix. Carrying unnecessary sensitive information on a laptop when traveling
- x. Using personally owned mobile devices that connect to their organization's network

The foregoing discussion leads to the proposition that even though ISS events are caused by a variety of reasons, employees remain a salient cause of most accidents. Given these incidents and statistics, a thorough understanding of the behavioral factors that affect employees' compliance of ISS is necessary. In order to fully understand the causes underlying employee behaviors in the ISS domain, multiple factors including organizational, attitudinal, environmental, and psychological must be examined. Many studies have identified employees as a significant research topic within the field of ISS compliance (e.g. Bulgurcu et al., 2010; D'Arcy and Hovav, 2009; Stanton et al., 2005; Straub and Welke, 1998) (See Table 1.1). Many scholars have studied the problem of ISS compliance from different narrow perspectives (e.g. Hu et al., 2012; Myyry et al., 2009; Siponen et al., 2010; Vance et al., 2012). However, a comprehensive integrated examination of employee behavior is necessary to gain a better understanding of how multiple factors interact and influence each other. This dissertation fulfills this dissertation objective.

Table 1.1 The Effects of Employees' Behaviors on ISS from Selected Studies

Study	Arguments
Bulgurcu et al. (2010)	Insiders may pose a challenge to an organization because their ignorance, mistakes, and deliberate acts can jeopardize information security.
D'Arcy and Hovav (2009)	Define insider as a person that has legitimately been given the capability of accessing one or many components of the IT infrastructure. Between one-half and three-quarters of all security incidents originate from within the organization.
Stanton et al. (2005)	Organizational constraint that impacts the effectiveness of the technologies lies in the behaviors of the employees who access, use, administer, and maintain information resources.
Straub and Welke (1998)	Bad actors who exploit vulnerabilities in systems occur among disgruntled employees and ex-employees and the persistence of this threat is testimony to the need for ongoing vigilance.

Bandura (1986)'s triadic model serves as the philosophical underpinning to this dissertation. Section 1.2 explains this model.

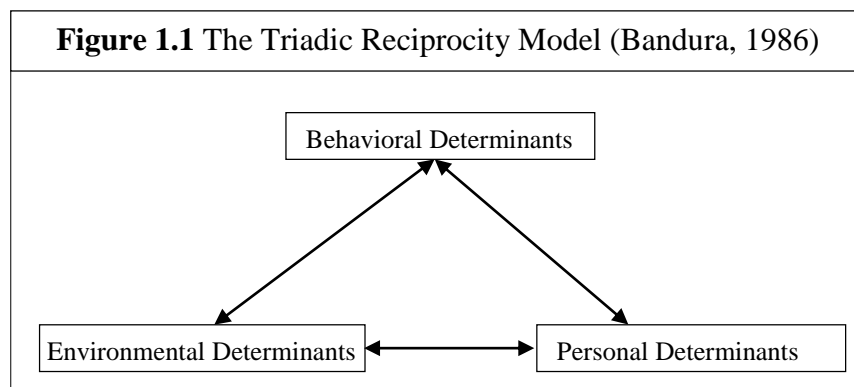
1.2 Ontological Framework

I aim to explore and understand the reasons that cause employees to not comply with ISS policies. Based on the foregoing discussion, I argue that a study of employees' ISS compliance behavior can be structured in normative, attitudinal, psychological, environmental, and organizational activities factors. I study and investigate the relationship between these factors to provide deeper insight into the phenomenon of employees' ISS compliance.

Employees' behaviors are influenced by the interaction between environment and self-determination (Cooper, 2000). In a magazine article, O'Dell (2012) stated that creating a security culture in an organization could minimize the ISS incidents resulted from employees' behaviors. I conducted an interview with the CIO at UTPA to find out the challenges faced by him in securing a large organization such as university. According to him establishing a security culture was the single most important goal. However, current literature is devoid of a comprehensive model that shows how an ISS culture could be created taking into account all relevant factors. I

argue that in order to improve ISS compliance, organizations should strive towards establishing an ISS culture. I suggest that a security culture is a result of the interactions among normative, attitudinal, psychological, environmental, and organizational activities factors. Similar to organizational culture, security culture is expressed in the collective values, norms and knowledge of organizational policies/ rules which affect the way employees interact with each other in the organizations, with the systems, and with management. In other words, security culture can be explained as the system of knowledge, norms, beliefs and customs that regulate employees' behaviors in organizations. Drawing from the foregoing discussion, I define security culture as the set of beliefs, norms, attitudes, as well as psychological, environmental, and organizational practices that aim to minimize unintended exposure of organizations' information and core knowledge to external entities.

The inquiry of this dissertation is influenced and informed by the Reciprocal Determinism Theory (Bandura, 1986) which explains individual's psycho-social functioning in terms of triadic reciprocal causation. Figure 1.1 shows this triadic reciprocal model.



Bandura (1986) states that individuals operate based on the interaction between their personal (internal psychological and attitudinal beliefs factors), behavioral, and environmental (situational) factors that function as determinants of each other. The reciprocal causation

between these factors provides individuals with opportunities to exercise some control over their behaviors (e.g. ISS compliance in this dissertation) (Bandura, 1986). According to this model, behavior, attitudes, and beliefs of others can change an individual's behavior because this person might potentially learn from others (e.g. employees, colleagues, family member) around him/her (Cialdini et al., 1991). Based on feedback derived from the environment, the individual can refine the learned behaviors through self-corrective judgments (Bandura, 1986). Thus, individuals self-regulate their own behavior as long as they rely on cognitive supports and manage relevant environmental cues and consequences (Bandura, 1991). I illustrate the triadic factors by taking an example. Consider a scenario where employees are working without having support from their management. With time these employees will no more care much about the policies and technologies that the organization may be implementing because of the lack of motivation and encouragement from top management. However, if these employees always feel the support of the management by providing financial resources, participating and involving in the initiation of new projects, and encouraging those who succeed in the project (situational factors), it is most likely that these employee will care more about the organization. In such cases, if ISS policies are implemented, these employees will most likely follow (behavior) them even though it is new for them and might change their way of doing things (psychological) because they (1) know that top management is serious about the initiative of this project (situation), (2) are sure that non-compliance might lead to some sort of organizational penalty (situation), and (3) already acquired the self-confidence that enable them (personal) to deal with ISS. By acquiring the self-confidence (personal), these employees can also help others around them such as colleagues, friends, family members (environment) by giving advises on what and how to deal with ISS to bypass any ISS incident. Taking advises, listening to the warnings of

others, and complying with organizational policies can positively influence employees' compliance with ISS.

I now explain the organizational, environmental, attitudinal, normative, and psychological factors.

1.3 Factors Affecting Employees' ISS Compliance

1.3.1 Organizational Factors

Practices such as organizational punishment/penalty and top management support are frequently employed by managers to influence employees' actions and to achieve business goals. I will describe this by taking an example that explains the importance of organizational factors in ISS compliance. Consider a scenario where employees who work in an organization where ISS policies are implemented but top management does not show much enthusiasm for this implementation. In such a scenario, employees will most likely do not comply with ISS policies because (1) there is no reward or punishment, and (2) unenthusiastic support by top management would give an impression that the implementation was being done only for perfunctory reasons. In such cases, employees who are not complying with ISS are not probably penalized because security is not an important issue for top management. Puhakainen and Siponen (2010) found that the CEO's passiveness in supporting the established ISS policies was one of the main reasons why employees ignored the ISS policy. Thus, organizational practices namely "top management support", and "organizational punishment" are expected to play a role in increasing employees' compliance with ISS policies.

I argue that organizational punishment and top management support are situational factors. These factors may influence employees' attitudes and behaviors toward ISS because they

are likely to recognize that the organization is serious about ISS (Tansik and Driskill, 1977). They may also believe that any deviant behavior will lead to punishment. In a magazine article, Campbell (2012) argues that in order to develop a successful security culture, organizations need to ensure that top management supports this development and acts appropriately because culture change in organizations usually comes from the top.

1.3.2 Environmental Factors

People interact with environment and share their experiences with other social members including their family members, friends, relatives, colleagues, etc. This phenomenon has been examined in literature and has been labeled word of mouth according to which individuals get influenced by listening to such experiences (Bone, 1995; Carl, 2006). Consider a scenario where an individual experienced a security breach because of violating ISS policies such as sharing his/her password with others. People tend to tell others about such incidents and its effect on the individual and/or the organization. Knowing the consequences of such behavior will most likely affect those employees who practice the same behavior that is sharing their passwords. Nguyen et al. (2011) found that bad news have a significant impact on individuals' behavior because they feel bad about the consequences thus they attempt to change their current behavior. Based on the foregoing, I posit that "environmental factors" are significant elements that may influence employee behavior toward ISS compliance.

Oral interactions, known as word of mouth, has received significant attention in the marketing discipline (Buttle, 1998). It has been found to have a strong influence on individual's beliefs about a product or service and buying behaviors because of the persuasive role it plays in influencing individual's attitudes and decisions (Bone, 1995). Mangold et al. (1999) argue that one dissatisfied individual can be expected to tell many other individuals about their experiences

that could change the behaviors of these people. Word of mouth is a pure environmental factor and it has not been studied so far in the context of ISS as a determinant of employees' ISS compliance. The main idea behind this factor is that the environment around the employees impacts them (Schneider et al., 1996). For instance, an employee's behavior towards ISS may be significantly affected if a friend or a family member shares a personal experience of an ISS incident. The altered behavior may manifest in different ways, for example, not accessing critical information from public computers, setting strong passwords, changing passwords frequently, or ensuring encryption on emails/WiFi connections.

1.3.3 Normative Factors

An employee's ISS compliance behavior may be influenced by typical patterns of behavior. These standards of behavior patterns are classified as injunctive, descriptive, moral, and perceived behavioral control (Ajzen, 2006; Cialdini, 2007; Larimer and Neighbors, 2003). These normative factors are briefly summarized in this section.

The injunctive norms tap into others' expectations of how people should behave (Cialdini et al., 1991). People act based on their perception of whether others approve of their actions. For example, an employee contemplating copying critical data to an unauthorized device may hesitate because of a perception that the important people may not approve this behavior.

The descriptive norms refer to people's perception of what others are doing and that they must be right (Cialdini et al., 1991). For instance, if employees find that others around them always lock their desktops when they are not in their office, they may believe that this is the right thing.

The moral norms refer to the standards of correctness or incorrectness impacting people's behavior (Ajzen, 1991). If we consider the earlier example, employees may justify not

complying with a company's policy of locking computers by suggesting that their offices are secured. Therefore, they do not recognize this non-compliant action as a mistake. In contrast, some others may lock their desktops under all conditions because they should comply with ISS policies because they have been correctly designed.

People's perceptions of ease or difficulty of performing a task is a function of the level of controls they may have over the pertinent situations (Ajzen, 1988). Consider a scenario where employees have multiple electronic accounts that require passwords. These employees feel that memorizing the different passwords is a burden for them; thus, they use a common password for these accounts. If the new ISS policy requires these employees to regularly change their passwords using a specific format, these employees will most likely find it to be a difficult task because they compare the complexity of a new task against a frame of reference which had much lower complexity.

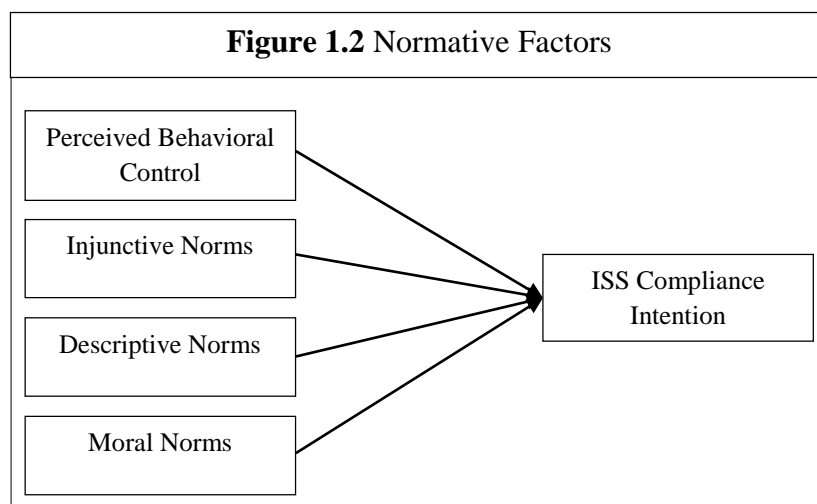
Foregoing discussion leads me to posit that "injunctive norms", "descriptive norms", "moral norms", and "perceived behavioral control" are significant factors that impact employee behavior toward ISS compliance.

This dissertation uses the theory of planned behavior (TPB), which explains and identifies the factors that may shape an individual's behavior towards ISS. According to TPB, an individual's intention to perform a given behavior is a function of his/her

- i. Feelings towards engaging in a specific behavior (attitude),
- ii. Perception of whether important others around him/her expects him/her to behave in a particular way (injunctive norms), and
- iii. Perception on the ease/difficulty of performing a behavior (perceived behavioral control).

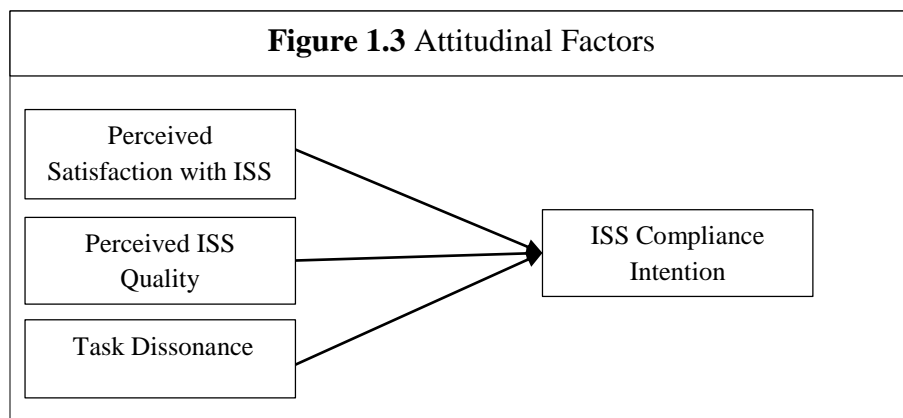
To fully capture the determinants of employees' behaviors, researchers (Cialdini et al., 1991; Conner and Armitage, 1998) advised that other factors should be added to TPB because this theory can be "regarded as a theory of proximal determinants behavior (p.1432)" and does not comprehensively explain the behaviors. They argue that injunctive norm is a weak predictor of behavior and thus the normative influences on behaviors need further consideration. Cialdini et al. (1991) suggest that descriptive norms which refer to what an individual thinks others do in a particular situation, should be examined to fully capture the impact of social norms on behavior. Descriptive norms have been found to be an important predictor of different compliance behaviors such as compliance with littering policies (Cialdini et al., 1990; 1991), and hotel's instructions (Cialdini, 2007).

Conner and Armitage (1998) advise that moral norms which are individuals' perceptions of the moral correctness or incorrectness of performing a certain behavior should be included as an extension (a direct predictor for behavior) to the TPB. This dissertation examines descriptive norms and moral norms in addition to injunctive norms, and perceived behavioral control. Figure 1.2 shows the expanded TPB model.



1.3.4 Attitudinal Factors

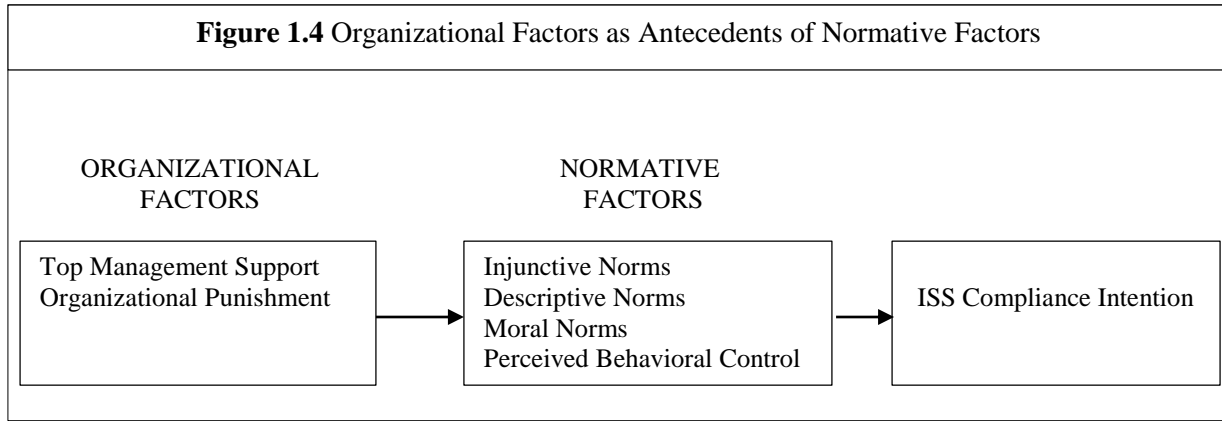
Studies in the ISS literature have mainly investigated employees' feelings towards ISS policies using a high level attitudinal construct without exploring the underlying dimensions (e.g. Anderson and Agarwal, 2010; Bulgurcu et al., 2010; Hu et al., 2012). To fully explain employees' feelings toward ISS, a deeper examination of attitudinal factors is required because "general attitude" is a multi-dimensional construct composed of three classes of evaluative responses: affective, cognitive, and behavioral (Bagozzi et al., 1979). Literature from "IT value" has identified lower attitudinal factors (e.g. satisfaction with the technology, and perceived quality of technology) to affect employees' behaviors towards technology (Amoako-Gyampah and Salam, 2004; Iacovou et al., 1995; Palvia, 1996; Wixom and Todd, 2005). These studies validated the importance of these attitudinal factors in studies related to IT adoption, success, and implementation. The impact of these factors on ISS compliance has not been investigated thus far. This dissertation explores the influence of multi-dimensional attitudinal factors namely perceived satisfaction with ISS, perceived ISS quality, and task dissonance on compliance with ISS. Figure 1.3 demonstrates this extension.



In general, individuals tend to form beliefs/feelings towards things around them especially the new ones. Consider the scenario where employees habituated to taking work home. By working from home, the employees are satisfied because they can balance the work duties with their personal life. Now, if these employees are required to not take official data home as described in the new ISS policies, they will most likely have problems in complying with the new mandates which impact their work life balance negatively and they will perceive the policies to be unnecessarily. This perception of “more work” makes employees feel dissatisfied with the new ISS policies. Employees prefer to finish their tasks with minimum amount of time and effort. Now, if the new ISS policies require employees to incur extra time and effort on tasks such as sending e-mail with encryption, and if the implications are not well explained, the employees perceive these policies to be not important and to have more costs than benefits. In other words, “perceived satisfaction with ISS,” “perceived ISS quality,” and “task dissonance” are important factors that impact employee behavior toward ISS compliance.

Many studies across disciplines have investigated the impact of attitudinal/norms factors on individual behaviors. In investigating the factors that shape employees’ behaviors to comply with ISS policies, Hu et al. (2012) found attitude, injunctive norms, and perceived behavioral control increased compliance. In the same context, Anderson and Agarwal (2010); Herath and Rao (2009b) found that descriptive norms promote employees’ ISS compliance. However, no study has examined the antecedents of descriptive norms and moral norms. Bandura’s model suggests that behavioral determinants are shaped by environmental and personal determinants but no study has investigated the relationships between the “behavioral”, “personal” and “environmental” factors in ISS context. Thus, I intend to investigate the influence of

organizational factors (top management support and organizational punishment) on employees' norms. Figure 1.4 illustrates this extension.

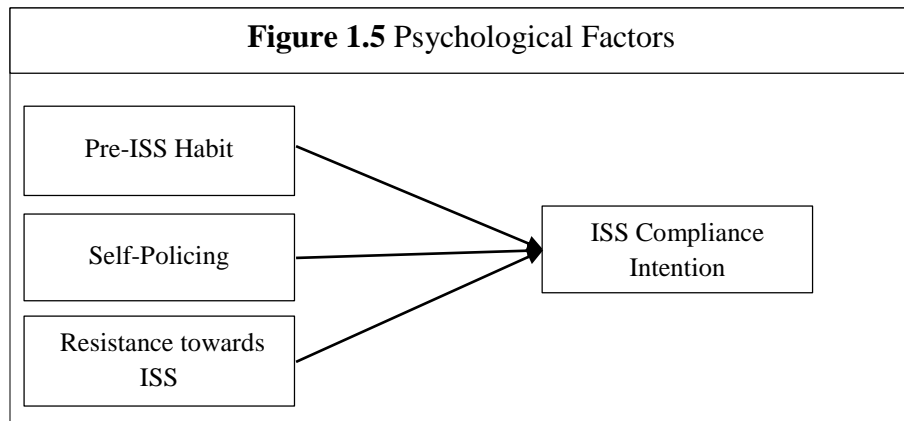


1.3.5 Psychological Factors

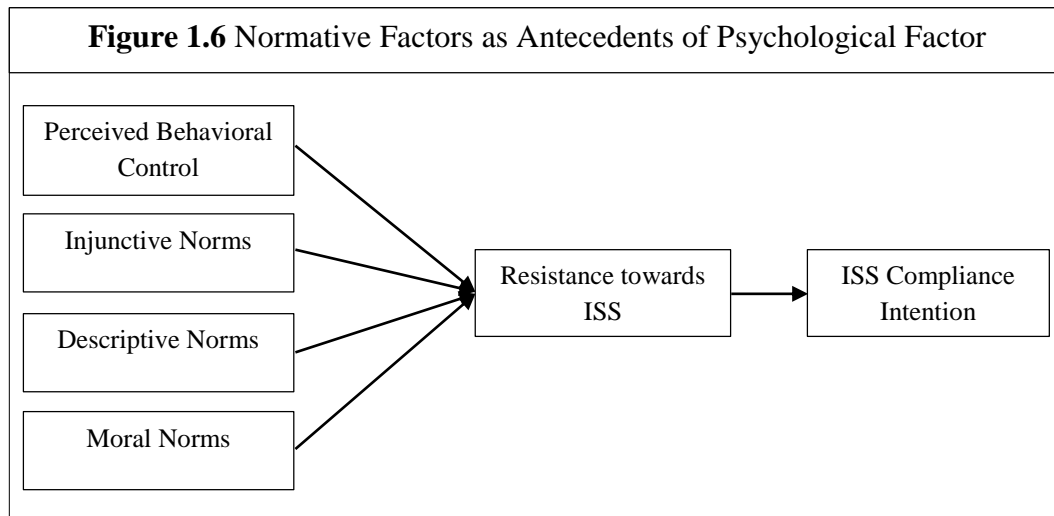
Generally, humans get used to working or doing things in a certain way. Once a habit is formed, it is difficult to change it. The stronger the habit, the more difficult it is to change. When organizations implement ISS policies employees may be asked to change the way they are used to working with IS and data sources. Unlike adoption of new IS systems, ISS implementation or compliance occurs in a continued usage context. Consider a scenario where employees are used to taking work home and working in late evenings. By doing this, the employees are able to balance personal and work life better by not having to stay late at their workplace. Now, if the new ISS policy requires that no official data can be taken out of the office, these employees will potentially face significant difficulty in complying with the new requirements and might even resist the change. Many studies have pointed out that even a simple directive about password management are not followed (McNickle, 2012). In other words, “habits of working with IS” and “resistance” are significant factors that should be considered while examining employee behavior toward ISS compliance.

I also investigate how employees' independent responsibilities influence their ISS compliance behavior. Self-policing is defined by yourdictionary.com as the "process where individuals or groups provide their own discipline and enforce it without outside help". It is the extent that employees police (control) their ISS compliance by themselves. Self-policing may shape employees' behaviors but has not been previously investigated in ISS compliance studies. Bandura (1991, p. 248) says: "self-regulatory systems lie at the very heart of causal processes. They not only mediate the effects of most external influences, but provide the very basis for purposeful action. Through exercise of forethought, people motivate themselves and guide their actions in an anticipatory proactive way." The notion behind self-policing is that employees can control their behaviors and comply with the policies set by the organization (Wood, 2003).

ISS policies require employees to change their ways of dealing with the organization's systems. For instance, employees may be asked to change their passwords every month, using a combination of special characters, numbers, etc. If these employees are used to (have habit to) have one simple password for a long period of time, for sure they will not easily accept the new procedures, even if they are obliged to apply them, similar to any changes in the organizations. Many studies argue that employees' resistance to change plays a very important role in successful implementations of organizational change (Del Val and Fuentes, 2003; Lapointe and Rivard, 2005). Thus, I argue that psychological beliefs namely, resistance and habit impact the behavior of the employees. Figure 1.5 presents the relationships between psychological factors and ISS compliance.



As explained earlier, Bandura’s model indicates that personal (psychological) factors are impacted by behavioral determinants. However, no study has attempted to examine the influence of behavioral determinants factors (normative) namely perceived behavioral control, injunctive, descriptive, and moral norms on personal psychological factors namely resistance. Based on this, I argue that the employees’ normative factors affect resistance. Figure 1.6 presents the relationships between the psychological and attitudinal/Normative factors.



In summary, by employing Bandura (1986) triadic reciprocal model and TPB as the underlying theoretical foundations and using the organizational behavior and socio-psychology

literature, I develop a holistic and integrated framework that explains the influence of organizational, attitudinal, normative, psychological, and environmental factors on employees' compliance with ISS as well as the inter-relationships between them.

1.4 Research Questions

I organize the scope of my research by stating the following research questions:

- i. Does employee resistance affect ISS compliance? What are the relationships between employee resistance and normative factors?
- ii. Do top management support and organizational punishment influence employees' ISS compliance in organizations? If yes, are these relationships mediated through other normative and psychological factors?
- iii. Do satisfaction with ISS, perceived ISS quality, and task dissonance influence employees' ISS compliance in organizations?
- iv. Does word of mouth impact employees' ISS compliance in organizations?
- v. Do habit and self-policing impact employees' ISS compliance in organizations?

1.5 Research Contributions

In order to answer these questions, I:

- i. Develop an integrated model that combines the organizational, attitudinal, normative, environmental, and psychological factors.
- ii. Provide theoretical explanation for ISS compliance behavior.
- iii. Empirically test the model.
- iv. Analyze the data and report findings.
- v. Draw implications for practitioners and scholars.

- vi. Articulate a contribution made by my dissertation to the practice and to research.
- vii. Identify future streams of research that arise out of this study.
- viii. Report limitations if any.

In this dissertation the goal is to contribute a comprehensive, intuitive, logical and theoretically sound model to the literature that has the potential to enhance ISS compliance in organizations. I do so by investigating and explaining relationships between different crucial factors that can help create and build an ISS culture in organizations. I am confident that this dissertation and the results are useful to scholars as well as practitioners. By highlighting which factors are important for creating a security culture, this dissertation has the potential to offer a practical approach to organizations for designing workplaces that motivate employees to comply with ISS. In doing so, this dissertation adds to the ISS literature and practice specifically by demonstrating what organizational, psychological, normative, environmental, and attitudinal factors influence ISS compliance.

In addition, this dissertation contributes to the literature via extension of TPB by positioning this theory in a larger framework comprising of organizational, normative, attitudinal, psychological, and environmental factors. This dissertation builds on top of TPB using Bandura's model by:

- i. Identifying specific factors that can influence TPB factors, and
- ii. Proposing that TPB impact intentional behavior indirectly through psychological factors.
- iii. Exploring low level attitudinal factors instead of using the general "attitude" construct.

By doing so, this dissertation does not only help practitioners to understand the factors that affect ISS compliance but also extends the TPB and IS literature in general.

1.6 Structure of this Dissertation

The remainder of this dissertation is organized as follows. First, I provide a literature review of the extant research on ISS, especially the factors used in this dissertation. Based on this review, I highlight the current gaps and present a conceptual model to bridge these gaps. This is followed by a set of research hypotheses and a theoretical model that highlights the influence of the (inter)relationships of organizational, attitudinal, normative, psychological, and environmental factors on employees' behaviors towards ISS compliance. I then discuss the methodology which includes research design, instrumentation and measures, pre and pilot-tests, and data collection. This is followed by data analysis methods used to test the research model and hypotheses. I then discuss the findings followed by conclusions, limitations, and future research directions.

CHAPTER II

LITERATURE REVIEW

This chapter reviews the extant literature of the constructs described in section 1.3.

2.1 Organizational Factors

This section provides an overview of organizational practices that can impact security culture and employees' compliance with ISS policies. Specifically the literature on top management support and organizational punishment is reviewed.

2.1.1 Top Management Support

Young and Jordan (2008, p. 715) define top management support as: “devoting time to the [IS] program in proportion to its cost and potential, reviewing plans, following up on results and facilitating the management problems involved with integrating technologies with the management process of the business.” Many scholars across business disciplines have studied the influence of top management support on the success of high cost or strategic value projects such as Enterprise Resource Planning systems (Ke and Wei, 2008) and R&D projects (Green, 1995). By lending its support, the top management can facilitate allocation of adequate financial and technical resources for major endeavors (Boonstra, 2013). Top management support is usually associated with issues such as clear IS vision and assimilation (Liang et al., 2007), team effectiveness (McComb et al., 2008), greater system usage (Guimaraes and Igbaria, 1997),

project performance (Bonner et al., 2003), and commitment to finish the project (Munns and Bjeirmi, 1996).

Researchers have identified various elements associated with the concept of top management support. Guimaraes and Igarria (1997) suggest that top management support, which includes high interest in the project, allocation of resources and encouragement, is an important determinant of system usage because it promotes more favorable beliefs for end-users. They argue that new projects are usually accompanied with changes in the way things were being done in the past which might affect the attitudes of employees towards enthusiastically adopting these changes. Thus top management has to encourage the employees by showing high interest, personal involvement in the project, and by allocating the required resources. Igarria et al. (1997) argue that support from top management could be presented by providing financial resources. McComb et al. (2008) propose that in order to successfully implement an IS project, top management members should lend support by placing themselves as project champions to show their high commitment and interest in the project. Sharma and Yetton (2003) argue that top management support includes actions such as:

- i. Reshaping the organization to make it more adaptive to the technology by introducing workflow patterns, work procedures, control and coordination mechanisms, reward systems, and routines;
- ii. Supporting the project implementation by introducing symbolic actions such as championship, visible enthusiasm in the project, communication with the employees, and resource availability; and
- iii. Supervising closely the employees during the implementation to mandate, negotiate, persuade, and motivate them to cooperate and adopt the new technology.

Ke and Wei (2008, p. 213) argued that by “formulating a strategic vision, strong advocacy of the vision, role modeling, creating intellectual stimulation, setting up the right structures to facilitate communication, and dispensing contingent rewards,” top management impact power sharing behavior, participative behavior, participative decision making culture, transformative vision, and risk tolerance culture within organizations. Lewis et al. (2003) argue that individuals form beliefs or cognition about the outcomes associated with their use of information technologies (IT) within an environment of influences derived from the individual, institutional, and social contexts in which they interact with IT and that beliefs about technology use (perceived usefulness) can be influenced by top management commitment to new technology.

Even though top management support has been extensively examined in the literature and has been identified as one of the critical success factors for projects, Boonstra (2013, p. 498) states that “we simply do not know a great deal about what top management support means in practice, or which types of behavior and behavioral patterns are associated with it.” Boonstra (2013) argues that researchers have extensively investigated the relationship between top management support and project success; however, research on the essence of the top management support concept has been limited. In most cases, top management support is examined as a single homogeneous construct that is related to project success which does not capture the essence and the multidimensionality of the top management support concept (Boonstra, 2013). Literature has identified many dimensions of top management support concept which can influence the outcome of projects; however these indicators do not comprehensively explain the behaviors and actions of top management. For these reasons, Boonstra (2013) presented a descriptive framework that breaks down the top management behaviors in five categories. These are reproduced verbatim below:

- i. Resources: top management secures financial, material, and human resources to support the strategic IS-project and promotes the effective implementation and use of the system.
- ii. Structural arrangements: top management establishes and enforces a project structure, and an adapted organizational structure that is receptive to the new system.
- iii. Communication: top management supports the project by communicating about it with visible enthusiasm and by expressing the possibility of needing to adapt the organization, the system, and the relationships among stakeholders.
- iv. Expertise: top management has a sufficient understanding of the project management of the strategic IS project as well as the content, context and implications of the proposed system.
- v. Power: top management has the power, and is willing and able to use it, to advance the project by resolving conflicts and protecting the project team.

In this dissertation, I use the above listed categories as indicators of top management support. By doing so, I contribute to the existing body of knowledge by examining the influence of a comprehensive top management support construct and its multidimensionality on ISS compliance.

ISS scholars have focused their attention primarily on employees when studying ISS in organizational settings. Murray (1991); Perry (1985); Wood (1995) in their arguments mentioned the importance of top management visibility in ISS. Their main thesis in this argument is that ISS technologies cannot protect organizations if management were not visible to employees. Employees do not take new instructions seriously especially if they feel that top management is not involved in the particular process/project. Von Solms and Von Solms (2004); Von Solms and von Solms (2004) identify top management as one of the most critical factors in ISS compliance

and emphasize communication as an important element to achieve success in ISS implementation. Von Solms and von Solms (2004) argue that top management should have a direct corporate governance responsibility towards ensuring that all the information assets of the company are secure and good care have been taken to maintain such security.

Kankanhalli et al. (2003) argue that ISS effectiveness is strongly influenced by organizational size, industry type, and top management support. In this study, Kankanhalli et al. (2003) assessed the impact of top management support on deterrent efforts¹ and preventive efforts². They found that organizations with stronger top management support are prone to engage in more preventive efforts than organizations with weaker support from higher management.

Puhakainen and Siponen (2010) using action research to design and implement theoretically grounded ISS training programs, found that the CEO's passiveness in promoting and following the established ISS policies was one of the main reasons why employees ignored the ISS policy requiring encryption of emails. In their interviews, the participants claimed that top management executives were themselves not always following the ISS instructions, which diminished the employees' motivation to comply with ISS rules and policies. After the CEO changed his attitude towards ISS and became actively involved in ISS issues, there were significant changes (increase) in employees' attitudes towards ISS compliance.

In an attempt to understand how top management can influence ISS compliance, Hu et al. (2012) developed a model that integrates the role of top management, organizational culture, and the theory of planned behavior. They found that top management participation in ISS initiatives

¹ Corresponds to certainty of sanctions because the amount of such efforts directly affects the probability that IS abusers will be caught.

² Helps to enforce policy statements and guidelines by warding off illegitimate activities. Typical examples of preventive efforts in the context of IS security include implementing security software to impede unauthorized access to and use of IS assets, and designing physically secure IS facilities.

has significant direct and indirect influences on employees' perceptions of what people of consequence think about their actions (subjective norms), and employees' perceptions of their skill and control over the intended actions (perceived behavioral control). In their study, Hu et al. (2012) used "top management participation" as a proxy for "top management support".

In my review of ISS literature, I find that influences of top management actions on employees' beliefs and behaviors have not attracted adequate attention of scholars. Von Solms and von Solms (2004) make their arguments based on teaching and consulting experience but lack theoretical grounding. Puhakainen and Siponen (2010) provide anecdotal evidence of the importance of top management support in influencing employee behavior toward ISS compliance, and call for quantitative studies to complement their findings. Hu et al. (2012) examined the influence of top management on three attitudinal beliefs factors namely, attitude, perceived behavioral control, and subjective (injunctive) norms. A number of scholars (Cialdini et al., 1991; 1990; Conner and Armitage, 1998) have argued that different types of norms such as: descriptive norms, injunctive norms and moral norms should be added to TPB factors in order to fully capture the influence of social norms. In this dissertation, I answer these calls by investigating the influence of top management actions on descriptive norms thereby extending Hu et al. (2012) model. I also examine the influence of a comprehensive top management support construct and its multidimensionality on ISS compliance. A summary of the relevant literature on top management support is presented in Table 2.1.

Table 2.1 Summary of Relevant Literature on Top Management Support

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Green (1995)	How does top management support affect R&D projects?	None	Survey	-After controlling for project characteristics, greater top management support will be related to less project termination. -After controlling for project characteristics and termination, greater top management support will be related to greater project contributions to business goals.
Munns and Bjeirmi (1996)	Aims (1) to identify the overlap between the definition of the project and project management and (2) to discuss how the confusion between the two may affect their relationship.	None	Commentary	None
Guimaraes and Igbaria (1997)	What are the important factors in Client/Server System implementation?	Technology Acceptance Model	Survey	-Management support will directly affect user satisfaction with the Client/Server Systems, system usage, and its impact on end-users' jobs
Lewis et al. (2003)	Present empirical evidence that institutional forces, social forces, and individual characteristics exhibit significant and differential impacts on two key individual beliefs about the use of information technologies: beliefs related to usefulness and ease of use.	Technology Acceptance Model	Survey	-Perceived top management support for the use of a technology has a significant positive influence on individual beliefs about the usefulness of the technology.
Von Solms and von Solms (2004)	Identify the 10 most important aspects called the deadly sins of information security' which result in companies experiencing severe problems in implementing a successful comprehensive ISS plan within the company.	None	Commentary	None

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Von Solms and Von Solms (2004)	Propose a hierarchical structure, based on various levels of abstraction, on how policies can be implemented to effectively influence the behavior of employees.	None	Commentary	None
Kankanhal et al. (2003)	Develops an integrative model of IS security effectiveness and empirically tests the model.	General Deterrence Theory, organizational size, top management support, and industry type	Survey	-Top management support is positively related to deterrent efforts. -Top management support is positively related to deterrent severity. -Top management support is positively related to preventive efforts.
Liang et al. (2007)	Investigate the assimilation of enterprise systems in the post implementation stage within organizations	Institutional theory and the influence of top management	Survey	-Stronger top management beliefs about the benefits of ERP lead to higher levels of top management participation in the ERP assimilation process. - Higher levels of top management participation in the ERP assimilation process lead to a higher extent of ERP assimilation within the organization.
Young and Jordan (2008)	How important is Top Management Support?	None	Descriptive Case Study	None
Puhakainen and Siponen (2010)	Develop an IS security training program	Elaboration Likelihood Model, and The Universal Constructive Instructional Theory	Action Research	None

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Sharma and Yetton (2003)	Does task interdependence moderate the effect of management support on implementation success?	None	Meta-Analysis	-The effect of management support on implementation success is a positive function of task interdependence. -In low task interdependence contexts, the effect of management support on implementation success is weak.
Hu et al. (2012)	- What is the role of organizational culture in shaping employee intention to comply with information security policies? - How does the top management influence employee intention to comply with information security policies?	Theory of Planned Behavior, Top Management Support, Organizational Culture	Survey	-Stronger perceived top management participation in information security initiatives leads to stronger positive attitude towards compliance with information security policies. -Stronger perceived top management participation in information security initiatives leads to stronger subjective norm about compliance with information security policies. -Stronger perceived top management participation in information security initiatives leads to stronger perceived behavioral control over compliance with information security policies.
Boonstra (2013)	- What behavioral types are associated with top management support for strategic IS projects? - How can these behaviors be placed in a coherent framework? and - Why do managers sometimes withhold these types of support?	None	Qualitative	None

2.1.2 Organizational Punishment

I now review the literature on organizational punishment which along with rewards may be the most used methods by managers to influence behavior of employees towards complying with rules, regulatory requirements etc. Employees are usually motivated by rewards and deterred by punishment. Punishment is usually used in situations where organizations want their employees “not to do something;” however, rewards may work better in converse situations. Security compliance may require both “avoid” and “encourage” behaviors but rewards are rarely used in ISS compliance (Siponen et al., 2010; Pahnla et al., 2007) because generally managers institutionalize rewards systems for those employees who exceed expectations whereas ISS compliance is not considered a primary responsibility of most users. Organizations expect their employees to comply with ISS without providing any tangible benefits for doing so. For this reason, in this dissertation I focus on organizational penalty which is more relevant to ISS compliance.

Organizations use fear of punishment as a deterrent to reduce undesirable behavior such as non-compliance with policies and rules (Ball et al., 1994). Within a firm, punishment is defined as “the application of a negative consequence to, or the withdrawal of a positive consequence from, an employee” (Trevino, 1992, p. 649). When employees’ interests and goals are not in harmony with that of organization’s (Liang et al., 2012), managers need to control employees’ behavior to ensure that the policies and rules are applied (Eisenhardt, 1989). Ball et al. (1994) noted that research on organizational punishment has often led to contradictory conclusions and uncertain results. Some scholars argue that employees in general tend to repeat actions that do not produce negative outcomes and avoid actions that lead to negative outcomes; thus reducing likelihood of punishment. The rationale behind this argument is that punishment

creates an anxiety in the minds of employees because they want to minimize losses (Kahneman and Tversky, 1979). Arvey and Ivancevich (1980, p. 131) state: “punishment may be a very effective procedure in accomplishing behavior change.” Johnston (1972, p. 1051) argues that no other procedure “provides an effect which is as immediate, enduring, or generally effective as that produced by the proper use of punishment procedures.” Many studies found support for positive relationship between organizational punishment and compliant behavior (Arvey et al., 1984; Podsakoff et al., 2006).

Contrary to the foregoing arguments, Sims (1980, p. 136) mention that “punitive behavior is not likely to be effective as an overall pattern of managerial behavior for influencing employees” because organizational punishment often tends to come after (result) an employee behavior and not before (cause).

According to General Deterrence Theory (GDT), when the possibility of punishment is high and the sanction is severe, potential violators will be deterred from committing unauthorized acts, especially when their motives are weak (Blumstein, 1978; Hoffer and Straub, 1989). In the ISS context, by using GDT (Blumstein, 1978), researchers have shown that punishment can be used as a deterrent to decrease ISS misuse, thereby increasing ISS compliance (D’Arcy and Hovav, 2009; Herath and Rao, 2009a; b; Hoffer and Straub, 1989). Hoffer and Straub (1989) argue that the prospect of punishment will deter employees’ abuse of IT systems if they perceive their employers to be serious about computer abuse.

Herath and Rao (2009a; b); D’Arcy and Hovav (2009); Siponen et al. (2010); Vance et al. (2012) examined the direct relationship between likelihood of punishment and ISS compliance.

Organizational punishment includes two dimensions:

- i. Perceived probability of being punished; and

ii. Perceived severity of punishment.

Mixed results were found in these studies but in general, they found that noncompliance with ISS security policies can be reduced by imposing punishment. If the employees perceive the punishment to be severe, and the possibility of getting caught to be high, then the likelihood of their undesired behaviors will reduce.

Using survey data collected from 312 participants from 77 organizations, Herath and Rao (2009a; b) did not find support for a positive relationship between punishment severity and ISS compliance. They mentioned that certainty of punishment is a more consistent practice and that several studies have reported contradictory results in investigating the effect of punishment severity of compliant behavior. I find these arguments to be weak and thus require further research. Results of both these studies contradict the findings of D'Arcy and Hovav (2009); Vance et al. (2012); Siponen et al. (2010) who found that the higher the severity of penalty the higher the compliance with ISS policies.

In addition to the mixed result which calls for further investigation, few gaps are present in the current literature as explained below.

Herath and Rao (2009a) argue that the role of the punishment severity in shaping ISS compliance is unclear and required further research. Venkatesh and Davis (2000) argue that perceived punishment may also influence injunctive norms because “the important other” is usually a person who has the power and authority to impose punishment. Yet no research has examined the relationship between punishment and injunctive norms leading to a gap in the literature.

Trevino (1992) argues that the deterrent effect of organizational punishment is raised significantly when employees observe a punishment event. The underlying reason behind this

argument is that observers can now imagine that they could also face the punishment if they carried out similar non-compliant acts. People are generally risk averse and they take action to avoid losses. Thus employees classify their peers in two categories;

- i. Those who have received punishment or who are likely to receive punishment in the future; and
- ii. Those who have not received punishment and are also not likely to.

Therefore, employees being risk averse are likely to emulate behavior of the second group.

Accordingly, I argue that there is a positive relationship between organizational punishment and descriptive norms. The relationship between “organizational punishment” and “descriptive norms” has not been investigated which also leaves a gap in the current literature. In this dissertation I fill this gap.

Clearly stated, organizational punishments when implemented for a period of time are likely to establish acceptable (right) and non-acceptable (wrong) behaviors among employees (O’Reillys and Puffer, 1989). This common understanding helps in establishing group norms and regulating the employees in a moral context (Xue et al., 2011). It also “provides a general mechanism for stabilizing any kind of moral norms (Sripada, 2005, p. 781). Therefore, there seems to be a logical explanation for a relationship between organizational punishment and moral norms. Current literature has not examined the influence of “organizational punishment” on “moral norms” which also creates a gap in the current literature.

A summary of the selected studies on organizational punishment is presented in Table 2.2.

Table 2.2 Summary of Relevant Literature on Organizational Punishment

Study	Research problem	Theory	Methodology	Propositions/Hypotheses
Hoffer and Straub (1989)	Outline the most common forms of abuse, the most effective countermeasures, and the steps that can lead to effective security management.	General Deterrence Theory	Survey	None
Podsakoff et al. (2006)	-Gather data on the relationships between leader reward and punishment behaviors -Provide a meta-analytic review incorporating all of the published data on the relationships between leader reward and punishment behavior.	None	Survey and meta-analysis	-The relationship between leader reward (punishment) behavior and subordinate effort and in role and extra-role performance will be more positive (or less negative) when the rewards (punishments) are administered contingent upon subordinate performance than when they are administered non-contingently.
Herath and Rao (2009a)	Investigate the impact of penalties (extrinsic incentive), social pressures (extrinsic incentive) and perceived value or contribution (intrinsic incentive) on the organizational security policy compliance.	General Deterrence Theory and agency theory	Survey	-Increased severity of penalty will be positively associated with intention to comply with organizational information security policies. -Increased certainty of detection will be positively associated with intention to comply with organizational information security policies.
D'Arcy and Hovav (2009)	Extend the General Deterrence Theory by proposing a model that posits that user awareness of security countermeasures (i.e., security policies, security education, training, and awareness (SETA) programs, computer monitoring) directly impacts user perceptions of the certainty and severity of sanctions associated with IS misuse, which in turn have a direct effect on IS misuse intention.	General Deterrence Theory	Survey	- Perceived certainty of sanctions is negatively associated with IS misuse intention. - Perceived severity of sanctions is negatively associated with IS misuse intention.

Study	Research problem	Theory	Methodology	Propositions/Hypotheses
Trevino (1992)	Develop a framework for studying the effects of punishment on observers-other organizational members who take an interest in a particular punishment event.	None	Conceptual	<ul style="list-style-type: none"> -Punishment of one individual deters the prohibited behavior in observers. -Failure to punish one individual increases the prohibited behavior in observers. -Social learning from a punishment event will increase with the credibility and attractiveness of the supervisor and with the perceived similarity of the punished individual. -Punishment that is perceived to be more certain and more severe will have a stronger deterrent effect. -Observers' misconduct is more likely to be deterred when the costs of expected punishment are higher than the gains associated with the misconduct. -Observers' expectations of informal sanctions from peers will deter prohibited behavior more than expectations of formal sanctions from supervisors.
Herath and Rao (2009b)	Evaluate the effect of employees' organizational commitment on security policy compliance intentions. Assess the influence of environmental factors such as deterrence, facilitating conditions, and social (subjective and descriptive norms) influence.	General Deterrence Theory Protection Motivation Theory Decomposed Theory of Planned Behavior	Survey	<ul style="list-style-type: none"> -The severity of penalty will positively affect intention to comply with organizational information security policies. -The certainty of detection will positively affect the intention to comply with organizational information security policies.
Liang et al. (2012)	Delineate the effects of reward and punishment on IT compliance and examine the moderating role of regulatory focus factors (promotion and prevention)	Control Theory and Regulatory Research Problem Theory	Survey	<ul style="list-style-type: none"> -Punishment expectancy positively affects IT compliance behavior.

Study	Research problem	Theory	Methodology	Propositions/Hypotheses
Siponen et al. (2010)	Understand why employees do not comply with the organization's information security procedures.	Theory of Reasoned Action, Protection Motivation Theory, General Deterrence Theory, and Diffusion of Innovation	Survey	-Sanctions have a significant impact on compliance with information security policies
Xue et al. (2011)	Understand the influence of punishment and perceived justice on user compliance with information technology (IT) policies.	Justice theory and Punishment Research	Survey	-Employees' punishment expectancy is positively related to their compliance intention in mandatory IT settings. -Employees' perceived justice of punishment is positively related to their compliance intention in mandatory IT settings. -Employees' perceived justice of punishment is positively related to their punishment expectancy in mandatory IT settings.
Vance et al. (2012)	Integrate the full Protection Motivation Theory (PMT) model with habit. This study used PMT model as mediator between habit and intention to comply with ISS policies.	Protection Motivation Theory and Habit	Survey	-Perceived severity positively affects employees' intention to comply with IS security policies.

2.2 Normative Factors

This section provides a literature review of normative factors that are pertinent to the topic of security culture and employees' compliance with ISS policies. Specifically the literature on injunctive norms, descriptive norms, moral norms, and perceived behavioral control is reviewed.

2.2.1 Social Norms: Injunctive and Descriptive

Social norms are standards of behavior that recommend and disapprove behavior in specific circumstances based on widely shared beliefs that describe how individual group members behave and perform in a given situation (Fishbein and Ajzen, 1980; Voss, 2001). The group in which social norms exist can be a family, a team, an association, an organization or even a whole society and norms emerge out of interaction with other individuals in the group. It is found that when a group of individuals share a particular goal, a social norm is formed among them promoting togetherness (Donaldson and Dunfee, 1994). As such, members might obey the norms voluntarily if their individual goals are in line with the normatively required behavior, or they may adapt or adjust to the norm if their individual goals differ from the normatively required behavior (Fehr and Fischbacher, 2004). This adapting or adjusting of behavior is usually goaded by fear of punishment at the organizational or society level. The expectation of ISS compliance is akin to good citizenry. In other words, even though security compliance is not a part of most employees' main responsibilities yet management expects them to follow certain behavior (e.g. be a good citizen by complying with ISS). That is "you do it because everyone does it"³. Taking this argument further, there is typically no concept of reward for complying

³ Not only that because of failure to so can have negative repercussion for the individual, the group, organization etc.

with ISS policies. This is similar to complying with traffic rules where there are severe penalties for violations but no tangible rewards⁴ for being a good driver.

When considering normative influence on behavior, Cialdini et al. (1990; 1991) suggest that it is critical to differentiate between two categories of normative beliefs: “what is” (descriptive) and “what ought to be” (injunctive). Each of these categories refers to a separate source of human motivation (Deutsch and Gerard, 1955). Descriptive norms (what is) motivate the employees to comply with ISS policies if they see others around them doing the same thing. The explanation behind this is that employees consider the behaviors of others around them as the acceptable way of doing things (Cialdini et al., 1991). The reasoning is that everyone is doing it, it must be right. For instance, if my colleagues lock their computers when they move from their offices, I am likely to start doing the same thing because I think this must be an acceptable thing to do.

On the other hand, injunctive norms motivate employees to comply with ISS policies because they ought to do it. For instance, employees are expected to comply with organizational rules/policies as it is part of their job. Thus, the primary difference between the two types of norms is that descriptive norms do not involve social sanctions for noncompliance with the norms because employees choose to follow others around them without assigning any judgments. In contrast, injunctive norms involve sanctions since employees ought to conform to a certain behavior that is comply with ISS (Lapinski and Rimal, 2005).

Both types of normative information are responsible for regulating individuals’ behavior. Researchers across disciplines examined the validity of social norms in a variety of different situations such as recycling (Schultz, 1999), littering (Cialdini et al., 1991; 1990; Kallgren et al., 2000), energy conservation (Goldstein et al., 2008; Nolan et al., 2008; Schultz et al., 2007),

⁴ Benefits of lower insurance premium are intangible.

alcohol use (Rimal and Real, 2005), tax evasion (Wenzel, 2004), and student gambling (Larimer and Neighbors, 2003). These studies show one or both types of social norms to be antecedents to individuals' behaviors. For instance, Nolan et al. (2008) found that descriptive norm is a strong predictor of individuals' decision to conserve energy in their homes. Schultz (1999) found that participants begin to recycling more frequently when they knew that others in their community were doing the same thing.

Studies of social influence have been conducted mainly within the frameworks of the Theory of Reasoned Action (TRA) (Ajzen, 1975) and the TPB (Ajzen, 1985). In these theories, social influence is represented by "subjective norm" which refer to the "perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991). Boer and Westhoff (2006), and Lapinski and Rimal (2005) assert that subjective norm used in these theories is similar to injunctive norm. The argument is that subjective norm is concerned with people's motivation to comply with the beliefs of important referents; which is quite similar to the injunctive norm. "My boss is doing this so I ought to do it because it must be the right thing to do it."

Research shows that injunctive norm exerts only a limited influence on people's behaviors because it only partially captures social norms (only injunctive and not descriptive) (Conner and Armitage, 1998). Several researchers demonstrated that both descriptive norm and injunctive norm have an independent influence on behavior (Beck and Ajzen, 1991; Conner and McMillan, 1999; Parker et al., 1995). In a meta-analysis study of 8097 articles, Ravis and Sheeran (2003) found that descriptive norm explained an additional five percent variation in intention after taking into account the effects of attitude, subjective norm, and perceived behavioral control.

In the ISS domain, scholars have given more prominence to injunctive norm as compared to descriptive norm (Anderson and Agarwal, 2010; Bulgurcu et al., 2010; Dinev and Hu, 2007; Herath and Rao, 2009a,b; Hu et al., 2012; Ifinedo, 2012; Li et al., 2010; Siponen et al., 2010). These studies argue that IT managers or ISS specialists frequently provide directions and counseling to employees for securely operating their computing resources. In organizational settings, this guidance typically originates from persons in positions of authority and indicates what employees ought to be doing in order to comply with ISS. In comparison, influence of descriptive norm on employees' behaviors towards complying with ISS policies has been examined only in few studies (Anderson and Agarwal, 2010; Herath and Rao, 2009b) which found that descriptive norm does indeed influence ISS compliance.

MacNeil and Sherif (1976) suggest that norms are subject to change because they are the product of interaction among individuals which therefore may change from a group to another. This also means that norms are affected by other factors (antecedents) that regulate the norms and the interactions among members of a group. Participants in Puhakainen and Siponen (2010) study claimed that because top management executives were not always following the ISS instructions, employees' motivation to comply with ISS rules and policies were diminished. When the CEO became actively involved in ISS issues, employees' attitudes towards ISS compliance increased because if management is doing it, it must be the right thing to do. Therefore I argue that there is a positive relationship between organizational punishment and descriptive norm.

Trevino (1992) argues that the deterrent effect of organizational punishment is raised significantly when employees observe a punishment event because observers can now imagine that they could also face the punishment if they carried out similar non-compliant acts. People

are generally risk averse and they take action to avoid losses. Thus employees classify their peers in two categories;

- i. Those who have received punishment or who are likely to receive punishment in the future; and
- ii. Those who have not received punishment and are also not likely to.

Therefore, employees being risk averse are likely to emulate behavior of the second group.

Accordingly, I argue that there is a positive relationship between organizational punishment and descriptive norms.

When examining the effects of both social norms (injunctive and descriptive), IS researchers have always treated these as independent variables. No study has examined the impact of the antecedents of social norms except Merhi and Midha (2013). As discussed in sections 2.1.1 and 2.1.2, scholars have suggested that top management support and organizational punishment influence the “norms” of the punished individual as well as other members in the same group. However, these relationships have not been explored in the literature. This dissertation examines the influence of organizational punishment and top management support on descriptive and injunctive norms. Summaries of the relevant literature on injunctive and descriptive norms are given in Tables 2.3 and 2.4.

Table 2.3 Summary of Relevant Literature on Injunctive Norms

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Anderson and Agarwal (2010)	1. What are the factors influencing a home computer user's security behavior? 2. Are there differences in the factors influencing a home computer user's intentions to protect her own computer versus the Internet? 3. Can the strength of some of these factors be changed through message cues?	Protection motivation theory	Survey, and Experiment	-Subjective norm is positively related to behavioral intentions to protect the Internet. -Subjective norm is positively related to behavioral intentions to protect one's own computer.
Ifinedo (2012)	Investigating factors leading employees to comply with information systems security policy	Theory of planned behavior, and protection motivation theory	Survey	-Subjective norms will have a positive effect on ISSP compliance behavioral intention
Herath and Rao (2009b)	1. Evaluate the effect of employees' organizational commitment on security policy compliance intentions. 2. Assess the influence of environmental factors such as deterrence, facilitating conditions, and social influence. 3. Explore the social influence more thoroughly using subjective and descriptive norms	Protection motivation theory, general deterrence theory and decomposed theory of planned behavior	Survey	-Subjective norms will positively affect intention to comply with organizational information security policies.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Merhi and Midha (2013)	How different types of training threat appraisal and policy awareness affect employees' compliance with information systems security	Social Norms	Survey	Injunctive norm will be positively associated with intention to comply with organizational information security policies.
Johnston and Merrill (2010)	Investigate the influence of fear appeals on the compliance of end users with recommendations to enact specific individual computer security actions toward the mitigation of threats.	Protection motivation theory	Survey	Social influence will have a positive effect on end user intentions to adopt recommended individual computer security actions with respect to spyware.
Li et al. (2010)	This research center on: 1. major costs and benefits that factor into employees' intention to comply with the IUP (compliance intention) 2. the relationships among these factors, and 3. mechanisms that could facilitate IUP compliance.	Rational choice theory	Survey	Subjective norms against Internet abuses have a positive impact on IUP compliance intention.
Dinev and Hu (2007)	User behavioral intention toward protective technologies that protect data and systems from disturbances such as viruses, unauthorized access, disruptions, spyware, and others	Theory of planned behavior, and technology acceptance model	Survey	Subjective norms positively affects behavioral intention

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Mahler et al. (2008)	Examined whether the efficacy of an appearance based sun protection intervention could be enhanced by the addition of social norms information	Social norms	Experiment	Injunctive norms information increases self-reported sun protection behaviors
Siponen et al. (2010)	Understand why some employees comply with information security policies while others do not.	Protection motivation theory, theory of reasoned action	Survey	Normative beliefs positively affects intention to comply with information security policies
Hu et al. (2012)	What is the role of organizational culture in shaping employee intention to comply with information security policies? How does the top management influence employee intention to comply with information security policies?	Theory of planned behavior	Survey	Stronger subjective norm about information security policy compliance leads to stronger behavioral intention to comply with the policies.
Larimer and Neighbors (2003)	Replicate and extend prior research on social norms (both descriptive and injunctive) with respect to gambling behavior in college populations	Social norms	Survey	-Students would report higher descriptive norms for gambling frequency and quantity than the actual mean of their own self-reported behavior and that both perceived descriptive and injunctive norms would uniquely predict gambling behavior and negative consequences in this population. -Descriptive and injunctive norms would represent unique sources of potential influence on gambling behavior

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Bulgurcu et al. (2010)	<p>What are the broad classes of an employee's beliefs about the overall assessment of consequences of compliance or noncompliance that influence attitude toward compliance and, in turn, intention to comply with the information security policy?</p> <p>What are an employee's beliefs about the outcomes of compliance and noncompliance that influence beliefs about the overall assessment of consequences?</p> <p>What is the role of information security awareness in shaping an employee's beliefs about outcomes and attitude toward compliance?</p>	Theory of planned behavior, and rational choice theory	Survey	An employee's normative beliefs about compliance with the organization's information security policy positively affect intention to comply with the requirements of the information security policy.

Table 2.4 Summary of Relevant Literature on Descriptive Norms

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Merhi and Midha (2013)	How different types of training threat appraisal and policy awareness affect employees' compliance with information systems security	Social Norms	Survey	Descriptive norm will be positively associated with intention to comply with organizational information security policies.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Anderson and Agarwal (2010)	What are the factors influencing a home computer user's security behavior? Are there differences in the factors influencing a home computer user's intentions to protect her own computer versus the Internet? Can the strength of some of these factors be changed through message cues?	Protection Motivation Theory	Survey, and Experiment	-Descriptive norm is positively related to behavioral intentions to protect the Internet. -Descriptive norm is positively related to behavioral intentions to protect one's own computer.
Herath and Rao (2009a)	Evaluate the effect of employees' organizational commitment on security policy compliance intentions. Assess the influence of environmental factors such as deterrence, facilitating conditions, and social influence. Explore the social influence more thoroughly using subjective and descriptive norms	Protection Motivation Theory, General Deterrence theory and Decomposed Theory of Planned Behavior	Survey	Descriptive norms will positively influence intentions to comply with security policies.
Mahler et al. (2008)	examined whether the efficacy of an appearance based sun protection intervention could be enhanced by the addition of social norms information	Social norms	Experiment	Descriptive norms information increases self-reported sun protection behaviors

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Rimal and Real (2005)	Examining how perceived benefits and similarity moderate the impact of descriptive norms on behaviors	Social norms	Experiment	-The influence of descriptive norms on behavior will be moderated by perceived benefits such that the interaction between descriptive norms and perceived benefits will be significantly associated with behavioral intentions and with self-efficacy. -The influence of descriptive norms on behavior will be moderated by similarity such that the interaction between descriptive norms and similarity will be significantly associated with behavioral intentions and with self-efficacy.
Nolan et al. (2008)	Investigate participants' awareness of the causal relationship between descriptive social norms and their behavior.	Social norms	Survey and experiment	Descriptive norms increases individuals' consumption of energy.
Larimer and Neighbors (2003)	Replicate and extend prior research on social norms (both descriptive and injunctive) with respect to gambling behavior in college populations	Social norms	Survey	Students would report higher descriptive norms for gambling frequency and quantity than the actual mean of their own self-reported behavior and that both perceived descriptive and injunctive norms would uniquely predict gambling behavior and negative consequences in this population. Descriptive and injunctive norms would represent unique sources of potential influence on gambling behavior

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Kallgren et al. (2000)	Investigate the effect on descriptive norms on individuals' behavior	None	Experiment	As the passages that participants read engaged norms more conceptually related to the antilittering norm, participants would be progressively less inclined to litter.
Cialdini et al. (1990)			Experiment	Individuals will concentrate attention on evidence of what the majority of people have done, thereby highlighting normative considerations that will reduce subsequent littering in a clean environment.

2.2.2 Moral Norms

Moral norms can be defined as individual's judgment of whether a certain behavior is correct or not (Ajzen, 1991). In other words, it is the individual's "feelings of moral obligation or responsibility to perform, or refuse to perform, a certain behavior" (Ajzen, 1991, p. 199). The role of moral norms in influencing individual behavior has been examined extensively in the sociology and social psychology literature (Hatcher et al., 2000) and is recognized as important factor in regulating individuals' compliance decisions (Tyler and Lind, 1992). The concept of moral norms has been used in a variety of situations such as tax compliance (Riahi-Belkaoui, 2004), fishing compliance (Gezelius, 2002; Hatcher et al., 2000), environmental protection policies compliance (Stern et al., 1985), and the consumption of natural resources (Kaiser, 2006; Kaiser and Scheuthle, 2003).

Myyry et al. (2009) argue that moral reasoning is quite relevant to ISS policies compliance because the decision to comply involves "right/wrong" dimensions. They provide theoretical explanation to how individuals use moral judgment and values in taking decisions. They use Kohlberg's Theory of Cognitive Moral Development (Kohlberg, 1969) which

prescribes six stages of moral reasoning structured from low to high in terms of moral judgment. The six stages⁵ are (reproduced almost verbatim) (Myyry et al., 2009).

- i. Individuals act to avoid sanctions and penalties.
- ii. Individuals act to receive something in exchange such as salary increase or reward.
- iii. Individuals' behavior is based on conforming the expectations of others as well as expectations associated with a social role or profession.
- iv. Individuals follow the laws and norms for their own sake.
- v. Individuals select an act that produces the greatest good for the greatest number of people.
- vi. Individuals apply the principle of universality. That is once action in a particular situation is right, then a similar act by anyone else in a similar situation will be right (Hare and Hare, 1981).

Myyry et al. (2009), citing other scholars, make an argument that level of moral judgment is not a sufficient to explain moral behavior. Thus, human values need to be considered to fully explain individual's moral behavior. "Human values are defined as enduring beliefs that is a specific mode of conduct or end state of existence is personally or socially preferable to an opposite or converse mode of conduct or end state of existence" (Myyry et al., 2009, p. 128).

Hu et al. (2011) posited that employees' intention to comply with ISS is directly influenced by the rational choice calculus⁶ which in turn is influenced by two internal (moral beliefs and individual propensity) and one external (perceived deterrence) constructs. They make

⁵ which are obedience, instrumental egoism and simple exchange, interpersonal accord and conformity, law and duty to social order, societal consensus orientation, and universal ethical principle

⁶ The rational choice calculus is composed of five different constructs: perceived extrinsic benefits, intrinsic benefits, formal risk, informal risk, and shame.

the argument that individuals carry out post benefit analysis of pertinent (rational choice calculus) factors of which their moral beliefs is a component.

TRA/TPB theories are used extensively to predict individuals’ behaviors and compliance but they do not explain moral reasoning underlying behavior in situations with ethical and moral dimensions (Conner and Armitage, 1998; Kaiser and Scheuthle, 2003). Moral norms direct people to evaluate right and wrong situations in order to guide their own behavior. Thus, in order to fully explain individual’s behavior, Ajzen (1991) suggests that moral norms may be a useful addition to the TPB because injunctive and descriptive norms may only partially explain people’s normative behavior in certain situations. In a meta-analysis study of TRA and TPB literature, Sheppard et al. (1988) found subjective norms to be a weak predictor of intention in several studies/situations but speculated that the weakness of subjective norms in predicting intention maybe due to measurement errors and that additional explanations are possible. Thus, Conner and Armitage (1998) assert that moral norms should be one of the predictors of individual’s behaviors, “especially in situations of moral and ethical dimensions.”

According to Myyry et al. (2009) the lowest level in the moral reasoning framework refers to the sensitivity of people to rewards and punishment. This leads to the question whether fear of punishment influences moral norms. Extensive review of the literature reveals that this relationship has not been examined till now. I bridge this gap in the extant literature. A summary of the relevant literature on moral norms is given in Table 2.5.

Table 2.5 Summary of Relevant Literature on Moral Norms

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Hatcher et al. (2000)	Investigating the role of moral and social norm on fishery regulation compliance	None	Survey	Moral norms positively affect fishery compliance with the regulations

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Tyler and Blader (2005)	Investigated two approaches to achieving employee adherence to organizations rules: Command and control approach which is linked to extrinsic motivational models of human behavior, in which people primarily respond to external contingencies in their environment. The self-regulatory approach, on the other hand, is linked to intrinsic motivational models of human behavior (legitimacy and moral value congruence), which emphasize individuals' innate preferences and desires	None	Survey	Moral norms positively affect adherence to organizational rules and policies.
Hu et al. (2011)	Why do employees go rogue and commit policy violations, and what could employers do to minimize the threat and the damage?	Rational choice, self-control, general deterrence, shame, and moral beliefs	Survey	Moral beliefs have an impact on perceived intrinsic benefits, shame, perceived informal risk, and perceived formal risk
Stern et al. (1985)	Investigates the role of moral norms as a motivator for people to reduce the pollution and protect the environment.	Theory of motivational types and values	Survey	Support for environmental protection depends in part on a moral judgment, that supporters of demands for environmental protection see environmental problems not only as unfortunate situations but as morally intolerable.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Myry et al. (2009)	Investigated the potential of moral reasoning values theories to explain employees' noncompliance with information systems security policies	Theory of cognitive moral development and the theory of motivational types and values	Survey	<p>-Preconventional moral reasoning is positively related to compliance with the information security policy in a hypothetical situation.</p> <p>-Preconventional moral reasoning is positively related to compliance with the information security policy in a real life situation.</p> <p>-Conventional moral reasoning is positively related to compliance with the information security policy in a hypothetical situation.</p> <p>Conventional moral reasoning is positively related to compliance with the information security policy in a real life situation.</p> <p>-Postconventional moral reasoning is positively related to compliance with the information security policy in a hypothetical situation.</p> <p>-Postconventional moral reasoning is positively related to compliance with the information security policy in a real life situation.</p>
Gezelius (2002)	Addresses the interface between law and the morality of civil society.	None	Interviews	The choice of compliance was guided by an informally enforced set of moral norms
Riahi-Belkaoui (2004)	Why do individuals resist total compliance with their tax commitments and why does this situation differ internationally?	None	Secondary data	Moral norms lead citizens to behave more honestly, provide correct information and improve the tax compliance rate

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Kaiser (2006)	Extends the TPB by adding moral norms as an antecedent to attitude	Theory of planned behavior	Survey	Moral norms positively effects individuals' attitude

2.2.3 Perceived Behavioral Control

Perceived behavioral control (PBC) is defined as the perceived ease or difficulty of performing a behavior and a personal sense of control over performing it (Ajzen, 1988). It is theorized as an antecedent to both intention and behavior by both TRA and TPB theories (Ajzen, 1988; Pavlou and Fygenson, 2006; Taylor and Todd, 1995). The role of PBC in influencing individual action has been examined extensively in the literature and has been found to be important factor in influencing individuals' compliance decisions. Researchers across domains examined the validity of PBC in a variety of different compliance situations such as; adherence to hand hygiene practice (Pittet, 2001), tax compliance (Bobek and Hatfield, 2003), and driver compliance with speed limit control (Cestac et al., 2011). These studies show that PBC influenced the compliance behaviors.

Several researchers (Hu et al., 2012; Warkentin et al., 2011; Zhang et al., 2009) examined the influence of PBC on employees' ISS behavioral compliance. In general, it was found that employees needed resources and skills to comply with ISS and that can help them face ISS threats. Having a perception of high level of resources or attention focused on data backup, anti-virus scanning of files/emails, data encryption, etc. may make employees feel that they have the necessary resources therefore are more capable to comply with ISS policies. These resources are offered by management. This leads to the question whether top management support impacts employees' PBC. Hu et al. (2012) examined the relationship between top management support

and PBC and found it to be significant; however, in this study top management support was not fully captured using a multidimensional construct. I extend Hu et al. (2012) contribution by examining the relationship between top management support as a multidimensional construct and PBC. A summary of the relevant literature on PBC is given in Table 2.6.

Table 2.6 Summary of Relevant Literature on Perceived Behavioral Control				
Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Hu et al. (2012)	What is the role of organizational culture in shaping employee intention to comply with information security policies? How does the top management influence employee intention to comply with information security policies?	Theory of planned behavior	Survey	Stronger perceived control over information security policy compliance leads to stronger behavioral intention to comply with the policies.
Warkentin et al. (2011)	Investigates the antecedents of information privacy policy compliance efficacy by individuals.	Social Learning Theory	Survey	An individual's behavioral intent to comply with information privacy policy is positively influenced by his or her self-efficacy regarding the information privacy policy compliance.
Zhang et al. (2009)	Incorporate perceived technical security protection into the theory of planned behavior and examined factors affecting end user security behaviors, specifically, compliance with security policies.	Theory of planned behavior and Risk compensation theory	Survey	Perceived behavioral control is positively related to end users' intention to comply with security policy.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Pittet (2001)	Investigate factors influencing lack of adherence by healthcare personnel to hand hygiene procedures.	None	Survey	Perceived behavioral control positively affects adherence by healthcare personnel to hand hygiene procedures.
Taylor and Todd (1995)	Extends, integrates and compares three models of IT usage (technology acceptance model, theory of planned behavior, and the decomposed theory of planned behavior) derived from the intentions and innovations literatures.	Technology acceptance model, theory of planned behavior, and the decomposed theory of planned behavior	Survey	Perceived behavioral control positively affects individuals' intention to use the technology
Pavlou and Fygenon (2006)	Extend the theory of planned behavior to predict two prevalent online behaviors: getting information and purchasing products from Web vendors. These two behaviors are predicted by examining the major constructs of TPB (attitude and PBC) and their most important antecedents.	Theory of planned behavior	Survey	PBC over getting information from a Web vendor positively influences (1) intention and (2) actual behavior toward getting product information from that Web vendor. PBC over product purchasing from a Web vendor positively influences (1) intention and (2) actual behavior toward product purchasing from the Web vendor.
Cestac et al. (2011)	Study factors likely to influence young French drivers' intention to drive faster than 110 km/h on a road where the speed limit is 90 km/h.	Theory of planned behavior	Survey	Perceived behavioral control positively influence drivers' intention to drive faster than speed limit

2.3 Attitudinal Factors

Attitude is defined as the individual's positive or negative feelings towards engaging in a specified behavior (Ajzen, 1991). In TRA and TPB theories, attitude has been defined as a single construct. However, in the psychology literature, attitude has been considered to be formed of three dimensions (tripartitemodel), that is, cognitive⁷, affective⁸, and behavioral⁹ (Breckler, 1984). Hong et al. (2011, p. 240) argue that "the tripartite model of attitude allows researchers to have a comprehensive view of individuals' attitudes toward change." The tripartite model has been used to examine different employees' attitude towards changes in organizations (Piderit, 2000). Whether considered as one construct as in the case of TRA and TPB or as a tripartite model, attitude has been found to be a stable predictor of individuals' behavioral intentions in numerous studies and there is a wide consensus on truism of this phenomenon(Ajzen, 1991; Breckler, 1984).

Most studies have considered attitude as the immediate antecedent to behavioral intention. In this dissertation, I provide insights into the influence of individual dimensions of task dissonance, perceived ISS quality, and perceived satisfaction with ISS policies. By doing so, I make a significant contribution both to research and practice because no one has studied the impact of these factors on ISS compliance. I now proceed to introduce each of these factors in the sub-sections below.

2.3.1 Task Dissonance

When employees believe that complying with ISS policies make them less productive in performance of their primary tasks (slowing down task completions, making jobs less flexible

⁷ refers to an individual's beliefs, thoughts, and perceptual responses about the attitude object

⁸ refers to an individual's feelings, emotional responses, or gut reactions engendered by an attitude object

⁹ reflects an individual's evaluations of an attitude object based on past behaviors

etc), they undergo “task dissonance.” PrincetonUniversity (2010) defines dissonance as “a conflict of people’s opinion or actions or characters.” Festinger (1962) introduced the Cognitive Dissonance Theory (CDT) to explain how discrepancies (dissonance) between a person’s cognition (feelings) and reality influence the individual’s subsequent actions/behaviors. Cognition refers to an individual’s beliefs, values, affect, opinion, and knowledge about his/her environment, while behavior refers to actions initiated in response to the cognition and/or personal evaluation of that behavior (Festinger 1957).

Extending this definition to the ISS situations, I define task dissonance as the discord arising in individual’s cognition because of conflicting utilities between his/her primary responsibilities/duties and ISS compliance tasks, especially when there was no rewards for complying with ISS. People generally act in a way to reduce dissonance. Thus, if they perceive that doing their primary jobs is more important, they may just decide to overlook ISS policies (copy critical data in the personal laptop to work at home after office hours) thereby reducing dissonance. Therefore, it is important for organizations to design their ISS policies in a manner that employees do not perceive as conflicting with their primary tasks and responsibilities.

In general, individuals tend to choose a pleasant or neutral task when given the choice of performing a task that may be unpleasant, pleasant, or neutral (neither pleasant nor unpleasant) (Foxman and Radtke, 1970). These employees believe that ISS policies add more work without any returns. The inconsistency between the employees’ attitudes or beliefs about what is beneficial for them and the obligation of complying with ISS creates a dissonance (Festinger, 1962). The greater the inconsistency, the greater will be the level of dissonance (Pallak et al., 1967).

In the ISS context, “relative advantage for job performance” is conceptualized as an employee’s assessment of the degree to which ISS helps them in their jobs (Guo et al., 2011). Workman et al. (2008) suggest that employees would think of ISS as net negative if they perceive that the compliance of ISS policies will make them less efficient in carrying their primary responsibilities. The problem is that, for the most part, ISS compliance is not considered as one of the primary responsibilities of most workers. They do not get tangible rewards (incentives, bonuses, promotions) even for fully complying with ISS policies. In contrast, if employees feel that complying with ISS policies allows them to perform better (protects emails from hacking, data from getting stolen), they would perceive complying with ISS as a net positive.

Several studies across disciplines have examined “cognitive dissonance;” however, task dissonance has not been explored in the current literature. It is also not known whether task dissonance influences ISS compliance or not because no study has yet examined this phenomenon. This dissertation makes a significant contribution by investigating the relationship between task dissonance and ISS compliance. A summary of the relevant literature on task dissonance is given in Table 2.7.

Table 2.7 Summary of Relevant Literature on Task Dissonance

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Oshikawa (1969)	Examine the effect of cognitive dissonance theory on consumer behavior	Theory of cognitive dissonance	Experiment	Dissonance reduction increases the repurchase probability of a purchased brand.
Vroom and Deci (1971)	Examine the attitudes of students toward their organizations one year and three and one half years after graduation.	Theory of cognitive dissonance	Survey	There is a greater positive difference between individuals’ ratings of the attractiveness of chosen and rejected alternatives just after rather than just before the choice.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Rabin (1994)	Examine the effects of moral concerns that an individual experience when he does something that hurts others. Why an individual feels bad for such behavior? Is it because of the conflict between the behavior and his own view of moral norms?	Theory of cognitive dissonance	Economical model	-A small increase in the material utility of an activity will increase the level of the activity, and will increase the level of the activity that people think is moral. -A small increase in the cost of maintaining dishonest beliefs will decrease the level of the activity, and will decrease the level of the activity that people think is moral. -There exist stable equilibria in which a small increase in the disutility from cognitive dissonance will increase the level of activity people engage in.
Shultz and Lepper (1996)	Explain how constraint on satisfaction leads to lowered cognitive dissonance	Theory of cognitive dissonance	Simulations	The reduction of cognitive dissonance can be usefully viewed as a constraint satisfaction problem
Cummings and Venkatesan (1976)	Review the consumer behavior literature relating to cognitive dissonance, critique the research, and provide some directions for future.	None	Literature review	none
Dickerson et al. (1992)	Examine the effect of cognitive theory on individuals behavior using an economic model	Theory of cognitive dissonance	Experiment	Higher hypocrisy increases dissonance; higher dissonance decreases water consumption

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Bem (1967)	Propose a theory of self-perception as an alternative interpretation for several of the major phenomena embraced by the theory of cognitive dissonance	Theory of cognitive dissonance; and theory of self-perception	Experiment	attitude statements which comprise the major dependent variables in dissonance experiments may be regarded as interpersonal judgments in which the observer and the observed happen to be the same individual and that it is unnecessary to postulate an aversive motivational drive toward consistency to account for the attitude change phenomena observed
Thogersen (2004)	Examine the issue of consistency and inconsistency in environmentally responsible behaviors	Theory of cognitive dissonance	Survey	Volitional environmentally responsible behaviors are positively correlated because people strive to be consistent in their performance or nonperformance of behaviors that are connected by a common association to a super ordinate goal, such as environmental protection.

2.3.2 Perceived ISS Quality and Perceived ISS Satisfaction

DeLone and McLean (1992); Gotlieb et al. (1994); Bhattacharjee and Premkumar (2004) suggested that perceived quality and perceived user satisfaction are two key elements that determine the success of an IS. Substantial confusion existed between perceived quality and perceived user satisfaction on whether these factors are the same or not because both factors are operationalized based on adaptation theory. This confusion was solved and the distinction between both factors has been explained. Satisfaction perceptions arise out of short reactions with the technology; however, perceived quality occurs as a result of a long interaction with the

technology. Perceived quality has been described as a form of attitude, a long-run evaluation, whereas perceived satisfaction relates to transaction based evaluations (Bitner, 1990). That is, perceived satisfaction is based on predicted expectations from a product while quality perceptions are based on the desired expectations. Quality perceptions are based on individual's evaluation of different attributes of the products and their relative preference to the user (Zeithaml, 1988) while satisfaction perception is influenced by the gap between user's expectation and perceived performance of a technology/service (Kim, 2012). That is, employees are likely to be satisfied if the performance meets or exceeds their expectation (Bhattacharjee, 2001).

Many scholars across disciplines used the Expectation-Disconfirmation Theory (EDT) (Oliver, 1980; Bhattacharjee, 2001; Teas, 1993) to understand individual's perceived satisfaction (Bhattacharjee and Premkumar, 2004). EDT illustrates a process model of individual behavior comprising of three stages:

- i. The initial pre-usage belief of a product/technology
- ii. Experience during usage
- iii. Perceptions of post-usage.

The difference between the initial expectations and the performance of the product/technology forms the disconfirmation which could be positive or negative depending on the difference between the two stages. If performance is better than initial expectations, disconfirmation will be positive; if performance is lower than initial expectations, disconfirmation will be negative. Both disconfirmation and initial expectation jointly determine the employee's perceived satisfaction and dissatisfaction with the technology/product, which at the same time affects employee's continuance usage of the technology/product.

Prior studies regarding the adoption and usage of IS technologies have validated the importance of perceived user satisfaction and perceived quality and found them to be reliable predictors of intention to IS use (Bhattacharjee, 2001; Kim, 2012; Limayem et al., 2007). Does the same phenomena hold good in ISS context? Do employees' perceptions of ISS quality and ISS satisfaction influence their compliance with ISS? No study has yet answered these question. This dissertation investigates the role of perceived satisfaction with ISS, and perceived ISS quality on ISS compliance. Summaries of the relevant literature on perceived quality and perceived satisfaction are given in Tables 2.8 and 2.9.

Table 2.8 Summary of Relevant Literature on Perceived Quality

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Carman (1990)	Replicates and test the SERVQUAL battery and offers suggestions for its use by retailers	None	Survey	None
Yoo and Donthu (2001)	Develop and validate a psychometrically rigorous instrument to measure the perceived quality of an Internet shopping site	None	Survey	None
Anton et al. (2007)	Examine the process whereby consumers dissolve their relationship with their service provider. Determinant factors of the switching intention are poor service quality, unfair pricing, low perceived commitment, critical and episode	None	Survey	The factors predisposing consumers to relationship dissolution (poor service quality and perception of low commitment) will have less influence on switching intention than the precipitating factors (price unfairness and anger incident).

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Gotlieb et al. (1994)	Examine the relationships among disconfirmation of expectations, perceived quality, satisfaction, perceived situational control, and behavioral intentions. Determine TPB and TRA can be extended to provide the theoretical foundation for explaining the relationship among these variables.	Expectancy value theory	Survey	-Positive disconfirmation of the focal dimension of expectations will have a positive effect on the perceived quality of a product. -Positive disconfirmation of the contextual dimension of expectations will have a positive effect on the perceived quality of a product. -Perceived quality will have a positive effect on satisfaction. Satisfaction will not affect perceived quality.
Bhatti et al. (2000)	Estimate users' tolerance of Web Quality of Service in the context of ecommerce	None	Experiment	None
DeLone and McLean (1992)	Present a comprehensive taxonomy that integrates view of the concept of IS success. The taxonomy posits six major dimensions or categories of IS success: system quality, information quality, use, user satisfaction, individual impact, and organizational impact.	None	Literature review	-System quality positively affects use. -System quality positively affects user satisfaction. - Information quality positively affects use. - Information quality positively affects user satisfaction.
Zeithaml (1988)	Presents a conceptual model that defines and relates price, perceived quality, and perceived value.	None	Conceptual	None

Table 2.9 Summary of Relevant Literature on Perceived User Satisfaction

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Kim (2012)	Examine the role of habit in the actual use of mobile data services and applications	Expectation confirmation model, perceived usefulness, perceived enjoyment, habit	Survey	<ul style="list-style-type: none">-User satisfaction with mobile data services and applications positively influences mobile data services and applications habit.-User satisfaction with mobile data services and applications positively influences continuance intention of mobile data services and applications.-Perceived usefulness positively influences user satisfaction with mobile data services and applications.-Perceived enjoyment positively influences user satisfaction with mobile data services and applications.-Confirmation of expectations positively influences user satisfaction with mobile data services and applications.
Limayem et al. (2007)	Explore the role of habit and its antecedent in the context of continued IS usage	Bhattacharjee's (2001) postacceptance model, and habit	Survey	<ul style="list-style-type: none">-Satisfaction with the technology positively affects habit.-Satisfaction with the technology positively affects IS continuance intention.-Confirmation positively affects satisfaction.-Confirmation positively affects perceived usefulness.-Perceived usefulness positively affects satisfaction.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Bhattacharjee and Premkumar (2004)	Investigate the following questions: Do IT users beliefs and attitude toward IT usage change over time as they experience IT usage firsthand? What emergent factors, if any, drive the change and why? To what extent are these effects generalizable across technology and IT usage contexts?	Expectation disconfirmation theory	Survey	-Beliefs (forward looking) positively affects satisfaction -Disconfirmation positively affect satisfaction Satisfaction positively affects attitude
Anton et al. (2007)	Examine the process whereby consumers dissolve their relationship with their service provider. Determinant factors of the switching intention are poor service quality, unfair pricing, low perceived commitment, critical and episode	None	Survey	Consumer satisfaction acts as a mediator variable between the predisposing and precipitating factors of dissolution and the consumer's switching intention. The mediating effect of satisfaction will be stronger for variables that predispose to dissolution than for variables that precipitate dissolution.
Mittal and Kamakura (2001)	Investigates how differences in customer characteristics affect (1) satisfaction thresholds, (2) response bias, and (3) nonlinearity in the satisfaction retention relationship	None	Survey	None

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Lam et al. (2004)	Conceptualize customer loyalty and investigate its antecedents in a business to business service context	None	Survey	<p>-Customer value has a positive effect on customer satisfaction.</p> <p>-Customer satisfaction has a positive effect on customer loyalty (recommend).</p> <p>-Customer satisfaction has a positive effect on customer loyalty (patronage).</p> <p>-The effect of customer satisfaction on customer loyalty (recommend) follows an increasing returns to scale relationship.</p> <p>-The effect of customer satisfaction on customer loyalty (patronage) follows an increasing returns to scale relationship.</p> <p>-Customer loyalty (patronage) has a positive effect on customer satisfaction.</p> <p>-Customer satisfaction mediates totally or partially the relationship between customer value and customer loyalty (recommend) in such a way that the greater the customer value, the greater the customer satisfaction and the greater the customer loyalty.</p> <p>-Customer satisfaction mediates totally or partially the relationship between customer value and customer loyalty (patronage) in such a way that the greater the customer value, the greater the customer satisfaction and the greater the customer loyalty.</p>

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Bhattacharjee (2001)	Examines cognitive beliefs and affect influencing one's intention to continue using information systems (IS)	Expectation confirmation theory	Survey	<ul style="list-style-type: none"> -Users' level of satisfaction with initial IS use is positively associated with there is continuance intention. -Users' extent of confirmation is positively associated with their satisfaction with IS use. -Users' perceived usefulness of IS use is positively associated with their satisfaction with IS use.
Oliver and DeSarbo (1988)	Investigate determinants of satisfaction and the way individuals process these factors to form satisfaction judgments.	Expectation and disconfirmation, equity theory, assimilation theory, and attribution theory.	Survey	<ul style="list-style-type: none"> -Under high expectations, inequity results in low satisfaction. -Under low performance, inequity compounds the small gain and reduces satisfaction while equity enhances outcomes and satisfaction. -Under high performance, the level of equity or inequity has no differential effect. -When others are responsible for the decision and performance is low (but positive), satisfaction is low due to blame attributions. -Under high expectations, low performance results in moderately low satisfaction due to disappointment.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Kim and Kankanhalli (2009)	Investigate the antecedents of trust belief to understand the mechanism of building user trust belief in a community driven knowledge sites.	Expectation confirmation Theory.	Survey	-User satisfaction with community driven knowledge sites positively influences trust belief in community driven knowledge sites -Confirmation of expectations positively influences user satisfaction with community driven knowledge sites. -Perceived usefulness positively influences user satisfaction with community driven knowledge sites. -Perceived enjoyment positively influences user satisfaction with community driven knowledge sites. -User satisfaction with community driven knowledge sites positively influences community driven knowledge sites habit. -User satisfaction with community driven knowledge sites positively influences continuance intention toward community driven knowledge sites.

2.4 Environmental Factors

2.4.1 Word-of-Mouth

Word of mouth refers to a form of informal, interpersonal communication between people regarding their personal experiences about an innovation, product, situations, news, etc. (Brown and Reingen, 1987; Herr et al., 1991). Bone (1992, p.579) defines Word of Mouth as “an

exchange of comments, thoughts, and ideas among two or more individuals in which none of the individuals represent a marketing source.” Social influence has received much attention in social psychology literature and there is sufficient evidence for the relevance of interpersonal communications, known as “word-of-mouth,” when persons make decisions in different situations including complying with rules (Carl, 2006). The effect of word of mouth has received significant attention in the consumer behavior literature because of its persuasive influence on consumers’ attitudes and purchase decisions (Bone, 1995). Whether positive or negative, word-of-mouth has been found to have a strong influence on the individual’s beliefs and behaviors (Arndt, 1967). Studies showed that word-of-mouth communications play a significant role in changing consumers’ attitudes and behaviors, and that consumers are more likely to rely on interpersonal communications compared to other communications media because of the real experience other individuals have had in the situation (Murray, 1991).

Karahanna et al., (1999, p. 189) suggest that there are two forms of social influence:

- i. “Informational influence: when individuals accept information as evidence of reality, and
- ii. Normative influence: when individuals conform to expectations of others.”

These two forms of social influence (informational and normative) are related to the communication process described in the Diffusion of Innovation (DoI) theory (Rogers, 1976). The DoI theory predicts the spread of an innovation, based on the time an individual takes to adopt new technology, and classifies five categories of adopters: innovators, early adopters, early majority, late majority, and laggards. It proposes that prospective adopters may form opinions of an innovation based on information collected from (1) external influence (e.g. media reports and expert opinions) and (2) interpersonal influences (word-of-mouth) (e.g. friends, colleagues,

superiors, and prior adopters). Studies in the IS and marketing validated the impact of both forms of influence on new product acceptance (Brancheau and Wetherbe, 1990; Herr et al., 1991).

In the ISS context, “word-of-mouth” can be conceptualized as an interpersonal communication occurring between two or more individuals, within or outside the organization, the core theme of communication being ISS. Many scenarios can be illustrated. An employee in an office may talk to his/her group members about how he/she had taken a full back up of customer data in his/her laptop and had nearly lost this laptop when clearing security at the airport. A friend may share an anecdote about his/her yahoo email being locked because of multiple login attempts even though he/she himself did not attempt these logins. The contents of these word of mouth communications may involve security news or accidents that people had experienced themselves or had the firsthand knowledge of. A person may become more risk averse in matters of ISS after hearing from his/her friend losing money because a bank account was compromised. Several studies in marketing literature have found that word of mouth was a stronger predictor of intentions and brand awareness as compared to regular advertisement channels. Does the same phenomenon hold good in ISS context? Do employees pay more attention to what they hear through informal channels rather than formal channels? No study has yet examined this phenomenon. This dissertation investigates the role of word-of-mouth and its impact on employees’ compliance with ISS policies. A summary of the relevant literature on word-of-mouth is given in Table 2.10.

Table 2.10 Summary of Relevant Literature on Word-of-Mouth

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Brown and Reingen (1987)	Examine the effect of strong social tie on word of mouth	The strength of weak ties	Interview	<ul style="list-style-type: none"> -Weak ties activated for a referral are more likely than strong ties to serve as bridges through which WOM referrals flow. -When a consumer is in social relations with both strong and weak ties who are available as potential sources of referral, strong ties are more likely than weak ties to be activated for the referral flow. -Active information seeking is more likely to occur from strong tie than weak tie sources of referrals. -Weak ties activated for the WOM referral flow of information are more heterophilous than activated strong ties.
Herr et al. (1991)	What are the effects of word of mouth communications and specific attribute information on product evaluations?	None	Experiments	<ul style="list-style-type: none"> -Word of mouth communications should have a greater impact on product judgments relative to less vivid printed information. -Vivid WOM communications should have a reduced effect on product judgments when a prior impression of the product is available (vs. not available) from memory. -Vivid WOM communications should have a reduced effect on product judgments when extremely negative attribute information is available
Murray (1991)	Study the consumer preferences for information in the consumption decision process involving services.	Services marketing theory		<ul style="list-style-type: none"> -Consumers choose more personal sources of information for services than for goods. -Personal independent sources of information are more effective for services than for goods. -Consumers have greater confidence in personal sources of information for services than for goods. -Service consumers use direct observation and/or trial as a source of pre purchase information less often than consumers of goods.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Murray (1991)	Study the consumer preferences for information in the consumption decision process involving services.	Services marketing theory		<ul style="list-style-type: none"> -Consumers choose more personal sources of information for services than for goods. -Personal independent sources of information are more effective for services than for goods. -Consumers have greater confidence in personal sources of information for services than for goods. -Service consumers use direct observation and/or trial as a source of pre purchase information less often than consumers of goods.
Bone (1992)	Examine the determinants of word of mouth communications during product consumption	None	Field study	<ul style="list-style-type: none"> -The amount of word of mouth in a group is expected to increase as the number of weak social ties among group increases. -The amount of word of mouth in a group is expected to increase when a group member takes on the role of committed decision maker. -The amount of word of mouth in a group is expected to increase as the number of individuals in the group who are experiencing the restaurant for the first time increases. -The amount of word of mouth in a group is expected to increase as the number of individuals who are experiencing a particular entre in the restaurant for the first time increases. -The amount of word of mouth in a group is expected to increase when the consumption experience represents a gift giving situation. -The amount of word of mouth in a group is expected to increase as the number of people in the group who experience extreme satisfaction increases.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Bone (1992)	Examine the determinants of word of mouth communications during product consumption	None	Field study	-The amount of word of mouth in a group is expected to increase as the number of people in the group who experience extreme dissatisfaction increases. -The amount of word of mouth in a group is expected to increase as the number of individuals in the group who receive the consumption experience as novel increases.
Carl (2006)	Examine the buzz (contagious talk about a brand, service, product, or idea) marketing and its effects on consumer purchase behavior.	None	Survey	None

2.5 Psychological Enablers/Disablers

This section provides an overview of psychological enablers/disablers factors that can influence security culture and employees' compliance with ISS policies. Specifically the literature on self-policing, habit, and resistance towards using ISS policies is reviewed.

2.5.1 Self-Policing

I introduce a new construct called "self-policing" to capture the psychological processes that individuals undergo when facing a choice set that involves controlling one's behavior. It is distinct from attitude and moral norms as it occurs post belief formations but before intentions are being formed. From a process standpoint, self-policing mediates the decision making path between the belief set comprising of attitudinal and normative factors and intentions. Webster (1913) defines the root word police as "to keep in order." The Collaborative International Dictionary of English v 0.48 refers Webster (1913) in defining "police" as "that concerns with

the order of community; the internal regulation of the state.” Wordnet (PrincetonUniversity, 2010) captures the verb sense of “police” as “maintain the security of by carrying out a patrol.” Wordnet (PrincetonUniversity, 2010) also provides coordinating terms of verb police as, “stand guard, sand watch, keep guard, stand sentinel.” When this notion is applied to individuals as self, two conceptualizations are necessary “of standing guard and something that requires guarding.” The notion of policing is easy to understand when applied to two entities those standing guard and those who willingly or otherwise act to disturb the order. Crawford (2005) describes policing as “intentional action involving the conscious exercise of power or authority (by an individual or organization) that is directed towards rule enforcement, the promotion of order or assurances of safety.” Extending this argument to self is perhaps somewhat abstract as interplay between two is applied to a single self. I borrow the theoretical explanation of self-policing from Thaler and Shefrin (1981, p. 394) who “model man as having two sets of preferences that are in conflict at a single point in time.” Thaler and Shefrin (1981) call this as a two-self model in which conflict arises because of long term preferences and more myopic short term preferences in individuals.

Self-policing is therefore the exertion of power over the self by the self to produce publicly approved behavior in the absence of external monitor/police and thus are regulating and enforcing the rules/policies by themselves on themselves. In other words, instead of having “police” to regulate individuals’ behaviors, these individuals regulate/police their own actions and behaviors. Bandura and Simon (1977) state that neither intention nor desire alone has much effect if an individual lacks the capability for exercising influence over his/her own motivation, beliefs and actions. To do this, an individual has to pay adequate attention to his/her own performances, the conditions under which they occur, and the immediate actions they produce.

Most IS literature till now focused on adoption, implementing change, diffusion issues because scholars and practitioners were more concerned with increasing use of IS technologies. Theories of reasoned action, planned behavior, and diffusion of innovation did a good job in explaining most phenomena related to adoption, use, and diffusion. Perhaps, new constructs may be necessary to provide insights into control problems such as ISS. Introducing the construct of self-policing, make a humble beginning in this endeavor. I explain how Thaler and Shefrin's conceptualization of two self-model can be applied to the ISS context.

Self-policing can be conceptualized as the conscious compliance with ISS policies to protect organizations' systems and data. Compliance refers to the application of the rules described in the policies as is without any need for anyone to monitor the employees. An employee who is working on a project that has short deadline receives a call and he/was asked to leave the work early because he/she has to take a member of his/her family to the physician. This person will have two options: (1) leave the work and come back do the work after work-time or during weekend; or (2) take the project home in order to finish it. This employee knows that if he/she chooses the second option, he/she can finish the work on time and in a convenient way (does not have to come outside work hours to finish) but he/she disobeys the ISS policies. Schelling (1978) argues that though this employees knows that this is a wrong behavior, he/she still decides to take it by giving excuses that he/she cannot come to work after work time. The theory of moral sentiments states that a person may be influenced by multiple psychological motives, each motive judged by a particular standard (Smith, 1759). Premised on this reasoning, self-policing reflects a conflict among multiple forces inside an individual. In the ISS context, one set of forces may be pro-compliance while the other may be anti-compliance. This

dissertation examines the relationships between moral norms and self-policing and ISS compliance. A summary of the relevant literature on self-policing is given in Table 2.11.

Table 2.11 Summary of Relevant Literature on Self-Policing

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Smith (1759)	Explains individuals' behavior as a result of ethical, philosophical, and psychological Factors Theory of moral sentiments	Theory of moral sentiments	None	None
Thaler and Shefrin (1981)	Explain the inner powers that affect individuals' decision and behavior	Economic theory of self-control; the theory of agency	Economic model	None

2.5.2 Habit

Verplanken et al. (1997, p. 540) define habits as “learned sequences of acts that become automatic responses to specific situations which may be functional in obtaining certain goals or end states.” In other words, habit refers to a repeated behavioral pattern that spontaneously occurs without conscious awareness leading to a habitual behavior (Triandis, 1971). Once a habit has been acquired, performance of future behaviors that are based on previous repeated behaviors requires little (if any) conscious attention and only minimal mental effort (Wood et al., 2002). Limayem et al. (2007) argue that habit is not the same as behavior; it is a special kind of mind-set that motivates an individual to perceive habit-related cues (Verplanken and Aarts, 1999). Verplanken et al. (1998) suggest that individual’s behavior is guided by conscious intention as well as by habitual responses. In their research, Limayem and Hirt (2003) propose

that technology use can be made habitual through making it mandatory initially or introducing rewards and other incentives for the use of the technology.

Habit has always been considered to be at least partly responsible for influencing individuals' behavior. Scholars in different disciplines have extensively examined the importance of habit. Major research has been conducted in health sciences (Lindbladh and Lyttkens, 2002; Orbell et al., 2001) marketing/consumer behavior (Bargh, 2002), food consumption (Saba et al., 1998); social psychology (Aarts et al., 1998; Bagozzi, 1981; Bargh et al., 2001) and organizational behavior (Louis and Sutton, 1991). These studies show that the formation of habit has two distinct characteristics:

- i. Self-reinforcing process, i.e. previous experience helps individuals to improve their skills and formulate a habitual behavior, and
- ii. Routinized responses that is individuals repeat previous behaviors automatically without consciousness.

Despite its importance, habit has found only little attention in the IS literature over the years (Bergeron et al., 1995; Limayem and Hirt, 2003; Thompson et al., 1994; Tyre and Orlikowski, 1994; Hong et al., 2011). In general, habit has been investigated from three different perspectives:

- i. The moderating effect of habit on the relationship between intention and IT use,
- ii. The direct effect of habit on IT use, and
- iii. The direct effect of habit on intentions to use IT (Vance et al., 2012).

Although the influence of habit in the IS adoption and usage phenomenon is validated (Kim, 2012; Limayem et al., 2007), the exact role of habit remains unclear in the ISS compliance. In a quantitative study, Pahnla et al. (2007) found a positive relationship between

habit and employees' ISS compliance. Their findings showed that ISS compliance could become habitual if it is enforced and thus influence employees' intention to ISS compliance. In another study, Vance et al. (2012) explored the impact of habit on intention to comply with ISS policies using the Protection Motivation Theory (PMT). They found that habit impacts the threat appraisal and coping responses of PMT. This dissertation assesses the role of habit acquired before the implementation of ISS policies on employees' ISS compliance. A summary of the relevant literature on habit is given in Table 2.12.

Table 2.12 Summary of Relevant Literature on Habit

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Lankton et al. (2010)	This study examines habit's antecedents and investigates the simultaneous effect of habit and prior IT use on continued IT use.	Learning theory and post adoption mode by Jasperson et al (2005)	Survey	-Habit will positively influence continued IT use frequency -Task complexity will negatively influence IT use habit. -Importance will positively influence IT use habit. -Prior IT use will positively influence IT use habit -Satisfaction will positively influence IT use habit
Pahnila et al. (2007)	Explain how employees' compliance with IS security policies and guidelines can be improved	General deterrence theory, protection motivation theory, the theory of reasoned action, information systems success, and Triandis' behavioral framework	Survey	-Habits positively affect an employee's intention to comply with IS security policies.
Polites and Karahanna (2012)	Examine inhibiting factors that affects users resistance of new technologies	Status quo bias	Survey	Incumbent system habit will positively impact inertia

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Vance et al. (2012)	Examine the influence of past and automatic behavior (habit) on employee decisions to comply with information systems security policies	Protection motivation theory	Survey	-Habit positively influences vulnerability. -Habit positively influences perceived severity. -Habit negatively influences rewards. -Habit positively influences response efficacy. -Habit positively influences self-efficacy. -Habit negatively influences response cost.
Kim (2012)	Examine the role of habit in the actual use of mobile data services and applications	Expectation confirmation model, perceived usefulness, perceived enjoyment, habit	Survey	-Perceived monetary value positively influences mobile data services and applications Habit -User satisfaction with mobile data services and applications positively influences mobile data services and applications habit -Mobile data services and applications habit positively influences the actual use of mobile data services and applications -Variety of usage positively influences mobile data services and applications habit.
Limayem et al. (2007)	Explore the role of habit and its antecedents in the context of continued IS usage	Bhattacharjee's (2001) postacceptance model, and habit	Survey	-Satisfaction with the technology positively affects habit. -Comprehensiveness of usage positively affects habit. -Frequency of behavior positively affects habit. -Habit moderates the relationship between IS continuance intention and IS continuance usage

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Limayem and Hirt (2003)	Examine the influence of habit on users' usage of the technology by extending the theory of planned behavior	Theory of planned behavior, Triandis' (1980) behavioral framework, and habit	Survey	Habit positively affects actual usage of the technology
Saba et al. (1998)	Examine the important predictors of intention and behavior (milk consumption) using an extended version of TRA by adding habit	Theory of planned behavior	Survey	Habit to drink milk positively affects the intention to consume milk.
Chiu et al. (2012)	Chiu et al. (2012) Investigate the moderating role of habit on the relationship between trust and repeat purchase intention in online settings. It also investigates the antecedents of habit. Based on studies such as Limayem et al. (2007), Van der Heijden et al. (2003), and nd Lankton et al. (2010)	Based on studies such as Limayem et al. (2007), Van der Heijden et al. (2003), and nd Lankton et al. (2010)	Survey	-Buyers' satisfaction is positively related to their habit of shopping from an online seller. -Perceived value is positively related to the habit of shopping from an online seller. -Familiarity is positively related to the habit of shopping from an online seller. -The habit of shopping from an online seller reduces the influence of trust on repeat purchase intention.
Aarts et al. (1998)	Examine the effect of habitual behaviors on individuals' actual behavior using a travel context.	Theory of planned behavior	Experiment	-When behavior is performed repeatedly and becomes habitual, it is guided by automated cognitive processes, rather than being preceded by elaborate decision processes

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Bargh et al. (2001)	Examine whether goals can be automatically activated with unconsciousness under the effect of habit	dynamic theory of action	Experiment	Goals can be activated outside of awareness and then operate non-consciously to guide individuals' self-regulation effectively.
Limayem and Cheung (2008)	Extend Bhattacherjee's IS continuance model by adding habit as the moderator between IS continued intention and IS continued use in an Internet based learning technology context	Bhattacherjee (2001) model, and habit	Survey	Habit positively affects IS continued use. Habit moderates the relationship between IS continuance intention and IS continued use.

2.5.3 Resistance toward ISS Policies

Historically, employees' resistance to change has been found to be a major factor for many projects failures. Usually, when a new technology is implemented in organizations, new rules and procedures are implemented. As a response to these changes caused by the implementation, employees' resistance becomes very significant due to the different changes in social as well as technical systems. Resistance has been defined as "opposition, challenge or disruption to process or initiatives" (Ferneley and Sobreperez, 2006; Jermier et al., 1994). Bhattacherjee and Hikmet (2007, p. 727) argue that "while acceptance behavior is targeted at a specific IT and driven by user perceptions related to that IT, resistance is a generalized opposition to change engendered by the expected adverse consequences of change. Resistance is therefore not focused so much on a specific IT, but on the change from the status quo caused by IT usage."

Possible behaviors due to resistance range from lack of cooperation to sabotage (Prasad and Prasad, 2000; Waddell and Sohal, 1998). In a qualitative research study, Ferneley and Sobreperez (2006) suggested that resistance passes through two phases; the first contains the employee cognitive process that leads to a resistance decision, the second contains the actual behavior of the employee which could be compliance, resistance or workaround¹⁰ (Ferneley and Sobreperez, 2006). Lapointe and Rivard (2005) point out that employees' reaction to new systems and changes takes different steps starting with the assessment of the new system, based on the initial interplay of its features, until forming a decision. Based on this, Lapointe and Rivard (2005) identified five basic constituents of resistance: behaviors, object, subject, threats, and initial conditions. Laumer and Eckhardt (2010) point out that previous studies of user resistance have a common argument, i.e., resistance is neither good nor bad and assume that resistance results from the mutual influence of several antecedents.

Within change management literature, resistance has been modeled as a tridimensional factor: affective, cognitive, and behavioral responses to change (Kark Smollan, 2006). George and Jones (2001) suggest that resistance includes both cognitive and affective components that come into play at different stages of the resistance process. Piderit (2000) argues that resistance to organizational changes can be understood from a multidimensional view of attitude because conceptualizing each dimension as a separate factor permits the examination of different reactions along the different dimensions. This could be explained in case an employee's cognitive response to a change in the ISS policies is in conflict with his or her emotional response. For instance, an employee may see the potential benefits of ISS policies for the organization but be concerned of the increased workload that this change might yield. In this

¹⁰ a related but separate and distinct phenomena from that of resistance

dissertation, I adopt Piderit (2000) argument and use resistance as an “attitude factor” which means resistance to use IS policies in this study is not the main (dependent) behavioral factor.

Despite the importance of resistance for the success of IS projects implementation, Kim and Kankanhalli (2009) state that few studies have proposed theoretical explanations of user resistance. They further mention that there is a lack of theoretically grounded approaches with quantitative empirical validation (e.g., through surveys). Laumer (2011) suggests that assessing the influence of satisfaction, organizational commitment and turnover intentions on resistance extend our understanding on organizational change. Thus, he called for those studies that explore whether significant relationships exist between these factors or not. In this dissertation, I examine the relationship between satisfaction and resistance to use ISS policies.

In a taxonomy research, Thomson et al. (2006) suggest that when implementing ISS policies, organizations have to take into consideration the beliefs and attitudes of their employees because often change in the current organization culture and the way things are done are necessary. These changes cause a huge amount of anxiety and resistance to change in employees. The top management must support significant organizational change or practice to influence employees’ values, norms and attitudes. Showing support from the management could help employees change their attitudes, norms, and thus reduce the level of anxiety to change. This dissertation suggests crucial relationships between resistance and attitude, norms, and top management support that enrich the body of knowledge and our understanding on factors affecting employees’ ISS compliance. In this dissertation, I quantitatively assess the relationships between attitudinal, normative and resistance to use ISS policies.

Belanger et al. (2011) argue that even if ISS policies are mandatory, a broad spectrum of reactions exists from compliance to resistance. Although employees are often faced with

mandatory ISS changes in an organization, they may exhibit other forms of resistance, which can negatively impact organization's implementation of technology (Lapointe and Rivard, 2005). In a mandatory setting, resistance to change may include voicing opposition, formally protesting, complaining, and demanding the withdrawal of the change (Lapointe and Rivard, 2005). Opposition to the ISS change could be presented by incorporating only minimum requirements and/or waiting until the last minute to comply with the required change. Although, this study adds to our understanding on the ISS compliance, it is noticed that this study did not investigate the relationships pointed previously by Thomson et al. (2006). A summary of the relevant literature on resistance is given in Table 2.13.

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Bhattacharjee and Hikmet (2007)	Explain what factors lead to physicians' resistance of healthcare information technology (HIT)	Technology acceptance model	Survey	-Physicians' resistance to change is negatively related to their intention to use HIT systems. -Perceived threat from HIT usage is positively related to physicians' resistance to change. -Physicians' resistance to change is negatively related to their perceived usefulness of HIT usage. -Physicians' resistance to change is negatively related to their perceived ease of use of HIT usage.
Thomson et al. (2006)	Discusses the importance of security culture on improving the information security effectiveness	None	Commentary	None
Ferneley and Sobreperéz (2006)	Examine users resistance to IT and the workaround in organizations from both positive and negative sides	None	Case study	None

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Belanger et al. (2011)	Examine the factors that affect user resistance to a mandatory security enhancement	Protection motivation theory, theory of planned behavior, technology acceptance model	Survey	-Attitude towards the mandatory security change will be negatively related to resistance behaviors.
Prasad and Prasad (2000)	Show how routine resistance was discursively constituted and how it limited organizational control. The discursive constitution was achieved through (a) owning resistance, (b) naming resistance, and (c) designating indirect resistance	None	Qualitative	None
Bamberg et al. (2003)	Examine whether habitual car use lead to more resistance to change of travel mode?	Theory of planned behavior	Survey	If past frequency of car use has resulted in an automatic response to goal related cues, one should expect resistant to change of travel mode
Kim and Kankanhalli (2009)	Explain user resistance prior to a new IS implementation by integrating the technology acceptance and resistance literatures with the status quo bias perspective	Technology acceptance model, and status quo bias theory	Survey	-Perceived value has a negative effect on user resistance. -Switching costs have a positive effect on user resistance. -Organizational support for change has a negative effect on user resistance -Self efficacy for change has a negative effect on user resistance. -Favorable colleague opinion has a negative effect on user resistance.
Laumer (2011)	Explain why do users reject technologies?	None	Literature review	None

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Piderit (2000)	How can we balance the organizational need to foster ambivalent attitudes toward change and the individual need to minimize the potentially debilitating effects of ambivalence?	None	Literature review	None
Ferneley and Sobreperéz (2006)	Examine users resistance to IT and the workaround in organizations from both positive and negative sides	None	Case study	None
Waddell and Sohal (1998)	Discuss how management may greatly benefit from techniques that carefully manage resistance to change by looking for ways of utilizing it rather than overcoming it.	None	Commentary	None

Study	Research Problem	Theory	Methodology	Propositions/Hypotheses
Laumer and Eckhardt (2010)	Explain why do users reject technologies?	Technology resistance and organizational change literature	Survey	-Resistance as a personality trait has a positive, direct impact on the affective resistance to change of individuals. -Resistance as a personality trait has a positive, direct impact on the behavioral resistance to change of individuals. -Resistance as a personality trait has a positive, direct impact on the cognitive resistance to change of individuals. -Affective resistance to change of individuals has a positive, direct effect on individual resistance behavioral intention. - Behavioral resistance to change of individuals has a positive, direct effect on individual resistance behavioral intention. -Cognitive resistance to change of individuals has a positive, direct effect on individual resistance behavioral intention.

2.6 Theoretical Gaps in ISS Research

Based on the above literature review, I argue that there are at least eight main theoretical gaps in the literature, which also obstruct our understanding of the effective ISS management practices in organizations. First, despite the fact that researchers have noted and studied the important role of psychological factors (habit and resistance) in ISS, I found that these studies in general lack strong theoretical foundations for linking these factors to ISS compliance. It is not clear whether these factors directly impact ISS compliance or they mediate relationships between individual's attitudinal and normative factors, and ISS compliance. In literature resistance has

been investigated in only one study and has been examined as a behavioral factor and not attitudinal; whereas habit has been examined in two studies as the acquired behaviors after ISS implementation. Habit and resistance have been considered in many studies as psychological factors, thus it is prudent to understand what elements may impact these factors as it is known that psychological factors are not fix (please refer chapter 1 for more details).

Second, self-policing which is another psychological factor has not been conceptualized and examined in literature. Because of the lack of studies on this factor, it is not clear whether self-policing impacts ISS compliance directly or it is a mediator between individual normative factors and ISS compliance.

Third, in the ISS studies I found the role of environmental factors, namely word-of-mouth, to be absent. Word-of-mouth has been found to be an important factor in determining individual's behavior as discussed in Section 2.4.1. It is not clear whether word-of-mouth impacts ISS compliance directly or its effect is mediated by other psychological factors, because no models have been proposed or tested in this matter. Hence, articulating and testing the explicit role of word-of-mouth in shaping employees' ISS compliance behavior will fill a major gap and make a significant contribution to the theory and practice of ISS compliance and management.

Fourth, in examining the influence of attitudinal factors on ISS compliance, researchers have mainly used the general construct "attitude". Attitudinal factors such as satisfaction with technology, and perceived system quality have been found to be crucial factors that impact individual's behavior (please refer to the paragraph on attitudinal factors above for more details). It is crucial to investigate whether low level attitudinal factors such as perceived satisfaction with ISS, perceived ISS quality influence employees' ISS compliance. Also, the literature has not

explored the impact of task dissonance, which might be formed when implementing ISS policies, on employees' ISS compliance.

Fifth, the role of moral norms is not clear in the literature since it has not been thoroughly examined. For instance, moral norms related to employees' motivation have not been investigated. Also, it not known whether moral norms influence ISS compliance directly or its effect is mediated by other psychological factors.

Sixth, the impact of organizational factors namely, top management support, and organizational punishment has not been thoroughly investigated. For instance, studies in ISS have not explicitly examined the indirect relationship between punishment and behavior but demonstrated the direct influence of punishment on employees' behavior. Venkatesh and Davis (2000) argue that punishment may have an impact on employees' attitudes and beliefs. However, the relationships between organizational punishment and different normative and attitudinal factors have not been discovered yet.

Seventh, in literature top management support has been measured using top management participation as a proxy. To measure the different dimensions of top management support, multidimensional construct should be used.

Finally, the impact of top management support on attitudinal/normative factors has not been explored with the exception of Hu et al. (2012) who examined its influence on PBC factors; injunctive norms, and attitude. Descriptive norms and moral norms are two different types of normative factors that, before this dissertation, we do not know whether top management support influences them or not.

In the next section, I present the conceptual, followed by the research model and hypotheses that explicate how organizational, environmental, attitudinal, normative and psychological factors influence employees' ISS compliance.

CHAPTER III

THEORY AND HYPOTHESES DEVELOPMENT

In this chapter, I first describe the conceptual model that bridges current gaps in the ISS compliance literature. Next, I describe the theoretical support for the research model and present the hypotheses.

3.1 Conceptual Model

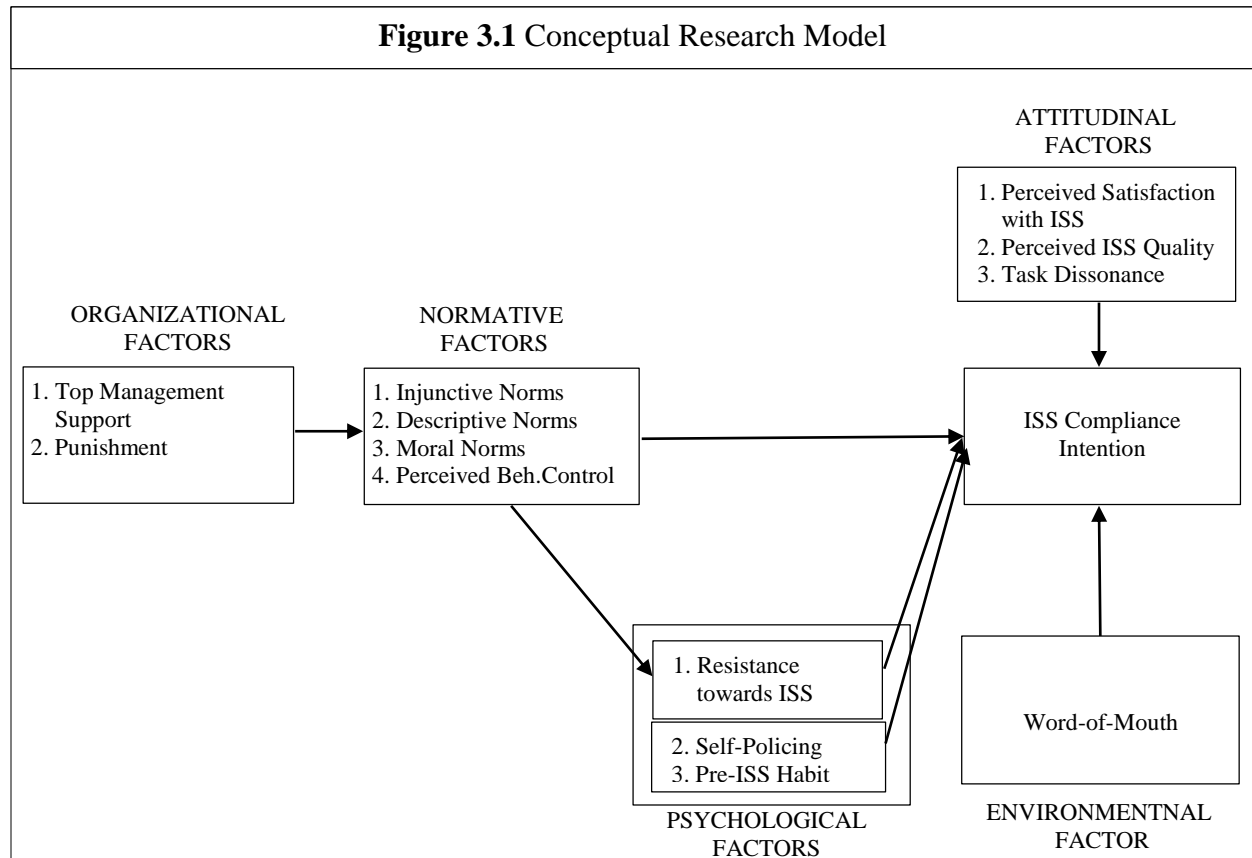
This dissertation seeks to develop an integrated model of employees' ISS compliance from a process perspective. Thus, I am interested in examining both direct and indirect effects of various pertinent factors on ISS compliance. Most ISS research in studying individual behavior primarily focus on attitudinal and beliefs constructs included in the TPB. The research model builds upon the TPB.

In this model, I differentiate between two categories of normative beliefs: the “is” (descriptive) and the “ought” (injunctive) (Cialdini et al., 1991; 1990). Descriptive norm is not included in the TPB. Conner and Armitage (1998) argue that moral norm has an important direct influence on behavior in some situations that include ethical dimensions. In this dissertation, I use the three types of social norms: injunctive, descriptive, and moral.

Second, in TPB, attitudinal factors are presented using the general construct “attitude.” However, in the psychology literature, attitude has been considered to be a multi-dimensional construct composed of three classes of evaluative responses: affective, cognitive, and behavioral

(Breckler, 1984). To better understand the impact of attitude on ISS compliance, in this dissertation I use three low level factors namely satisfaction with ISS, perceived ISS quality, and task dissonance. The influences of these attitudinal factors on ISS compliance have not been investigated before in ISS context. Thus, this dissertation investigates the influence of multi-dimensional attitudinal factors namely satisfaction with ISS, perceived ISS quality, and task dissonance on ISS policies compliance.

TPB's factors are salient beliefs and attitudes towards a principal behavior in a social context. Individual's behavior, on the other hand, is shaped and influenced by environmental, situational, and personal factors (Bandura, 1986). I argue that to fully understand employees' ISS compliance and to build a security culture in an organization, an investigation on the effects of the environmental, situational, and personal factors on employees' behavior is needed. It is important to understand why some employees comply with ISS while others do not, and why ISS compliance is higher in some organizations than in others. In this dissertation, drawing on the findings of prior literature on psychology, organizational behavior, and social psychology, I integrate different theoretical paradigms in order to explain employees' compliance with ISS. The major premise of this dissertation is that organizational factors influence employees' normative factors towards ISS, which in turn either directly affect the employees' compliance with ISS/or indirectly through psychological enablers/disablers factor (resistance). Attitudinal and environmental factors impact employees' intention to comply with ISS policies (Bandura, 1986). Figure 3.1 shows the conceptual model.



3.2 Top Management Support and Norms

In this section, I discuss three theories that underpin the relationships between top management support and the normative factors. I then present a set of hypotheses that are tested against the relations.

3.2.1 Theory of Reasoned Action

The Theory of Reasoned Action (TRA) focuses on individual's intention to behave in a certain way (Ajzen, 1975). An intention is a plan or a likelihood that an individual will behave in a particular way in specific situations. TRA posits that an individual's behavioral intention can be predicted based on his/her attitudes toward the behavior and subjective norm. According to

TRA, individuals' attitudes toward a particular behavior are influenced by individuals' beliefs about the outcome of the behavior. Subjective norm is premised on the notion that individuals are members of social groups (e.g. families, neighbors, professional communities) and that the individuals are subject to influences of standards of social behavior implicitly established by the group. Individuals' perception that others around them expect them to behave in a specific way influence their behavior. TRA has been used extensively to predict individuals' behaviors and compliance (Elliott et al., 2003).

3.2.2 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) extended the Theory of Reasoned Action by bringing in the notion of "perceived behavioral control" (Ajzen, 1991). According to TPB, an individual's intention to perform a given behavior is a function of:

- i. Feelings towards engaging in a specific behavior (attitude),
- ii. Perception of whether important others around the individual expects him/her to behave in a particular way (injunctive norm)
- iii. Perception of the individual's ability to perform a behavior (perceived behavioral control).

The extension became necessary because a counter-argument against the relationship between behavioral intention and actual behavior was raised (Ajzen, 1991). It was proposed that behavioral intention does not always lead to actual behavior and is not the only direct predictor of actual behavior especially where an individual does not have a complete control over the situation (Ajzen, 1991). With this extension, TPB covers non-volitional behaviors for predicting behavioral intention and actual behavior. TPB has also been used in wide range of studies that focused on individual behavior (Hu et al., 2012).

3.2.3 Social Exchange Theory

Social exchange theory (SET) is a social psychological theory that posits how individuals deal with other members in a group (Blau, 1964; Kelley and Thibaut, 1959). The premise of SET is that individuals when dealing with others tend to base their decisions based on a cost-benefit analysis; the higher the benefit that an individual can get from interacting with others, the greater the communication between the members would be. In other words, individuals can be viewed as rationally choosing between different options. Since social exchanges require physical and mental efforts from individuals, they tend to choose the relationships that are accompanied with rewards. This theory has been used to explain why top management support influences employees' behavior especially when organizations initiate significant changes (Gefen and Ridings, 2002). Employees tend to think that they may be able to extract greater benefits for themselves by associating themselves with such actions that have the sanction and approval of top management.

3.2.4 Discussion and Hypotheses

Many studies found that cognitive beliefs of employees are influenced by the observed behavior of top management (Armstrong and Sambamurthy, 1999; Jarvenpaa and Ives, 1991; Puhakainen and Siponen, 2010). Hu et al. (2012) argue that there are at least three significant mechanisms through which top management can shape the cognitive beliefs of employees towards new initiatives and policies:

- i. Legitimacy mechanism: This occurs by championing the new policies through (1) articulating a clear vision and strategy, and (2) setting the goals and measures about the policies. Establishing legitimacy of ISS policies is important because otherwise

employees may consider these as “unnecessary extra work.” (Albrechtsen, 2007; Hu et al., 2011).

- ii. Visible top management commitment: Visible commitment sends an implicit message to employees that the “changes” or “policies” do matter. If employees perceive their top management to be committed to a project, they will respond by trusting it and by making decisions in equivalence with the new policies (James, 2000).
- iii. Fairness and justice mechanism: Tyler et al. (2007) argue that an organizational environment characterized by fair procedures lead employees to form positive beliefs and attitudes towards the organization and the projects that are being implemented.

ISS policies implementation may increase employees’ anxiety because of increased complexity of dealing with IS and additional responsibilities thrust upon them. Top management support can be demonstrated by allocating enough resources for the project, themselves practicing the ISS policies, setting clear strategies, providing training for employees, and supporting the ISS organization etc. Existing studies indicate that top management support should positively influence employees in adopting and using ISS policies (Hu et al., 2012).

Allocation of resources is suggested as one of the primary dimensions of top management support for undertaking any significant organizational endeavor (Igarria et al., 1997). Employees can improve their proficiency and skills in ISS by undergoing training, attending workshops and colloquiums that can be enabled by allocating adequate resources. Allocating adequate resources also helps organizations acquire various technological tools and applications that may be essential to protect firm’s data and computing resources. Thus, provision of adequate resources is linked to the confidence employees may perceive in tackling various ISS issues. The TPB stipulates that perceived behavioral control is the aggregate sum of control beliefs and perceived

power (Ajzen, 1991). If employees feel that they have the requisite knowledge and resources to deal with ISS situations, they are likely to believe that they have more control and power over ISS compliance requirements. Therefore, I posit that:

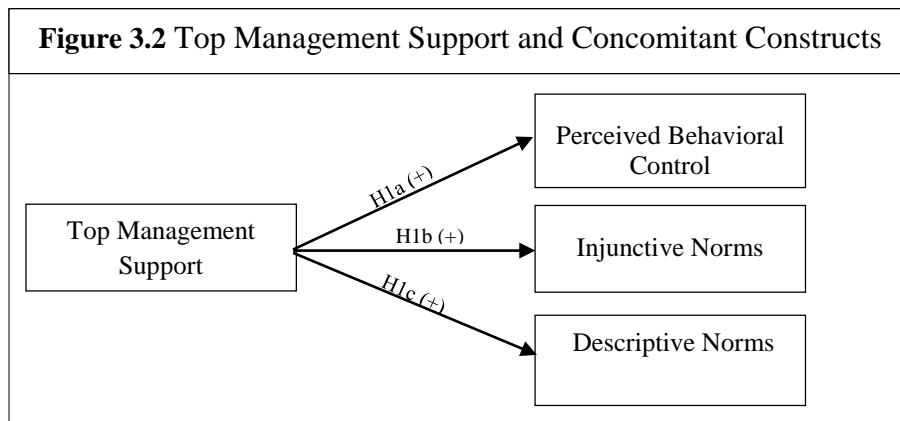
H1a: Greater top management support for ISS policies will positively influence employees' perceived behavioral control.

Injunctive norm is the employees' perceptions of what others expect them to do (Cialdini et al., 1991). For instance, employees are expected to comply with organizational rules/policies because it is deemed to be a part of their job. One of the dimensions of top management support is leadership (Green, 1995). Leadership visibility and support make employees believe/know what is expected from them by the group they belong to. Therefore, I posit that:

H1b: Greater top management support for ISS policies will positively influence injunctive norms.

Descriptive norm is what an individual thinks others do in a particular situation. In stable environments, visible top management actions influence what most people do because good leaders become role models of members they lead (Green, 1995). Applying this analogy to the ISS context, if persons comprising the top management comply with ISS policies, employees are likely to imitate their leaders' behavior by themselves complying with ISS policies. In other words,

H1c: Greater top management support for ISS policies will positively influence descriptive norms.



3.3 Punishment and Norms

In this section, I discuss three theories that underpin the relationships between organizational punishment and the normative factors. I then present a set of hypotheses that are tested against the relationships.

3.3.1 General Deterrence Theory

The General Deterrence Theory (GDT) (Blumstein, 1978), originating from the discipline of criminology, implies a psychological process whereby individuals are prevented from committing a crime only if they perceive sanctions to be certain, and severe. Merriam-Webster Dictionary defines deterrence as “the inhibition of criminal behavior by fear especially of punishment.” GDT has been extensively applied in the literature and found to play an important role in reducing negative behaviors (Williams and Hawkins, 1986). GDT suggests that unwanted behaviors (e.g. crimes, ISS con-compliance, piracy) can be deterred through certain and severe threat of punishment (Williams and Hawkins, 1986). In other words, the premise of GDT is that higher perceptions of punishment certainty and punishment severity reduce the probability of having an unwanted behavior such as ISS non-compliance. IS scholars have also examined the

role of deterrence on employees' ISS behaviors (Hoffer and Straub, 1989; Straub, 1990; Straub and Welke, 1998). Please see section 2.1.2 for more details about these studies.

3.3.2 Protection Motivation Theory

The Protection Motivation Theory (PMT) proposes that individuals respond to a threat based on four factors (Rogers, 1975):

- a. The perceived severity of a threatening event,
- b. The perceived probability of the occurrence,
- c. The efficacy of the recommended preventive behavior which is an individual's expectation that carrying out supervisors' recommendations can remove the threat,
- d. The perceived self-efficacy, which is an individual's perception of his/her abilities to perform an assignment.

In other words, PMT stems from:

- i. The threat appraisal, which assesses the severity and the chance of occurrence of the situation
- ii. The coping appraisal which is the response of the individual to the situation.

PMT has been widely used to understand how individuals respond to threats and change their behaviors (Vance et al., 2012).

3.3.3 Social Learning Theory

The Social Learning Theory (SLT) (Bandura and Simon, 1977) posits that individuals learn by observing others' attitudes and behaviors. Bandura and Simon (1977, p.22) state: "most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information

serves as a guide for action.” SLT states that individuals first pay attention to behaviors of other individuals around them and then try to imitate them. The imitated behaviors will most likely be adopted by the learner for a long time of period. This theory can be utilized to explain normative influences in shaping people’s behavioral intentions.

3.3.4 Social Norms

Social norms are rules and standards of behavior that are accepted by a group of people to guide their behaviors (Cialdini and Trost, 1998). These standards are implicit – not written down in the form of a policy. They are formed based on the interaction of the group members who agree on what and where a member of a group should behave in a specific situation. Non-compliance with the rules usually leads to tangible sanctions such as firing from an organization, paying a fine, staying in jail, and/or intangible sanctions such as isolation from a society. Social norms can include:

- i. General expectations such as individuals’ behavior in societies/cultures,
- ii. Specific rules such as those expectations of a valued person (injunctive norms),
- iii. Individuals expectations of their own behaviors (personal),
- iv. Standards that develop out of individuals’ observation of other group member’s behavior (descriptive) (Cialdini and Trost, 1998).

3.3.5 Discussion and Hypotheses

To control employees from committing undesirable behaviors, managers use punishment as a kind of deterrent. Higgins (1997) posits that people are motivated to opt for pleasure and avoid pain. Liang et al. (2012) suggest that to regulate employees’ behavior, organizations can manipulate the reward system to encourage desirable behavior. The GDT suggests that the

perceived severity of the punishment and the probability of being punished diminish the likelihood of intentional misbehavior. Punishment can be considered as a form of social control that helps to establish group norms by identifying acceptable and unacceptable behaviors (O'Reillys and Puffer, 1989). In other words, punishment emphasizes the rules that should be followed by the members of a group. Punishments when used as legitimate deterrents clearly communicate to members “what ought not to be.” When policies are clearly communicated and accepted by the group, they help consolidate such pronouncements into normatively acceptable behavior. Based on the foregoing discussion, I posit:

H2a: Greater punishment certainty for violating ISS policies will positively influence injunctive norms.

H3a: Greater punishment severity for violating ISS policies will positively influence injunctive norms.

Actual handing out of punishment initiates a ripple effect within the immediate environment by raising risk perceptions of others who observe the punished employee (Atwater et al., 2001; Liden et al., 1999; Xue et al., 2011). Bandura (1971) argued that employees adjust their own behavior by learning from others – what behavior incurs penalties and what behavior does not. Moreover, widely accepted regulatory mechanisms such as deterrent policies influence general behavior of most participants cascading into widely accepted norms of doing things. For example, despite the lack of enforcement of anti-littering rules by many city governments, people do not litter in public places because “others do not do it”. Consequently, I posit:

H2b: Greater punishment certainty for violating ISS policies will positively influence descriptive norms.

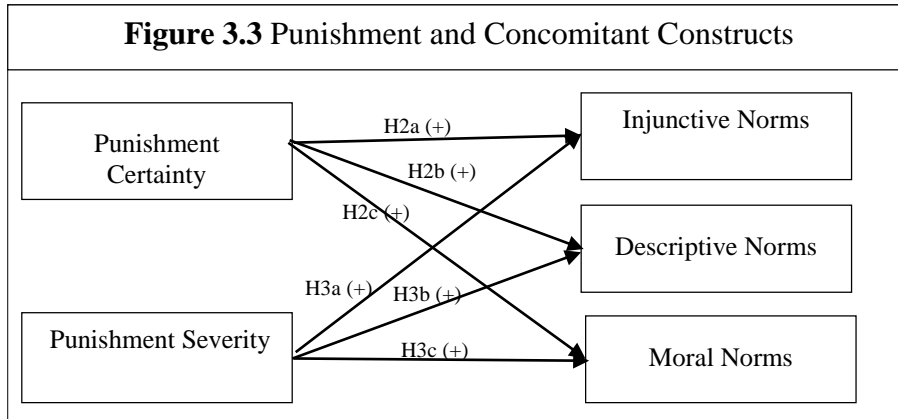
H3b: Greater punishment severity for violating ISS policies will positively influence descriptive norms.

The deterrent policies help employees to differentiate between right (legal) and wrong (illegal) behaviors. When deterrent policies are widely communicated among participants, they may act as references that distinguish right from wrong for the particular group thus establishing moral norms. For example, departments of road safety display speed limit signs on roads to communicate appropriate range of driving speeds to drivers. Drivers know that if they violate these limits they may be fined (deterrent). By communicating speed limits every few miles, notions of safe (“right”) and unsafe “wrong” are established. Several drivers may drive at speeds within the limits prescribed even if they were sure that there were no police in the proximity. Thus, in stable environments, deterrents can influence group moral norms.

Severity of punishment makes individuals realize the importance of the case (e.g. ISS compliance) because severe punishments are more likely to be associated with important matters. Thus, greater punishment severity makes employees realize what is “wrong” and what is “right.” Also, behaviors that are linked to certain punishments make employees aware of what are the acceptable and unacceptable behaviors. Uncertain punishment are not usually linked to crucial cases. Based on this discussion, I posit that:

H2c: Greater punishment certainty for violating ISS policies will positively influence moral norms.

H3c: Greater punishment severity for violating ISS policies will positively influence moral norms.



3.4 Perceived Satisfaction, Habit, Resistance, and ISS Compliance Intention

3.4.1 Expectation-Disconfirmation Theory

Expectation-Disconfirmation Theory (EDT) (Oliver, 1980) illustrates a process model of individual behavior comprising of three stages:

- i. The initial pre-usage belief of a product/technology,
- ii. Experience during usage,
- iii. Perceptions of post-usage.

The difference between the initial expectations and the performance of the product/technology forms the disconfirmation which could be positive or negative depending on the difference between the two stages. If performance is better than initial expectations, disconfirmation will be positive; if performance is lower than initial expectations, disconfirmation will be negative. Both disconfirmation and initial expectation jointly determine the employee's satisfaction and dissatisfaction with the technology/product, which at the same time affects employee's continuance usage of the technology/product.

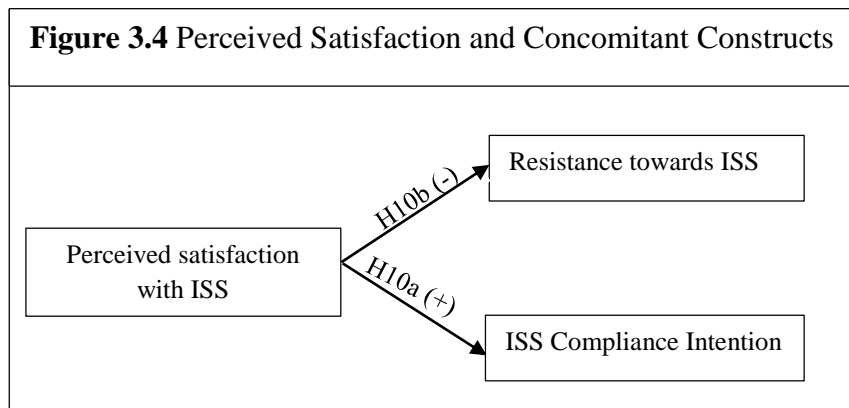
3.4.2 Discussion and Hypotheses

Perceived satisfaction with ISS reflects employees' overall experience with the ISS policies. Significant body of research in the IS and marketing disciplines has established that perceived satisfaction is a reliable key driver of behavioral intention (Limayem et al., 2007; Thong et al., 2006). According to the Expectation–Confirmation model, employees' perceived satisfaction is affected by the intensity and direction of the gap between the expectation and perceived performance of a technology/service (Bhattacharjee, 2001). Employees are more likely to be satisfied if the performance meets or exceeds their expectation (Bhattacharjee, 2001). Extending the foregoing arguments to ISS, employees are likely to exhibit greater compliance if they perceive the policies as satisfactory. Thus:

H10a: Higher level of perceived satisfaction with ISS policies will increase employees' ISS compliance.

Martinko et al. (1996) suggest that employees display resistance to a new system when their actual experience of using the system is less than what they had expected. If employees have high perception of satisfaction with ISS, they are more likely to adopt the policies and requirements and consequently exhibit lesser resistance. Consequently, I posit that:

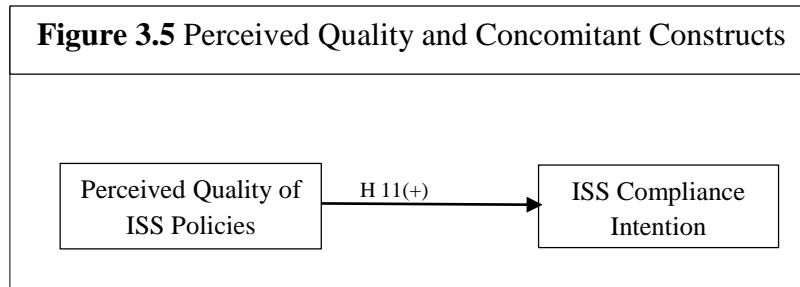
H10b: Higher of level of perceived satisfaction with ISS policies will reduce resistance towards ISS compliance.



3.5 Perceived ISS Quality and ISS Compliance Intention

DeLone and McLean (1992) identified six IS success features: system quality, use, user satisfaction, individual impact, organizational impact and information quality. System quality is seen as a key element for identifying the factors which may affect the success of an IS. Quality perceptions are based on individuals' evaluation of different attributes of the products and their relative preference to the user (Zeithaml, 1988). Many studies have examined the determinants of system quality perception, some being: integrity, usefulness, currency, reliability, completeness, conciseness, format, and relevance (Bailey and Pearson, 1983); understandability (Srinivasan, 1985); resource utilization; accuracy, and ease of use (Hamilton and Chervany, 1981). Perceived quality is thus based on the desired expectations and is described as a form of attitude because it is a long-run evaluation (Bitner, 1990). Extending the foregoing arguments to ISS, employees are likely to exhibit greater compliance if they perceive the policies having high quality. Therefore, I posit:

H11: High perception of ISS quality will lead to higher ISS compliance intention.



3.6 Cognitive Task Dissonance and ISS Compliance Intention

3.6.1 Rational Choice Theory

The Rational Choice Theory (RCT) explains how individuals make their decisions under the influence of their preferences (Coleman and Fararo, 1993; Cornish and Clarke, 1986; Scott, 2000). RCT postulates that individuals choose between alternatives based on the expected benefit (utility) that they would receive from each option. It is human nature to maximize utility and minimize costs in order to achieve a specific goal. In other words, RCT's main proposition is that individuals

- i. Base their behavior on rational calculation,
- ii. Act based on rationality, and
- iii. Aim to maximize benefits.

3.6.2 Cognitive Dissonance Theory

The Cognitive Dissonance Theory (CDT) explains the relationships among cognitions (Festinger, 1962). Cognitive dissonance refers to discrepancies (dissonance) between people's cognition (feelings) and reality which influences the individuals' subsequent behaviors.

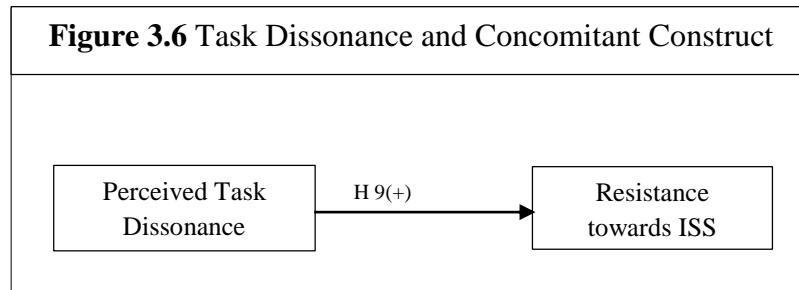
Cognition refers to individuals' beliefs, values, affect, opinion, and knowledge about their environment, while behavior refers to actions initiated in response to the cognition and/or

personal evaluation of that behavior (Festinger, 1962). According to CDT, individuals hold beliefs about themselves and about other things around them. Generally, individuals tend to find a consistency between both types of cognitions (beliefs), but when these two cognitions contradict, the dissonance increases. Individuals facing misalignment of beliefs act in order to reduce or eliminate the dissonance.

3.6.3 Discussion and Hypotheses

In the ISS context, task dissonance may be defined as inconsistencies between employees' beliefs about what their primary responsibilities are and what they may have to do in order to comply with ISS policies. When employees do not consider conforming with ISS policies as their specified set of responsibilities, they are likely to develop an aversion for these policies. Researchers found that the value considerations motivate individuals to engage in specific behavior (Babin et al., 1994). Employees develop dissonance because they do not see ISS compliance as part of their jobs, and they do not get promotions, bonuses, or rewards for doing ISS related jobs (Guo et al., 2011). If the ISS requirements were to inhibit their primary task performance, employees are likely to face dissonance and they may take actions (resistance) to reduce this dissonance. Thus, if they can get away with not complying - they will do so. For instance, if someone had to reach somewhere very quickly, encounters a red signal at a crossing with no one on the cross roads – what will this person do? Perhaps cross the signal! In other words,

H9: Higher task dissonance caused by ISS policies will increase employees' resistance to use them.



3.7 Group Norms, Perceived Behavioral Control, and Resistance toward ISS

3.7.1 Reactance Theory

Reactance theory is a social psychological theory that explains the individuals' behaviors in response to the perceived loss or threatens of their freedoms in an environment (Brehm, 1966). Reactance theory is based on the notion that individuals desire freedom of choice. People oppose such actions that threaten their freedoms (Edwards et al., 2002). The intensity of opposition is proportional to the degree of threat perceptions of potential loss of freedom. If individuals lose a particular freedom, they:

- i. May feel increased desire for the freedom and view it as more attractive than it was before.
- ii. Might respond by trying to reassert the freedom by performing the behavior that was taken away and forbidden.
- iii. Aggressively respond to the individual responsible for removing the desired option (Baumeister et al., 2002).

3.7.2 Status Quo Bias Theory

Status quo bias theory explains people's preference for maintaining the current situation (Samuelson and Zeckhauser, 1988). Individuals generally tend to prefer living a constant situation, or if changes are needed they prefer it to be as little as possible. Samuelson and Zeckhauser (1988) explain the status quo bias by referencing the following theoretical concepts:

- i. Rational decision making which implies that individuals make decision to maximize utility.
- ii. Risk aversion theory: Individuals tend to dislike losses.
- iii. Psychological commitment which includes three factors:
 1. Sunk costs phenomena. People do not act rationally when they face outcomes and new choices as a result of decisions they make.
 2. Social norms. Others in a group may want to maintain the current status.
 3. Individuals want to feel that they have control over the current situations. Changes are associated with uncertainties (Kim and Kankanhalli, 2009).

3.7.3 Discussion: Group Norms and Resistance toward ISS

Several studies have shown that injunctive norms have direct and positive influence on people's intention towards a certain behavior (Anderson and Agarwal, 2010; Bulgurcu et al., 2010; Dinev and Hu, 2007; Herath and Rao, 2009a; Hu et al., 2012; Li et al., 2010; Siponen et al., 2010). One can argue that injunctive norms weaken or diminish resistance towards any change because if employees believe that their supervisors are expecting them to use the ISS policies, they are more likely to use them. Hence, I posit:

H5a: Injunctive norms will negatively influence employees' resistance to use ISS.

The effect of others' behaviors on employees can be expected to change their attitude towards using ISS policies. Several studies across disciplines have shown that descriptive norm has a direct and positive influence on people's intention towards a certain behavior (Nolan et al., 2008; Schultz, 1999). Employees change the way they do things and do not resist if they see others around them changed their behaviors. In other words, if employees find that their colleagues have started using ISS policies, they will more likely change their attitudes and start using them. Hence, I posit that:

H6a: Descriptive norms will negatively influence employees' resistance to use ISS.

Moral norm is an implicit group standards that distinguish right versus wrong (Conner and Armitage, 1998). As discussed earlier, resistance is a consequence of threat of lost freedoms (Edwards et al., 2002). In absence of moral norms, a person facing resistance is likely to take actions to remove the threats to their freedoms. However, moral forces imbibed by people may act to diminish or aggravate the resistance based on how the group norms are framed. This phenomenon can be best illustrated by an example. Most air passengers are seen cooperating with security agencies when entering airports despite the fact that going through these procedures adds to their travel time and sometimes even risks missing their planes. This is because despite the additional steps now required to undertake air travel, people in general have imbibed a common standards of right and wrong behavior. Based on this discussion, I extend the same argument to ISS situations and posit that:

H7a: Moral norms will reduce employees' resistance to use ISS.

Perceived behavioral control refers to people's perception of their ability to perform a given behavior and is defined as the aggregate sum of product of control factors and associated perceived power (Ajzen, 1991). Thus, employees who have perception of high control over tasks

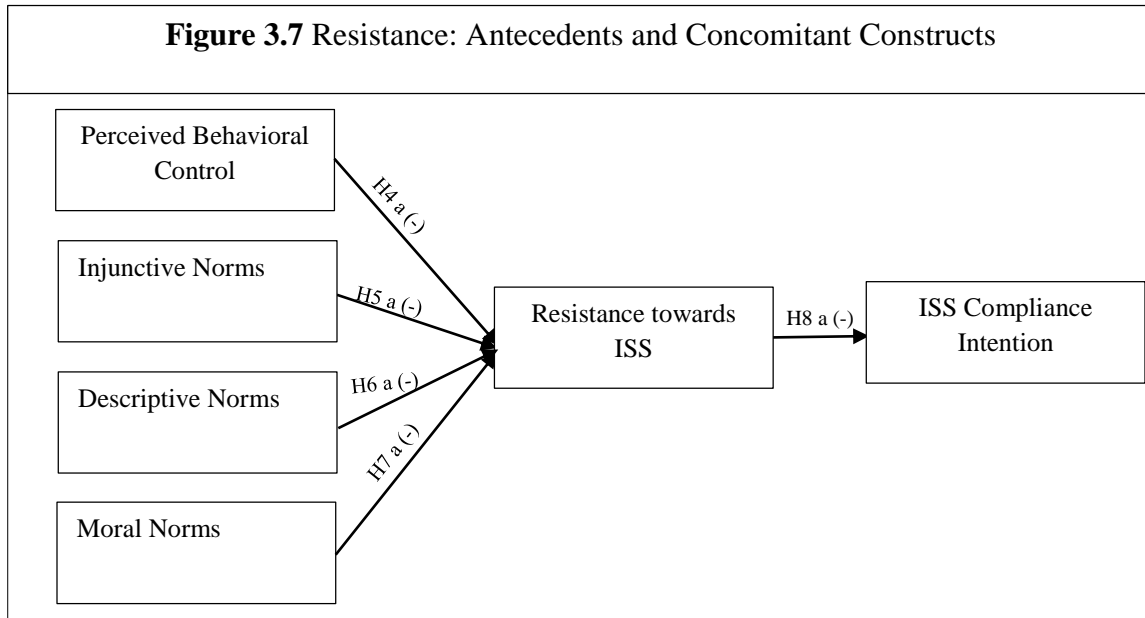
assigned to them are likely to exhibit lower resistance towards accepting and undertaking such tasks. Consequently, I posit:

H4a: Perceived behavioral control will negatively influence employees' resistance towards IS.

3.7.4 Discussion and Hypothesis: Resistance toward ISS and ISS Compliance Intention

Many studies have examined users' resistance to change as a major barrier to the successful implementation of IS projects (Bhattacharjee and Hikmet, 2007; Ferneley and Sobreperez, 2006). Anxiety caused by changes in work processes because of the new systems is one of the primary reasons for user resistance (Polites and Karahanna, 2012). Bhattacharjee and Hikmet (2007, p. 726) argue that "resistance is not quite equivalent to non-usage, because non-usage may imply potential adopters are simply unaware of a new IT or are still evaluating the IT prior to its adoption, while resistance implies that the IT has been considered and rejected by these people." Resistance towards ISS compliance may be caused by the employees to maintain status-quo and may manifest in various ways including implicit or explicit opposition as explained by the reactance theory (Brehm, 1966; Samuelson and Zeckhauser, 1988). Bhattacharjee and Hikmet (2007) and Lewin (1947) argue that resistance is a cognitive force preventing potential behavior, therefore is an antecedent of behavior. Accordingly, I posit that:

H8: Employees' resistance to use ISS policies is negatively related to their intention to comply with ISS policies.



3.8 Pre-ISS Habit and ISS Compliance Intention

3.8.1 Aarts' Model of Habits

Habit is a psychological construct and is defined “as an automatic pattern of behavior in reaction to a specific situation; may be inherited or acquired through frequent repetition”

(PrincetonUniversity, 2010). Aarts et al. (1998) describe habit in terms of three main characteristics:

- i. Habit includes goal-directed type of automaticity; that is, goal is a prerequisite for habitual behaviors to consolidate.
- ii. Satisfactory experiences increase individuals' propensity to repeat a behavior.
- iii. Habitual behavior includes “mental representations” of the situation and the choices directed towards the situation. Therefore, it is believed to be a cognitive phenomenon.

The opposite view is supported by the learning theory which suggests that the behavior to the stimuli is automatic and does not include cognitive processing.

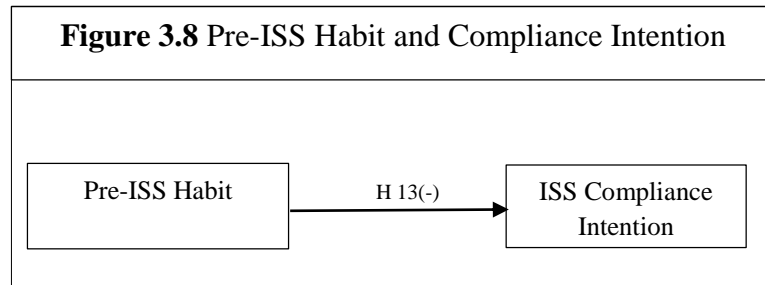
Based on these characteristics¹¹, Aarts et al. (1998, p. 1359) defines habit as a “goal-directed automatic behaviors that are mentally represented. And because of frequent performance in similar situations in the past, these mental representations and the resulting action can be automatically activated by environmental cues.”

3.8.2 Discussion and Hypotheses

Scholars from different disciplines have highlighted the importance of habit as a factor responsible for influencing individuals behavior (Limayem and Hirt, 2003; Limayem et al., 2007). Habitual behavior occurs automatically without conscious awareness. They are learned acts that are gradually established in employees’ memory through repeated performance (Chiu et al., 2012). Once acquired, habits are difficult to modify because of the automatic response characteristic. Ouellette and Wood (1998) found that when a behavior has been performed frequently in the past, future behavior is directed by an automated process. Aarts et al. (1998)’s conceptualization of habit and also the definition of the term suggests that habit makes individuals automatically act when presented with the same stimuli. In most ISS scenarios, the basic stimulus does not change but new safeguards and precautions are added. People still open and close files, copy and carry data when traveling. Thus in a continued usage context, people may find it difficult to adapt to changes when dealing with ISS policies. Thus, I posit that:

H13: Stronger pre-ISS implementation habits will negatively influence employees’ ISS compliance.

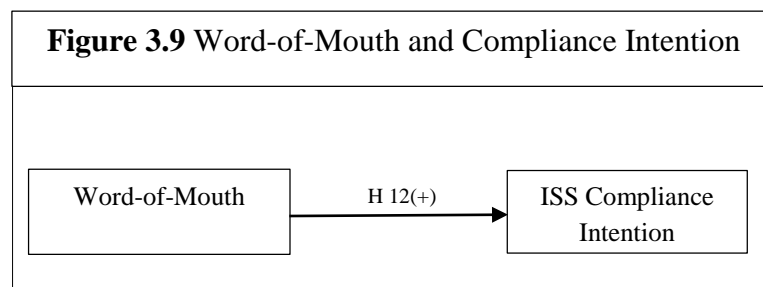
¹¹ Aarts accepts the role of cognitive processing as the third factor.



3.9 Word-of-Mouth and ISS Compliance Intention

Word-of-mouth communication can be expressed as sharing of information through non-formal channels of communication. Thus, word-of-mouth communication may include exchange of thoughts, ideas, news, or experience a person among relatives, friends, and other non-formal social relationships. Many studies have shown that word-of-mouth can significantly influence people's behavior because informal channels are considered more creditworthy because of apparent lack of conflict of interest (Brown and Reingen, 1987; Herr et al., 1991). For example, word of mouth is known to influence people's buying behavior. Extending these arguments to the ISS context, one can argue that word-of-mouth stories and anecdotes narrated by non-formal social actors may have a significant influence on people's behavior towards using or ignoring a policy. Hypothesis H12 is based on the foregoing arguments.

H12: Word of mouth will positively influence ISS compliance intention.

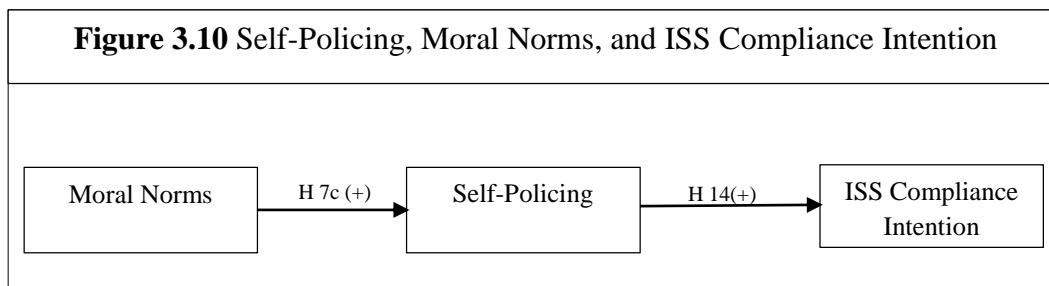


3.10 Moral Norms, Self-Policing, and ISS Compliance Intention

In section 2.5.1, the construct of “self-policing” was defined as a psychological process distinct from attitudes. Self-policing is activated when individuals face a choice set that involves controlling one’s behavior. In terms of the process, it is conceptualized to occur after cognitive beliefs are formed but before intentions are activated. Self-policing is relevant only in situations where self-control is a dimension. The theoretical basis for conceptualization of self-policing is provided by Thaler and Shefrin (1981) who describe a person with self-control as a “model man as having two sets of preferences that are in conflict at a single point in time.” Thaler and Shefrin (1981) call this as a two-self model in which conflict arises because of long term preferences and more myopic short term preferences in individuals. Smith (1759) argues in the theory of moral sentiments that people are selfish in nature but they also care about others around them. In the ISS context, the two sets of preferences can be denoted as pro-ISS and anti-ISS. Because self-control is an important characteristics of self-policing, I posit that moral norms may be its antecedent.

H7c: High moral norms will positively impact self-policing.

H14: Self-policing will positively influence employees’ ISS compliance intention.



3.11 Group Norms, Perceived Behavioral Control, and ISS Compliance

Injunctive norm refers to individuals' beliefs about what others approve or disapprove (Cialdini et al., 1991). In other words, it is not one's own view of what constitutes appropriate behavior but one's perception of what others believe to be appropriate behavior. Injunctive norm specifies what ought to be done. Previous studies indicate that such evaluation strongly influences compliance decisions because individuals adjust their behavior based on the views of those individuals who are important to them (Larimer and Neighbors, 2003). In other words, employees in organizations comply with ISS policies if they perceive that important referents, such as peers and supervisors, would like them to comply with these policies. In considering injunctive norm in organizational settings, Venkatesh et al. (2003) examined employees' perceptions of the expectations of superiors, managers, and peers in relevant IS departments. They found that if employees believe that their peers, managers, or superiors expect a specific behavior from them, they will more likely do it. In this dissertation, I assume that the expectations of managers, supervisors, information security officers, IT staff, and peers will have a persuasive effect on employees' compliance with ISS policies. If employees believe that these individuals expect them to comply with ISS policies, they will more likely do so. Based on this, I posit:

H5b: Injunctive norms will positively influence ISS compliance intention.

Descriptive norm describes what most people do, or refers to what an individual thinks others do in a particular situation (Cialdini et al., 1991). It sends the message "if a lot of people are doing this, it's probably a wise thing to do" (Cialdini, 2007, p. 264). In other words, employees make their decisions on their perceptions of what most others do in similar situations (Venkatesan, 1966). Behavioral literature has recognized the significance of descriptive norm,

meaning that individuals create their behavior based on others' behaviors because imitating others offers individuals an information processing advantage and helps them to take the best decision when they are about to take a decision (Cialdini et al., 1991). In other words, employees in organizations comply with ISS if they perceive that most of their peers are complying with these policies. If employees recognize that others around them are complying with ISS policies, they will most likely do the same. Based on this, I hypothesize that:

H6b: Descriptive norms will positively influence employees' ISS compliance intention.

The perception that employees have on the expectation of their colleagues and supervisors make them look at others' behaviors and imitate them. Based on this, I posit:

H5c: Injunctive norms will positively influence descriptive norms.

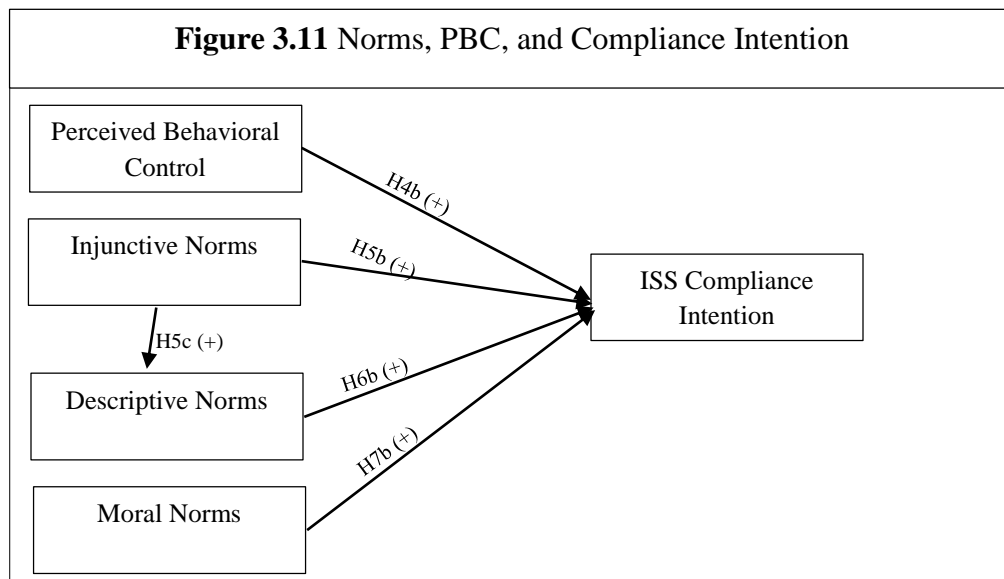
Meta-analyses and literature review studies of the TRA/TPB have stressed the need for further consideration of normative influences on behavior and suggested that moral norms should be added to TPB factors (Conner and Armitage, 1998). Moral norms can be defined as the individual's perception of the moral correctness or incorrectness of performing a certain action (Ajzen, 1991). In other words it is the third type presented in section 3.3.1. Employees who have high level of moral norms tend to comply with all kinds of rules/policies and avoid behaviors that harm other individuals or organizations. Hu et al. (2011) suggest that an employee with strong moral beliefs is more likely to underestimate the benefits while over-estimating the risks of the misconduct. Hence, this type of employees is more likely to comply with ISS policies. Based on this, I posit:

H7b: Moral norms will positively affect employees' ISS compliance intention.

Ajzen (2006) emphasized that PBC designates a subjective degree of control over the performance of a behavior and not the perceived likelihood that performing the behavior will

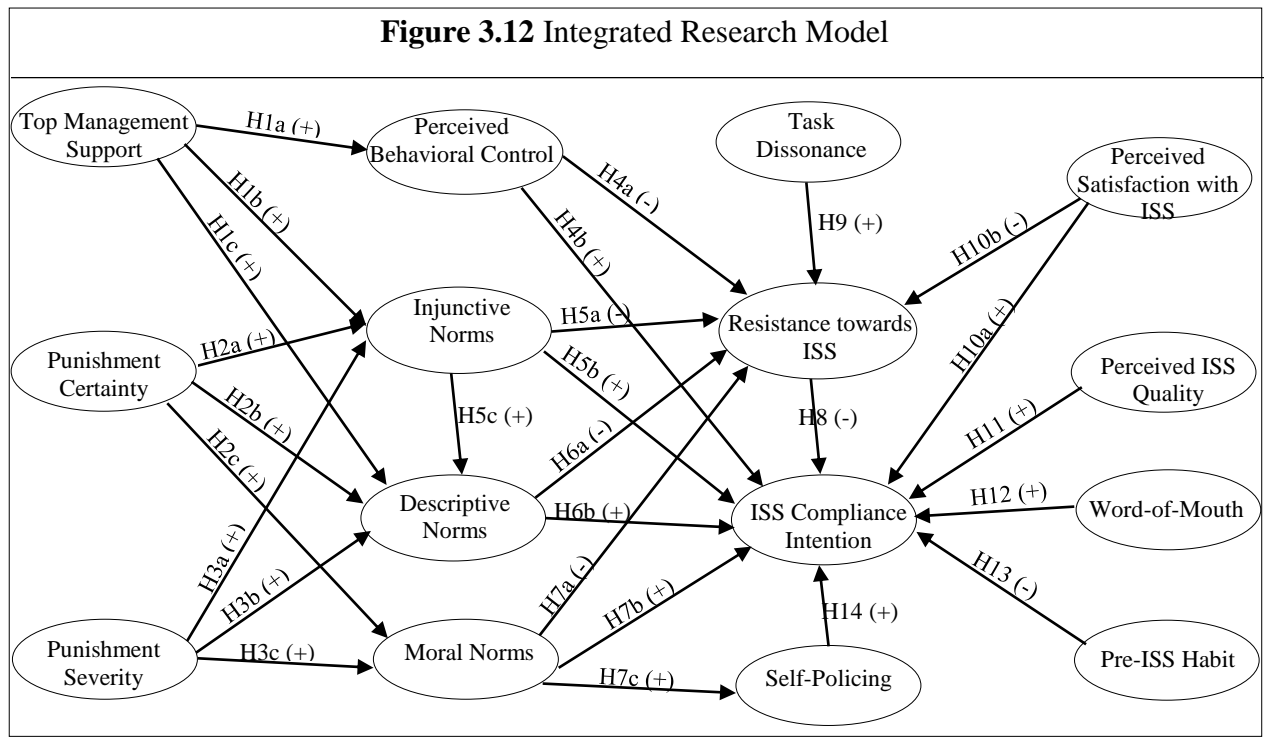
produce a given outcome. He suggested that PBC “should be read as perceived control over the performance of a behavior” (p. 668). In other words, PBC is the employees’ perception on whether they have the necessary resources, skills/capabilities, and whether it is easy or difficult to apply the ISS policies in their job. For instance, if ISS policies require employees to use encryption when sending information related to the organization, employees should first know about encryption and how to use it. If employees have the skills/capabilities and perceive that the organization provides the technology needed to do so, they will apply the ISS policies easier than other employees who do not have capabilities and resources. Hence, I postulate that:

H4b: Perceived behavioral control will positively influence employees’ ISS compliance.



These research hypotheses are presented in Figure 3.12. To measure the exact influence of the model’s factors and in line with previous research on behavioral and organizational studies, in this dissertation I control for some factors such as age, gender, job type, education, organization size, and work experience.

Figure 3.12 Integrated Research Model



CHAPTER IV

METHODOLOGY

In this chapter, I first describe the choice of research method followed by the unit of analysis. I then describe the population and sampling method followed by choice of analytic method. Next, I discuss sample size requirement followed by measurement validation which includes reliability, construct validity, convergent validity, and discriminant validity tests (Gefen et al., 2000; Straub et al., 2004). I then present the instrumentation and measures followed by development of scales. Next, pre-test and pilot tests are described. Finally, I describe the data collection.

4.1 Choice of Research Method

Research methods in IS can be broadly classified into four paradigms: positivism, interpretivism, critical methods, and design science (Chua, 1986; Hevner et al., 2004; Orlikowski and Baroudi, 1991). Positivism refers to “the belief that social-science research should emulate how research is done in the natural sciences” (Lee, 1999, p. 29). Positivism asserts that the aim of knowledge is simply to describe the phenomena individuals’ experience (Trochim and Donnelly, 2008). The purpose of science in positivism is to adhere to what researchers can observe and measure (Bhattacharjee, 2012). For this reason, positivist researchers tend to observe and measure phenomena while detaching themselves from the research setting because according to the positivist ontology, there is only one objective reality and the researcher’s job is

to find that reality (Hudson and Ozanne 1988). Therefore, positivist researchers remain emotionally neutral in order to make clear distinctions between reason and feeling as well as between science and personal experience (Hudson and Ozanne 1988).

Positivism believes that the universe is deterministic, which means that things operate by laws of cause and effect (Trochim and Donnelly, 2008). For this reason, positivism uses elements often associated with the natural sciences, such as independent and dependent variables, mathematical propositions, quantitative data, inferential statistics, and experimental controls (Lee and Hubona, 2009). In other words, positivist research is grounded on a priori fixed relationships which are investigated using structured instrumentation (Orlikowski and Baroudi, 1991). Thus, positivist studies mainly assess theories in order to gain more knowledge of a phenomena (Orlikowski and Baroudi, 1991). Positivism helps researchers answer the “what” questions. In positivism, objective observation and measurement are at the core of the scientific endeavor (Trochim and Donnelly, 2008). Measures are usually developed in order to assess relationships between factors because they can capture the essence of an unobserved phenomenon (Orlikowski and Baroudi, 1991).

Interpretivism “assumes that people create and associate their own subjective and intersubjective meanings as they interact with the world around them” (Orlikowski and Baroudi, 1991, p. 5). For an interpretivist researcher it is essential to understand reasons, meanings, details and other subjective experiences related to the research (Hudson and Ozanne 1988). The aim of interpretive methods is to help researchers answer the “how and why” of individuals’ interaction and behavior in a social world (Orlikowski and Baroudi, 1991). For this reason, during data collection, the researchers attempt to interact with participants in order to understand the “how and why” associated with the phenomenon. Researchers may also remain open to new ideas

during the study and let them develop because these ideas help gain more knowledge and provide new insights on the research (Hudson and Ozanne 1988).

In contrast to positivism, which attempts to discover objective social reality, interpretive studies argue that social reality is not objective but can only be interpreted (Orlikowski and Baroudi, 1991). The philosophy of an interpretive study is based on the belief that “social process is not captured in hypothetical deductions, covariances, and degrees of freedom. Instead, understanding social process involves getting inside the world of those generating it” (Rosen, 1991, p. 8). In other words, interpretive researchers attempt to “understand” phenomena through information they gather from participants; or qualitative data. The intention behind interpretive studies is usually to understand the deeper structure of phenomena; this underlying philosophy causes the research goal to shift away from universal generalizability of the findings which positivism encourages (Orlikowski and Baroudi, 1991).

Critical methods “aim to critique the status quo, through the exposure of what are believed to be deep-seated, structural contradictions within social systems, and thereby to transform these alienating and restrictive social conditions” (Orlikowski and Baroudi, 1991, p.6). The philosophy of critical research methods is the belief that social reality was created throughout history. Thus, phenomena that are related to nations, societies, organizations, and/ or employees are not constrained to existing state (Chua, 1986). Another important concept in critical research is “totality” (Orlikowski and Baroudi, 1991). This means that elements of social reality cannot be examined and treated separately because these elements complement each other. Critical research focuses on the development of a process of a phenomena.

The design science paradigm “seeks to extend the boundaries of human and organizational capabilities by creating new and innovative artifacts” (Hevner et al., 2004, p.75).

The main objective of design science is problem solving through creating innovations (artifacts) that “define the ideas, practices, technical capabilities, and products through which the analysis, design, implementation, management, and use of information systems can be effectively and efficiently accomplished” (Hevner et al., 2004, p. 76). Artifacts are tangible things or processes that help in improving or solving a problem domain. Examples of artifacts include, but are not limited to, algorithms, computer interfaces, system design methodologies or languages (Hevner et al., 2004). Within the design science research tradition, the artifact must be constructed and evaluated rigorously in order to ensure its capability to solve problems.

IS discipline studies complex phenomena because the domain includes interaction between individuals, technologies, and organizations (Mingers, 2001). With the rapid advancement and the increased dependence on technology, a phenomenon may need to be examined from more than one research paradigm to gain full understanding (Venkatesh et al., 2013). Mingers (2001) argues that combining more than one research method is useful. Mingers (2001) adds that multi-method research has three advantages: triangulation (validating results by combining a range of data sources and methods), creativity (discovering new factors that stimulate further work) and expansion (widening the scope of the research to cover new aspects).

Venkatesh et al. (2013) argue that there is a difference between multi-method research and mixed-methods research. Multi-methodology research can be conducted using either a single paradigm or multiple paradigms, whereas mixed-methods research requires a combination of methods (Venkatesh et al., 2013). Venkatesh et al. (2013) propose that better understanding of a phenomenon can be achieved by combining qualitative and quantitative research methods. The usage of quantitative and qualitative research methods can be independent of each other or

findings from one approach may inform the other (Venkatesh et al., 2013). There are major advantages of mixed-methods research:

- i. The ability to address confirmatory and exploratory research questions simultaneously (Teddlie and Tashakkori 2003, 2009; Venkatesh et al., 2013). Mixed-methods can help researchers execute both in one study.
- ii. Mixed-methods research has the ability to provide stronger conclusions and implications than a single method (Venkatesh et al., 2013). This is because of the different ways each of these techniques works. For instance, qualitative methods are more concerned with the deeper structure of a phenomenon; however, quantitative methods are more interested in high level structure of a phenomenon.
- iii. Mixed-methods research provides an opportunity for a greater variety of conclusions which stimulates future research (Venkatesh et al., 2013). Findings of qualitative and quantitative methods may not be the same and thus require more investigation of the topic to understand reasons for the differences.

This dissertation aims to develop and examine an integrated model identifying interrelations among factors which affect employees' compliance. These relationships are based on previous theories borrowed from many disciplines. In other words, the research model presented in this dissertation is a combination of different theories that explain what factors cause employees' noncompliance with ISS policies. In this dissertation, the goal is confirm relationships among different factors and not to explore the "how and why" of factors behaving in a specific way. For these reasons, the research questions can be answered using a positivist quantitative method. A field survey is chosen because it enables the analysis of the phenomenon

as it exists in the “real world.” Survey is an important method “to produce quantitative descriptions of some aspects of the studied population” (Pinsonneault and Kraemer, 1993, p. 77).

4.2 Unit of Analysis

The “intellectual puzzle” of this dissertation is motivated by the findings of several studies (e.g. Hu et al. (2012); Siponen and Vance (2010)) that assert that employees’ behaviors are the salient causes of most ISS accidents. The goal is to examine various factors that directly or indirectly affect employees’ behaviors towards ISS compliance. All the constructs included in the research model (Figure 3.12) tap into experiences or perceptions of people interacting with ISS policies in organizations. Thus, this dissertation is examining factors affecting ISS compliance at the individual (employees) level and not at the organizational level. Therefore, users of IT systems (employees) who interact with ISS policies in organizations are the most appropriate data source for this dissertation. In other words, the unit of analysis of this dissertation is individual employee/worker working with IS systems and exposed to organizational ISS policies.

4.3 Population and Sampling

A population is defined as all unit of analysis with the characteristics a researcher wishes to study (Bhattacharjee, 2012). The unit of analysis may be a person, group, organization, country, or any other unit a researcher is wishing to examine. In this dissertation, every employee who works in an organization implementing ISS policies can be a unit of the population. Thus, the population of this study are employees who interact with ISS rules and policies at their workplaces. Because of feasibility and cost constraints, and because of the limited access to all population units, researchers use a sample for sourcing data that is used for empirical analysis

and drawing conclusions (Bhattacharjee, 2012). Sampling involves selecting population units so that the results can be credibly generalized to the target population (Trochim and Donnelly, 2008). There are two main types of samplings: random and non-random.

In random sampling, every member (unit) of the population has an equal chance to be selected from the population to be part of the sample. Random sampling is called probability sampling because units are selected by chance. Results found from a random sampling are unbiased because every unit has an equal probability of being selected (Patten, 2010). There are four random sample techniques:

- i. Simple random sampling: In this method, each population unit (employee) has an equal and non-zero probability of being chosen. Simple random sampling includes the whole population in the sampling frame, making it the most preferred type of sampling. The benefit of employing random sampling is that the findings can be generalized to the whole population with greater confidence. Simple random sampling is desirable when the goal of the researcher is to generalize the results of a study. However, simple random sampling is difficult to achieve, unless the population is small and accessible (Bhattacharjee, 2012).
- ii. Stratified random sampling: In stratified sampling, the sampling frame is divided into homogeneous and distinct subgroups, and a simple random sample is drawn within each subgroup. The total units drawn from the groups become the sample for a study. A disadvantage for this sampling technique is that, most of the time, groups are not equal, which makes one or more of the groups less represented in the final sample (Bhattacharjee, 2012).

- iii. Systematic sampling: In this technique, the units of a population are ordered according to some criteria set by researchers, and elements are selected at regular intervals through the ordered list (Bhattacharjee, 2012). The generalization from systematic sampling is based on the sorting criteria used by the researcher (Trochim and Donnelly, 2008).
- iv. Cluster sampling: This technique divides a population into groups called clusters, and subjects in each group are randomly selected (Trochim and Donnelly, 2008). A disadvantage for this technique is that differences might exist between the clusters, making the results less generalizable to the whole population than those found in simple random samples (Bhattacharjee, 2012).

In non-random sampling, each member (unit) of the population has an unequal chance of being selected from the population. Non-random samplings are called non-probability sampling because units are not selected by chance (Bhattacharjee, 2012). For example, units may be selected because they are in a place the researcher has access to. There are different types of non-random sampling:

- i. Convenience sampling: Convenience sampling targets a small sample of a population, typically chosen by researchers because they can easily gain access to the data sources (Trochim and Donnelly, 2008). It is a non-probability sample because researchers systematically exclude units from the whole population.
- ii. Judgment sampling: In this technique, units are chosen in a non-random manner based on their expertise (knowledge) on the phenomenon being studied (Bhattacharjee, 2012).
- iii. Quota sampling: In this technique, the population is divided into mutually exclusive subgroups (similar to stratified sampling), and then a non-random set of units is chosen

from each subgroup to meet a predefined quota (sample size) (Bhattacharjee, 2012). Unit selection ends once the desired quota is reached.

- iv. Snowball sampling: In this technique, researchers start by identifying a few units that match the criteria for inclusion in the study, and then ask them to recommend others who can be part of the study (Bhattacharjee, 2012).

Convenience sampling method is inexpensive and fast in comparison with probability sampling, but suffers from the inability of the researcher to confidently generalize the findings to the target population. But, in many situations, this may be the only method available to the researcher because of practical considerations. Researchers often do not have sufficient access to the whole population and do not have resources to obtain a random sample. For this reason, researchers use convenience sampling technique instead of random sampling, assuming that the sample chosen represents part of the population (Patten, 2010). If researchers decide to use convenience sampling, it is preferred to collect responses from units of different groups such as different organizations, industries, sizes (Patten, 2010; Trochim and Donnelly, 2008).

I used convenience sampling approach in this study because of the inability to access the list of all employees who interact with ISS policies. Although I used convenience sampling, I tried to minimize its effects on the findings. I collected data from employees of different organizations representing different industries and are of various sizes (Randall and Gibson, 1990). Table 4.1 presents a list of the organizations participating in this dissertation and their industry type. For instance, at IBC bank data were collected from its 23 branches, 4-5 responses from each branch. Participants in this dissertation were also from different levels and different departments. More details about how the data were collected are discussed in “Data collection” section 4.11.

Table 4.1 Organizations Used in this Dissertation and Industry

Organization Name	Industry
Texas regional Bank	Financial
BBVA Compass	Financial
International Bank	Financial
ACE Cash Express	Financial
Capital One	Financial
Bank of America	Financial
Elsa State Bank	Financial
Bloomberg	Financial
Wells Fargo Bank	Financial
IBC	Financial
Alps	IT
Commscope	IT
Teleplan	IT
Hastings	IT
Oracle	IT
Vesta	IT
Best Buy	Retail
UTPA	Education
Alberta Electric Systems Operators	Service
Hidalgo County	Government
Renaissance Hospital	Health

4.4 Choice of Analytic Method

Structural Equation Modeling (SEM) is used to assess the hypothesized causal paths among the constructs. SEM is a family of statistical procedures that analyzes multiple relationships among latent constructs through the use of equations quite similar to multiple regression equations (Hair et al., 2010). In contrast to simple regression, SEM can model relationships among multiple independent and dependent constructs simultaneously in a systematic and comprehensive manner with great speed (Gerbing and Anderson, 1988; Hair et al., 2010). SEM is a preferred choice among analytic methods where research design includes complex models similar to the model presented in this dissertation because it estimates multiple interrelated dependence relationships at one time. This makes it different from linear regression, which can analyze at a time, only one layer of relationship between independent variables and

one dependent variable. Similar to linear regression, SEM calculates the coefficients among causal relationships (Hair et al., 2010). It also helps the researcher examine the standardized loadings of observed items on latent variables and provides fuller information on how the research model is supported by the data collected than is presented by regression techniques (Hair et al., 2010; Gefen et al., 2000). Analyzing a complex (multi-layer) research model, similar to the one presented in this dissertation, in SEM rather than linear regression produces a more rigorous analysis because it enables the measurement errors of the observed variables to be analyzed as an integral model (Gefen et al., 2000). In order to test a multi-layer research model in linear regression, researcher has to divide and test each layer at a time; however, in SEM, all layers will be assessed in one test. Computational power of the modern computers makes SEM a great tool in the hands of positivist researchers to quickly analyze complex models.

Two distinct approaches are frequently used within the family of SEM methods: the covariance-based and the variance-based techniques. These two types of SEM procedures “differ in the objectives of their analyses, the statistical assumptions they are based on, and the nature of the fit statistics they produce” (Gefen et al., 2000, p. 24). I explain these differences in the next few paragraphs.

- i. The objective of the covariance-based SEM is to show that the proposed research model being analyzed with all its relationships is plausible given the sample data (Gefen et al., 2000). In other words, the objective of covariance-based SEM is to demonstrate that the operationalization of the model being assessed is corroborated by data (Bollen, 1989, Hair et al., 2010). Covariance-based technique minimizes the difference between the covariance of the sample collected and those of the predicted covariance matrix (Haenlein and Kaplan, 2004). The predicted covariance matrix is derived from the path

(direct and indirect) estimates of the model (Hair et al., 2010). Thus, a covariance-based SEM reproduces the covariance matrix of the observed variables (Chin and Newsted, 1999). In other words, an estimated covariance between two latent factors will be equal to the total of coefficients of all direct and indirect paths between the two factors. The difference between the observed and predicted covariance matrices indicates the level of model fit (Hair et al., 2010). Covariance-based SEM techniques are best suited for confirmatory research because they emphasize the overall fit of the observed covariance matrix with the predicted covariance model (Bollen, 1989, Gefen et al., 2000; Hair et al., 2010).

- ii. The objective of variance-based SEM (PLS) is to maximize “the variance of the dependent variables explained by the independent variables instead of reproducing the empirical covariance matrix” (Haenlein and Kaplan, 2004, p. 290). In other words, the variance-based SEM is designed to explain variance, such as the significance of the coefficients of relationship and R-square, which makes it similar to linear regression (Gefen et al., 2000). For this reason, variance-based SEM techniques are best suited for exploratory and predictive applications (Gefen et al., 2000; Hair et al., 2010). It is suggested that variance-based SEM techniques should be regarded as complimentary technique and a forerunner to covariance-based SEM (Chin, 1998).

Because each technique uses a different algorithm, results given by both methods tend to be different (Gefen et al., 2000; Goodhue et al., 2012). It is found that results of covariance-based SEM are more accurate than those of variance-based SEM (Bollen, 1989; Gefen et al., 2000). This dissertation’s goal is not to only assess relationships between factors, but also to present and confirm a theory that helps improve compliance with ISS policies. For this reason, I

use the covariance-based technique (AMOS) because its objectives fit the goal of this dissertation.

4.5 Sample Size

Experts have differed on the question of minimum sample size required for a robust analytic performance by covariance based SEM (Anderson and Gerbing, 1988; Chin, 1998; Westland, 2010). In general, larger sample sizes lead to increased accuracy when estimating unknown parameters (Hair et al., 2010). Small sample size can cause the statistical software to either not execute the analysis or to bias the results. The sample size can affect the power statistic (Anderson and Gerbing, 1988). Power statistic is the probability that a significant relationship will be found if it exists (Hair et al., 2010). It is the long-term probability given the population effect size, alpha (significance level), and sample size of rejecting the null hypothesis (Cohen, 1992). Power and sample size are positively related; this means the bigger the sample size, the greater the power (Haas, 2012). As the power increases, the chances of finding a significant relationship increases.

Anderson and Gerbing (1984) found that a sample size of 150 can lead to a converged and proper solution if three or more indicators represent each factor (Anderson and Gerbing, 1988). For this reason, Anderson and Gerbing (1988, p. 415) argue that a “sample size of 150 or more typically will be needed to obtain parameter estimates that have standard errors small enough to be of practical use.”

Because no consensus among experts seems to exist on what minimum sample size will result in good covariance based SEM modeling, many researchers have used a rule of thumb which requires a minimum sample size equal to ten times the total number of free indicator variables that exist in a model (Kanawattanachai and Yoo, 2002). Applying the ten times rule,

the measurement model in this study consists of 38 free indicators, a minimum sample size of 380 (38 x 10) is required.

Tanaka (1987) argued that sample size should be dependent on the number of estimated parameters, which means the latent variables and their correlations, and not on the total number of indicators. This is because in SEM “both the regression coefficient (factor loading) linking the observed and latent variable and the error component (unique variance) of the model must be simultaneously estimated” (Tanaka, 1987, p. 137). Velicer and Fava (1998) concluded, after reviewing the literature on sample size, that there is no support for rules suggesting that a sample size is a function of indicators. Velicer and Fava (1998) displayed that in SEM, convergence to proper solutions and goodness of fit are influenced by a greater number of indicators per latent variable and higher factor loadings. However, they did not suggest a required minimum sample size. Westland (2010) argues that sample size is not solely dependent on indicators count; but, it is a function of effect size, number of indicators, number of latent constructs, level of significance, and power. Effect size is the degree to which the null hypothesis (H0) is false and is indexed by the difference between H0 and H1 (Cohen, 1992). Effect size is an index starting at zero (Cohen, 1992). Each statistical test has its own index, and for all, the effect size of H0 is equal to zero (Cohen, 1992). In SEM, researchers should aim for the smallest effect size—which means the smallest correlation possible between latent variables—because when effect size is not equal zero, H0 is false; thus, failure to reject H0 incurs a type II error (Cohen, 1992; Westland, 2010). Cohen (1988, 1992) provides guidelines for the level of effect size that should be used in social science research: for small effect size (0.1–0.23); medium (0.24–0.36); and large (>0.37).

Westland (2010) developed two lower bounds that specify the sample size needed in SEM: “the first as a function of the ratio of indicator variables to latent variables, and the second

as function of minimum effect, power, and significance” (p.476). Thus, to compute a sample size, number of latent variables, indicators, effect size, significance level, and power are needed. In this dissertation, I use the highest value in the lowest range of effect size, which is 0.23 because it is still considered to be a small effect size and a power level of 0.80 (Cohen, 1998, 1992). There are 15 latent variables, 52 indicators and the significance level used is 0.05. Using the calculator provided by Westland (2010), this dissertation requires a minimum sample of 359 observations.

4.6 Measurement Validation

Objectivity of data is of prime importance in positivist research (Straub et al., 2004). A rigor research design is characterized by the extent to which data collected accurately represent the latent constructs and are relevant to the theories the researcher is attempting to assess (Coombs, 1976). Latent constructs are factors that cannot be measured directly. They are social constructions because they are measured indirectly through indicator variables. In other words, direct measures are used as indicators for latent constructs. In order to ensure that the conclusions based on the measured indicators are accurate, the researcher must establish that the measures are valid and reliable. The purpose of validation is to establish a high degree of confidence that the findings are indeed true (Nunnally, 1978; Straub et al., 2004). Without instrument validation, conclusions made by the researcher are in doubt (Straub, 1989). Measurement items (indicators) of an instrument are validated by assessing content validity, construct validity, and reliability.

Content validity is the degree to which measures capture the essence of the latent construct they are supposed to represent, and cover a representative sample of the behaviors, thoughts, and feelings that define the construct to be measured (Hair et al., 2010). Content

validity is established by reviewing the literature and/or through expert panels (Straub, 1989). Literature provides definition and arguments that help researchers develop measurement items to represent latent constructs. In other words, researchers can identify the boundaries of a latent construct through the literature review. As long as the constructs are the same, it is advisable to use previously developed measures because they have been validated by researchers (Lee and Hubona, 2009; Straub, 1989; Straub et al., 2004).

Construct validity is the extent to which “a given test/instrumentation is an effective measure of a theoretical construct” (Straub et al., 2004, p. 424). Construct validity verifies whether measurement items are a reasonable operationalization of the construct (Straub et al., 2004). In other words, construct validity shows whether a set of measurement items, chosen to represent a construct, fit together and capture the essence of a latent construct (Hair et al., 2010; Straub et al., 2004). Items of a construct should represent only a particular latent construct. Construct validity involves statistical tests and is assessed by convergent and discriminant validity.

Convergent validity is defined as the degree to which the measurement items are related to the construct they are theoretically predicted to be related to (Hair et al. 2010). In other words, convergent validity verifies whether measures are most closely associated with their respective construct (Straub et al., 2004). Items related to a construct should converge (show significant high correlation) together and share a high proportion of variance in common (Hair et al., 2010, Straub et al., 2004). Traditionally, four methods are used to estimate the amount of convergence among measurement items: composite reliability coefficients, Average Variance Extracted (AVE), loadings of measures using principal component factor analysis, and loadings of measures on latent construct using Confirmatory Factor Analysis (CFA) (Chin, 1998; Coombs,

1976; Gefen et al., 2000; Hair et al., 2010; Nunnally, 1978; Schermelleh-Engel et al., 2003; Shadish et al., 2002). I describe these methods and their relevance in next paragraphs.

In a principal component factor analysis, a construct shows high convergent validity when all items measuring the construct load greater than 0.4 on that particular factor/construct (Hair et al., 2010). Factor loadings indicate the correlation between a latent construct (factor) and measures (indicators) (Gefen et al., 2000; Hair et al., 2010). Cross-loadings indicate that measures converge and correlate with more than one factor, which points out that these measures are not distinct and represent more than one factor (Hair et al., 2010). Thus, cross-loadings point out that measures are not valid (Shadish et al., 2002).

Structural equation modeling (SEM) software, by conducting CFA, can also be used to examine whether measurement items are valid (Hair et al., 2010). This can be done by examining the standardized loadings estimates of measurement items on their intended constructs. Standardized loadings estimates on a particular construct have to be greater than 0.7 to suggest adequate convergent validity (Chin, 1998).

AVE is “calculated as the mean variance extracted for the items loading on a construct and is a summary indicator of convergence” (Hair et al., 2010, p.709). It is calculated as the total of all squared standardized factor loadings of all items of a construct divided by the number of items (Hair et al., 2010). AVE indicates the amount of variance items share with a latent construct. A coefficient greater than 0.5 is considered to be an acceptable level because it means that half of the variance of the latent construct is explained by the item measures (Fornell and Larcker, 1981). Indeed, a value greater than 0.5 indicates that the error component is lesser than the variance explained.

Discriminant validity refers to the extent to which measures of different constructs are unique (Hair et al., 2010). It can be assessed by comparing the correlation between pair constructs and the AVE of each construct (Fornell and Larcker, 1981). The correlation between a pair of latent variables (constructs) should be less than the square root of the AVE estimate of each variable (Anderson and Gerbing, 1988).

Reliability is the extent to which a respondent answers the same or similar questions in the same manner each time (Straub, 1989). In other words, reliability tests ensure that indicators in each construct are internally consistent and produce stable results (Hair et al., 2010). Two tests of reliability are frequently used: Cronbach's alpha and composite reliability. To demonstrate high reliability, values of both indicators should exceed 0.70 (Cronbach, 1951; Gefen et al., 2000; Hair et al., 2010). Considerable debate centers around which of the two reliability indicators researchers should use (Bacon et al., 1995). Cronbach's alpha remains a commonly used indicator for reliability (Hair et al., 2010). In Cronbach's alpha, factor loadings of measures are constrained to be equal and all error variances are constrained to be equal (Cronbach, 1951). Composite reliability measures allow items to depart from the assumption that item measures share equal variance and to receive weights proportional to their true-score variances (Bacon et al., 1995). Composite reliability is computed from the squared sum of factor loadings for each construct and the sum of the error variance terms for a construct (Hair et al., 2010). Therefore, composite reliability is a better measure because all items of a latent construct rarely have the same true-score variance (Bacon et al., 1995). Differences in the coefficients obtained from both tests are usually minimal (Hair et al., 2010).

4.7 Instrumentation and Measures

A robust instrument validation and measurement purification requires three steps before collecting data for analysis (Straub, 1989). These steps are:

- i. Pretest
- ii. Technical validation, and
- iii. Pilot test.

Pretest is a qualitative testing of the content validity of the constructs (Straub et al., 2004). Measures can be pretested by asking people with domain knowledge to check whether measures embody the real meaning of each construct. In case previously validated measures are present in the literature, it is advised that these measures are used (Boudreau et al., 2001). The reason is because earlier researchers have defined the latent constructs and empirically validated the measurement items. By repeatedly subjecting the same measures to validation and reliability tests using different data sources, the rigor of measurement is enhanced.

The technical validation aims at assessing the validity and reliability of the constructs using two sets of data (Straub, 1989). Data from both sets are collected using different methods (e.g. survey, interview, etc.) to ensure that the method of collecting data does not influence the results.

Pilot test is a small scale preliminary study done by administering the survey to a sample of population (Straub, 1989). The aim of a pilot test is to ascertain whether the instrument measures are clear, valid, and reliable. During the technical validation and pilot test stages, techniques such as convergent validity, discriminant validity, and reliability are performed.

Churchill (1979) presented a sequence of steps to be followed in developing multi-item measures in marketing and other social behavior studies. Based on these steps, MacKenzie et al.

(2011) presented a similar set of recommendations that helps researchers develop valid measures in IS domain. These steps are:

- i. Conceptualization
- ii. Development of measures
- iii. Model specification
- iv. Scale evaluation and refinement
- v. Validation, and
- vi. Norm development.

The first step involves specifying the domain of the construct. This simply means that the researcher must clearly define the construct; that is to clearly specify what is included in the definition and what is excluded.

The second step is to generate measures that capture the definition given for the construct in the previous step. This can be done by searching the literature for validated measures or finding arguments given by researchers. If these are not available, a focus group selected from experts in the domain should be used to identify the measures.

After identifying the measures, the next step is to formally specify a measurement model that captures the relationship between indicators (direct measures) and latent (unobserved) constructs. The relationships between indicators and latent are defined based on the causality. If the latent construct causes the measured variables, it is called reflective measurement model; however, if measured variables cause the construct, it is called formative measurement (Hair et al., 2010). The difference between these two types of measurements is that reflective indicators can be viewed as a sample of all possible items available within the conceptual domain of the

construct; however, formative construct should be represented by all indicators responsible for its formation (Hair et al., 2010).

Next, data are collected from a sample of respondents in order to conduct a pretest. At this stage, convergent and discriminant validities are evaluated in order to examine the psychometric properties of the scale (MacKenzie et al., 2011). Results from these tests may point out problems in the measures such as wordings and ambiguity, and thus require researchers to add, drop, or reword measures. Because of the changes that might occur during the previous stage, new sample data should be collected to conduct validation tests. Validation tests include convergent validity, discriminate validity, and reliability. At this stage, it may take more than one round until researchers develop clear, precise, and valid measures.

4.8 Development of Scales

In this dissertation, 15 latent reflective constructs are represented by 54 items. The satisfaction items (4 measures) were measured using a seven-point semantic differential scale. All of the remaining constructs (50 items) were measured using a seven-point Likert scale anchored at 1 = strongly disagree and 7 = strongly agree. The measures used in this study are based on previously validated measures, whenever possible, (Boudreau et al., 2001; Gefen, 2000; Straub et al., 2004). Thus, measurement scales of 12 out of 15 constructs have been adapted from previous research. Scale measures for three constructs are not available in the literature. Questions and items are self-developed in this dissertation. Table 4.2 shows the constructs, definitions, reliability coefficient, type of scale, and the primary sources of the measurement items.

Extensive review of literature did not reveal existing measures for multidimensional top management support, task dissonance, and self-policing constructs. Therefore, measures for

these new constructs are self-developed based on arguments and definitions existing in previous studies. Statistical procedures advised by Straub (1989), Gefen et al. (2000), and Straub et al. (2004) are used to estimate the validity and reliability of the newly developed items.

Table 4.2 Construct Operationalization

Construct	Definition	Reliability	Type of scale	Sources
Intention to ISS Compliance	Employees' intention to comply with ISS policies	0.87; 0.92	Likert	Hu et al. (2012); Ifinedo (2012)
Resistance	Employee's opposition, challenge or disruption to new policies and changes (improve)	0.86	Likert	Oreg (2006)
Habit	Employees' learned actions that have become automatic responses to cues and are intended to obtain one or more goals	0.89; 0.90; 0.86	Likert	Lankton et al. (2010); Limayem and Hirt (2003); Vance et al. (2012)
Self-policing	Exertion of control over the self to produce self-approved behavior in the absence of external regulator	—	—	Self-developed
Word-of-mouth	Gossip spread by oral communication (wordnet)	0.80	Likert	Harrison-Walker (2001)
Satisfaction with ISS	Employees' emotional state following IT usage experience, involves valence and intensity	0.97; 0.96	Semantic differential	Xue et al. (2011); Bhattacharjee and Premkumar (2004)
Perceived ISS quality	Employees' subjective judgment about the overall excellence and quality of ISS.	0.82; 0.87	Likert	Barnes and Vidgen (2001); Fassnacht and Koese (2006)
Task dissonance	Employees' perception on the effort required to do a task using ISS policies	0.93	Likert	Self-developed based on Rutner et al. (2008)
Injunctive norms	Employees' expectations of whether ISS compliance is accepted and encouraged by people who are important to them in the organization	0.92; 0.93	Likert	Anderson and Agarwal (2010); Bulgurcu et al. (2010); Herath and Rao (2009a)
Descriptive norms	Employees' beliefs that others around them are complying with ISS	0.90; 0.96	Likert	Anderson and Agarwal (2010); Herath and Rao (2009a)

Construct	Definition	Reliability	Type of scale	Sources
Moral norms	Employees' psychological sense that motivate them to govern a person's thoughts and actions	0.84	Likert	Li et al. (2010)
Perceived behavioral Control	Employees' beliefs in their abilities, resources, and control they have to take an action.	0.91; 0.95; 0.92	Likert	Anderson and Agarwal (2010); Herath and Rao (2009a); Workman et al. (2008);
Perceived top management support	Employee's perception of the top managers' behavior and actions in facilitating and supporting the organizational actions.	Was not assessed (descriptive study)	No scale	Self-developed based on Boonstra (2013)
Severity of Punishment	Employee's perception of the degree of punishment procedures set by the organization	0.88	Likert	Herath and Rao (2009a)
Certainty of Punishment	Employee's perception of the probability of being punished as described by the organization's rules	0.93; 0.86; 0.92	Likert	Bulgurcu et al. (2010); Herath and Rao (2009a); Peace et al. (2003)

A brief review of each construct included in the research model (Figure 3.12) and its associated measures is presented below.

Measures for ISS compliance intention are adopted from Hu et al. (2012) and Ifinedo (2012). The measures tap into employees' intention to comply with ISS policies. Measures for intention to comply are:

Thinking of my organization and job ...

... I am likely to follow the organization's information security policies

... It is possible that I will comply with the organization's information security policies

... I intend to follow the organization's information security policies

Resistance scales extract the extent of employees' opposition to ISS policies (Markus, 1983). Resistance measures are adapted from Oreg (2006). Measures used by Oreg (2006) were adopted from Oreg (2003), who developed these measures. The measures are:

In my organization...

... I am stressed by the changes brought about because of information security policies

... I am upset by the changes brought about because of information security policies

... I complain to my friends about the changes that are necessitated because of information security policies

... I express my resistance to changes that are necessitated because of information security policies to my friends

... I believe the changes that are brought about because of information security policies do not personally benefit me

... I believe the changes that are brought about because of information security policies make my job harder

Measures of habit tap into employee's "learned actions that have become automatic responses to the particular cues" (Lankton et al., 2010). These are adapted from Limayem and Hirt (2003), Vance et al. (2012), and Lankton et al. (2010). The habit measures are:

Think about how you interacted with the information systems/technologies BEFORE you became aware of the current information security policies in your organization:

- Using information systems/technologies was fairly automatic to me in performing my tasks
- I did not have to think twice before using information systems to perform my tasks
- Using information systems had become a habit for me

Measures of perceived ISS satisfaction are adapted from Bhattacharjee and Premkumar (2004) and Xue et al. (2011), who adopted these measures from Bhattacharjee (2001). The measures tap into employees' emotional state following ISS usage which involves two dimensions: valence (positive versus negative) and intensity (quality) using semantic differential items (Bhattacharjee and Premkumar, 2004). ISS satisfaction measures are:

I am _____ with my organization's information security policies

Extremely dissatisfied Extremely satisfied

Extremely displeased Extremely pleased

Extremely frustrated Extremely contented

Extremely unhappy Extremely delighted

Perceived ISS quality scales extract the employees' subjective judgment about the overall excellence and quality of ISS. Perceived ISS quality measures are adapted from Barnes and Vidgen (2001) and Fassnacht and Koese (2006). ISS quality measures are:

Information security policies in my organization ...

... make computer systems dependable

... make computing environment safe and secure

... are capable of responding to most threats to systems and data

Measures of self-policing tap into employees' perception on the degree of exertion of control that they have over the self to produce self-approved behavior in the absence of external regulators. Given the absence of pre-validated scales for self-policing, new scales are developed for this construct. The measures used for self-policing are:

When at work ...

- ... I always consider whether my actions will protect organizational information systems
- ... I always think about the consequences of my actions before using information systems
- ... I always consider risk to my organization before using information systems
- ... I always think about the appropriateness of my actions before interacting with information systems

Injunctive norms scales extract the employees' expectations of whether ISS compliance is accepted and encouraged by people who are important to them in the organization. Injunctive norms measures are adapted from Anderson and Agarwal (2010), Bulgurcu et al. (2010), and Herath and Rao (2009a). Injunctive norms items are:

In my organization...

- ... the IT department expects that I should comply with information security policies
- ... people who are important to me expect that I should comply with security policies
- ... my colleagues expect that I should comply with the information security policies
- ... my supervisors expect that I should adhere to information security policies

Measures of descriptive norms tap into employees' beliefs that others around them are complying with ISS. Scale measures for descriptive norms are adopted from Anderson and Agarwal (2010), and Herath and Rao (2009a). Descriptive norms items used in this dissertation are:

In my organization...

- ... it is common to find other employees complying with information security policies
- ... most employees generally comply with the information security policies
- ... I am certain other employees comply with the information security policies

... it is likely that most employees follow the information security policies

... I believe other employees comply with the information security policies

Moral norms scales extract employees' psychological senses that motivate them to govern their thoughts and actions. Moral norms measures are adapted from Li et al. (2010). Items for moral norms are:

In my organization ...

... I think it is morally right for employees to comply with information security policies

... I think complying with information security policies is the right thing to do

... I think not complying with information security policies is wrong

... I think employees should always adhere to information security policies

... I think employees should do whatever they can to comply with information security policies

Perceived behavioral control scales tap into employees' beliefs in their abilities, resources, and control they have to take an action. Scale items for perceived behavioral control are adopted from Anderson and Agarwal (2010), Herath and Rao (2009a), LaRose et al. (2008) and Workman et al. (2008). The measures are:

In my organization ...

... I find it easy to comply with information security rules and policies

... complying with the information security policies is mostly under my control

... I have the resources and the knowledge to comply with information security policies

... complying with information security policies is easy for me

... I can comply with most of the information security policies without needing any help

Measures for perceived top management support tap into employees' perception of the top managers' behavior and actions in facilitating and supporting the organizational actions. Given the absence of pre-validated scales for top management that fully capture its multi-dimensionality, new scales are created for this construct based on the dimensions and definitions given by Boonstra (2013). Boonstra (2013) defined the dimensions of top management support as follows:

- Resources: top management secures financial, material, and human resources to support the strategic IS-project and promote the effective implementation and use of the system.
- Structural arrangements: top management establishes and enforces a project structure, and an adapted organizational structure receptive to the new system.
- Communication: top management supports the project by communicating about it with visible enthusiasm and by expressing the possibility of needing to adapt the organization, the system, and the relationships among stakeholders.
- Expertise: top management has a sufficient understanding of the project management of the strategic IS project as well as the content, context and implications of the proposed system.
- Power: top management has the power, and is willing and able to use it, to advance the project by resolving conflicts and protecting the project team.

Based on these definitions, the items below were developed for this dissertation.

In my organization, the top management...

... provides adequate resources (financial, human, etc.) to support information security policies

... frequently communicates with employees about the importance of information security policies

- ... has created adequate organizational structure to enforce information security policies
- ... encourages compliance of information security policies
- ... demonstrates that information security is a priority by their words and actions
- ... support for information security policies is visible
- ... strongly supports information security

Perceived severity of punishment scales extract employees' perception of the punishment degree if anyone violated the policies. Perceived severity of punishment measures are adopted from Herath and Rao (2009a) and Peace et al. (2003). Peace et al. (2003) developed the measures for severity of punishment and were adopted by Herath and Rao (2009a). Measures of perceived severity of punishment are:

In my organization ...

- ... employees who are found violating information security policies are severely punished
- ... employees who are found violating information security policies receive severe penalty
- ... employees who are found violating information security policies are severely reprimanded

Measures of perceived certainty of punishment tap into employees' perception on the probability of being punished if anyone violated the policies. Scale measures for perceived certainty of punishment are adopted from Bulgurcu et al. (2010), Herath and Rao (2009a), and Peace et al. (2003). Original measures for perceived certainty of punishment used in these studies were developed by Peace et al. (2003). Items that measure perceived certainty of punishment are:

In my organization ...

- ... employees are effectively monitored for information security policies compliance
- ... violations of information security policies are mostly known to the relevant IT department

... people who violate security policies are definitely known to the relevant IT department

Measures of word of mouth tap into employees' casual or unconstrained conversation with others about ISS accidents. Scale measures for word of mouth are adapted from Harrison-Walker (2001) who self-developed them. Items of word of mouth are:

Within and outside my organization...

... I mostly hear negative things/stories about risks to information systems

... I hear about information security breaches quite frequently

... most people have negative things to say about information security environment

... most people warn others about consequences of information security breaches

Task dissonance scales extract employees' perception on the discord arising in their cognition because of conflicting utilities between their primary responsibilities/duties and ISS compliance tasks. Task dissonance measures are adapted from Rutner et al. (2008). Rutner et al. (2008) developed measures for negative emotional and positive emotional dissonance. These measures are close to this study from the dissonance perspective; however, Rutner et al. (2008) were assessing negative and positive emotional dissonance. Task dissonance measures are:

Thinking about my job description ...

... complying with information security policies is not among my main responsibilities

... doing my job is more important to me than strictly adhering to all information security policies

... My performance is likely to be negatively affected if I were to adhere to all security policies

... I think strictly complying with information security policies is likely to make me less efficient

... complying with information security policies probably makes my work more complex

4.9 Pre-Test

I pre-tested the instrument in three waves in order to make the questions clear and measure the constructs as defined. The reason for this step was to establish content validity. In total, six doctoral students (four majoring in IS and two in marketing), nine professors (one from the department of management and eight from IS/QUMT), and eleven IT and security practitioners (all domain experts) participated in the pre-test. Two IS doctoral students, one management professor, and three IS professors participated in the first wave. Participants in this stage pointed the need for some changes, especially in the wording, in order to make measures clear. The main issue was that few measures may have conveyed more than one meaning, which lead participants in the study to interpret the question differently from the original intent. Based on this feedback, modifications were made to the wording of the measures. For instance, a measure for top management support was written as: “In my company, the top management has set up adequate organizational structure to enforce and promote information security policies.” The “enforce and promote” in this measure might make participants think that these are two different things or it might be the case where organizations use “promote” or “enforce.” For this reason and to make the question clearer, this measure was changed to: “In my organization, the top management has created adequate organizational structure to enforce information security policies.” Measures that were changed are highlighted in Appendices B and C.

Three IS (one of them participated in the first wave) and two marketing doctoral students, one management professor (participated in the first wave), five IS professors (three of them participated in the first wave), and seven IT and security practitioners (from the IT department at UTPA) participated in the second round of pretests. Minor modifications to the wording of the measures were needed in this round also because of ambiguity in some measures. For instance, a

measure for ISS quality “In my company information security policies are dependable” was changed to “Information security policies in my organization make computer systems dependable.” The comment received for this measure stated that it is not clear what “dependable” refers to.

In the third round, two IS professors (participated in the first two rounds), one QUMT professor, and four IT and security professionals (from: National Institutes of Health Information Technology Acquisition and Assessment Center, Capital One, Renaissance Hospital, and Edinburg Children Hospital) participated. No changes were made at this stage.

4.10 Pilot Tests

To validate the psychometric properties of the instrument, I pilot-tested the survey in three waves (Straub, 1989). In the first wave, 115 individuals employed by UTPA participated in the study. The sample was non-random and participants were not selected a-priori but were contacted based on their availability at a certain time and convenience. Employees at UTPA are familiar with ISS policies. . Because all employees, have to complete the ISS policies training every year. Participants in this pilot-test are a mix of part-time and full-time employees. Table 4.3 presents some characteristics of the participants.

Table 4.3 Respondent Characteristics (1 st Pilot)		
Measure	Frequency	Percentage
Gender		
Male	72	62.6
Female	40	34.8
Age		
18-24	29	25.2
25-34	38	33.0
35-44	23	20.0
45-54	15	13.0
55-64	9	7.9
Job Type		
Operational	76	66.1
Tactical	4	3.5
Strategic	27	23.5
Experience (in years)		
0-1	24	20.9
2-5	27	23.5
6-10	16	13.9
10-20	30	26.1
>20	18	15.7

After collecting data, tests for reliability, discriminant and convergent validity were assessed. The reliability of measurement items for each construct was assessed using Cronbach's alpha. Convergent and discriminant validity were assessed using factor analysis. I found that measures of injunctive and descriptive norms load on one factor. At this stage, measures for injunctive norms were:

- In my company people who are important to me think that I should follow the information security policies.
- In my company my colleagues think that I should comply with the information security policies.
- In my company the IT department thinks that I should follow the information security policies.

And measures for descriptive norms were:

- In my company it is common to find other employees complying with information security policies.
- In my company most employees generally comply with the information security policies.
- In my company I am convinced other employees comply with the information security policies.

The full survey instrument of the 1st pilot test is in Appendix-B. To understand the reason behind the cross-loading, I interviewed five persons who participated in the survey, in one session, to ask about their feedback on the instrument and what they thought when they answered the questions. I wanted to find out if participants perceive the measures of descriptive and injunctive norms to be the same or different. The participants perceived measures of both constructs to be different. In order to make sure that both constructs are interpreted as distinct, the measures had to be rephrased. For instance, “think” in the injunctive norms was changed to “expect” which makes it closer to the definition of the injunctive norms construct that is “the expectations of other.” The last measure of descriptive norms contained “I am convinced” was changed to “I believe” which also makes it closer to the definition of the construct. New measures were also added for each construct. After modifications:

Measures of injunctive norms are:

- In my organization the IT department expects that I should comply with information security policies.
- In my organization people who are important to me expect that I should comply with security policies.
- In my organization my colleagues expect that I should comply with the information security policies.

- In my organization my supervisors expect that I should adhere to information security policies.

Measures for descriptive norms are:

- In my organization it is common to find other employees complying with information security policies.
- In my organization most employees generally comply with the information security policies.
- In my organization it is likely that most employees follow the information security policies.
- In my organization I believe other employees comply with the information security policies.

The reliability coefficient for perceived punishment certainty was lower than 0.7 indicating a problem in reliability of the measures. Table 4.4 presents the reliability coefficients of the 1st pilot-test. To solve this issue, measures of perceived certainty of punishment were modified. The measures used before modifications are:

- In my organization employees are effectively monitored for information security policies compliance.
- In my organization information security policies violations are generally known to the IT department.
- In my organization people who violate security policies would be definitely caught.

After modifications, these measures became:

- In my organization employees are effectively monitored for information security policies compliance.

- In my organization violations of information security policies are mostly known to the relevant IT department.
- In my organization people who violate security policies are definitely known to the relevant IT department.

Construct	Cronbach's alpha
Punishment certainty	0.51
Descriptive norms	0.76
Injunctive norms	0.75
Moral norms	0.73
Perceived behavioral control	0.78
Self-policing	0.87
Resistance towards ISS	0.79
Satisfaction with ISS	0.92
Punishment severity	0.94
Top management support	0.83
Task dissonance	0.86
Word of mouth	0.81
Pre-ISS habit	0.80
Perceived ISS quality	0.80

The second pilot test was done at a medium-sized family practice clinic. Twenty-five employees, including physicians, work at this clinic. Twenty of these employees (all except physicians) participated in this test. Participants were also familiar with ISS because policies are implemented at this clinic. After running tests for reliability, discriminant and convergent validity, I found that reliability coefficients for all constructs are higher than 0.8 and the items loaded perfectly to their constructs. The full survey instrument of the 2nd pilot test is in Appendix-C.

Because of the small sample size of this pilot study, a third wave was completed. Data for the third pilot-test were collected from individuals working in four different industries: education, financial, retail, and IT. UTPA, Best Buy, different Bank branches, and one small IT company participated in this test. Similar to the first pilot test, UTPA employees were not selected a-priori but were contacted based on their availability at a certain time and convenience. Individuals who had participated in the first wave did not participate in the third round. I distributed 75 questionnaires to UTPA employees out of which 56 responded. A manager at Best Buy distributed 50 copies to his employees during check-in. Participation in the survey was optional. The surveys were distributed in two shifts, early morning and night (closing) shift. I did not make direct contact with participants. After two reminders, 21 responses were collected. A manager of a small IT company that develops software distributed 11 copies to all his employees. All 11 surveys were completed. As for the Bank branches, I visited 13 of them in Edinburg, TX. Managers of these branches received a total of 98 surveys for distribution to their employees. I did not make any direct contact with employees. After four reminders, 45 completed surveys were collected. Table 4.5 presents characteristics of the participants in the 3rd wave of the pilot test.

Table 4.5 Respondent Characteristics (3rd Pilot)								
Measure	Education (N=56)		Financial (N=45)		Retail and IT (N=32)		Total	
	N	%	N	%	N	%	N	%
Gender								
Male	16	67.9	16	50	21	37.5	53	39.8
Female	38	28.6	28	28.6	8	14.3	74	56.0
Age								
25-34	8	14.3	19	33.9	13	23.2	40	30.0
35-44	21	37.5	16	28.6	13	23.2	50	37.6
45-54	9	16.1	6	10.7	5	8.9	20	15.0
55-64	17	30.3	4	7.2	1	1.8	22	16.5
Education								
High School	11	19.6	22	39.3	12	21.4	45	33.8
College	23	41.1	22	39.3	19	33.9	64	48.1
Master	18	32.1	0	0	1	1.8	19	14.3
Doctoral	4	7.1	0	0	0	0	4	3
Job Type								
Operational	42	75	35	62.5	13	23.2	90	67.7
Tactical	5	8.9	5	8.9	2	3.6	12	9.0
Strategic	5	8.9	5	8.9	15	26.8	25	18.8
Experience								
0-1	4	7.1	6	10.7	7	12.5	17	12.8
2-5	16	28.6	17	30.4	12	21.4	45	33.8
6-10	9	16.1	13	23.2	7	12.5	29	21.8
10-20	16	28.6	4	7.1	5	8.9	25	18.8
>20	11	19.6	5	8.9	1	1.8	17	12.8
Organization size								
< 500	29	7.1	13	23.2	23	41.1	65	48.9
500-999	4	28.6	2	3.6	1	1.8	7	5.3
1000-4999	16	16.1	4	7.1	1	1.8	21	15.9
5000-10000	2	28.6	2	3.6	0	0	4	3.0
>10000	2	19.6	23	41.1	5	8.9	30	22.6

After each round, tests for reliability, discriminant and convergent validity were assessed. Table 4.6 presents the Cronbach's alpha for 1st and 3rd round. It also presents coefficients grouped by industry, which makes it easy to compare the first pilot results to the third pilot results, especially because the first round of pilot test comprised of responses only from an educational organization. The retail and IT industry are not included in the table because of the small sample size. It is clear that results improved from the first to the third round of pilot tests. After revising the measures in the three pilots, it became clear that the measures used are reliable and valid. After the 3rd pilot test, no changes were made to the instrument. Thus, the survey used

in the 3rd pilot test was the same survey used for data collection. The full survey instrument of the 3rd pilot test is in Appendix-D.

Table 4.6 Reliability Coefficients-Cronbach's Alpha

Construct	1st Pilot		3 rd Pilot	
	Education	Education	Financial	Total
	Cronbach's alpha	Cronbach's alpha	Cronbach's alpha	Cronbach's alpha
Punishment certainty	0.51	0.80	0.79	0.87
Descriptive norms	0.76	0.94	0.93	0.92
Injunctive norms	0.75	0.91	0.87	0.94
Moral norms	0.73	0.81	0.71	0.87
Perceived behavioral control	0.78	0.85	0.82	0.89
Self-policing	0.87	0.95	0.91	0.96
Resistance towards ISS	0.79	0.96	0.91	0.95
Satisfaction with ISS	0.92	0.98	0.99	0.98
Punishment severity	0.94	0.97	0.96	0.97
Top management support	0.83	0.94	0.92	0.94
Task dissonance	0.86	0.86	0.86	0.89
Word of mouth	0.81	0.89	0.81	0.87
Pre-ISS habit	0.80	0.89	0.89	0.87
Perceived ISS quality	0.80	0.91	0.83	0.85

4.11 Data Collection

The sample in this study includes employees from twenty one different organizations located in forty two different cities of the United States. Participants in this study are familiar with ISS policies because their organizations already had implemented ISS policies. A total of 725 individuals were invited to complete the survey instrument. Of the distributed surveys, 575 were returned. Ten surveys were dropped because they were not complete and 565 usable surveys were used for data analysis. Thus, the effective response rate was about 78 percent. Online (63 respondents) and paper-based (502 respondents) methods were used to collect the

responses. I performed a t-test statistic to find out whether there is a difference between online and paper-based. I found that there is no difference ($t= 1.82$) at the 0.05 level between data collected using paper and online-based surveys. I will explain in detail the data collection method I used in each organization in the following paragraphs. Table 4.7 presents the organizations, sampling frame, number of employees who participated in this dissertation, assignment method (random or not), and type of survey (online or paper).

Table 4.7 Number of Employees from Each Organization

Organization Name	Type of Organization	Sampling Frame	N Completed	Randomly Assigned	Online/Paper Survey
Texas regional Bank	Financial	3	3	Yes	Paper
BBVA Compass	Financial	120	102	Yes	Paper
International Bank	Financial	50	39	Yes	Paper
ACE Cash Express	Financial	15	15	Yes	Paper
Capital One	Financial	9	9	Yes	Paper
Bank of America	Financial	14	15	Yes	Paper
Elsa State Bank	Financial	13	9	Yes	Paper
Bloomberg	Financial	29	18	No	Online
Wells Fargo Bank	Financial	31	14	Yes	Paper
IBC	Financial	70	106	Yes	Paper
Alps	IT	20	5	No	Paper
Commscope	IT	10	6	No	Paper
Teleplan	IT	5	3	No	Paper
Hastings	IT	25	6	Yes	Paper
Oracle	IT	79	45	No	Online
Oracle	IT	21	21	No	Paper
Vesta	IT	15	11	No	Paper
UTPA	Education	79	56	No	Paper
Alberta Electric Systems Operators	Service	25	15	Yes	Paper
Hidalgo County	Service	7	7	No	Paper
Renaissance Hospital	Health	5	4	No	Paper
Best Buy	Retail	80	56	Yes	Paper

Fifty six employees from the University of Texas-Pan American (UTPA) completed the survey, out of 79 distributed. Employees who provided data for pilot-tests were not asked to participate in the final data collection. There was no formal plan for approaching employees.

Employees who were at their offices and agreed to participate in the study provided data. Completed surveys were collected personally or sent via campus mail.

Different bank branches in the McAllen-Edinburg area provided data for this dissertation. Branches which participated in the pilot test did not provide data for the final study. Texas Regional Bank (3 participants), Wells Fargo Bank (14 participants from two branches), Capital One (9 participants), Bank of America (15 participants from two branches), and Elsa State Bank (9 participants) participated in this dissertation. Managers of these branches received a total of 70 questionnaires and distributed them. Details are presented in Table 4.7. I did not make any direct contact with employees. After two reminders, 50 completed surveys were collected.

A supervisor at the International Bank (corporate office) randomly selected 50 employees and asked them to return the surveys to him. I did not make any direct contact with employees. A reminder was given to employees after few days. I received 39 completed surveys.

Alps, Commscope, Teleplan, and Hastings are companies that have plants and warehouses in the Maquiladora district. Most employees at these companies are laborers and do not have access to IS because of their job duties. Those who have management positions or who have access to IS were target for data collection. A total of 60 surveys were distributed by Human Resource managers. I did not have any direct contact with employees who participated. After eight reminders/visits, I collected a total of 20 filled surveys.

Managers of two Best Buy stores distributed 80 questionnaires to their employees. Surveys were given to two-shift employees during lunch break. A total of 56 completed surveys were returned after two weeks.

A top management executive at IBC Bank sent questionnaires to 23 branches. Seventy questionnaires were given to him. He requested that each manager of these branches should

choose 4-5 random employees to complete the surveys. For this reason, more copies were made at the Bank. After two weeks, I collected 106 surveys.

A manager at ACE Cash Express distributed 15 questionnaires to all her employees. I collected 15 completed surveys. I did not have any direct contact with employees. Similarly, a manager at Vesta distributed 15 surveys to all his employees. After two reminders, 11 employees completed the questionnaires.

At Alberta Electric Systems Operators, permission was only given to 25 employees for participating in the study. These 25 employees were randomly selected from seven departments: network infrastructure, server infrastructure, operations support, real time operations, business analyst, change management, and application administration. Of the 25 distributed questionnaires, 15 were collected.

I e-mailed the PDF file of the survey to an employee at Oracle. He distributed 21 copies to his colleagues who work at the same department. A total of 21 copies were collected. I also provided him a link for the survey. Online survey is more convenient for employees to fill in, especially for those who work in different sites offering consultation for other organizations. Surveygizmo.com was used. A total of 79 employees received an invitation to participate in the study. Out of these 79 employees, 45 completed the survey.

An executive at Hidalgo County allowed 7 employees working in his office to participate in the study. Seven completed surveys were collected. The Human Resources department at Renaissance Hospital agreed that only 5 employees who work at their office could participate in the study. I collected 4 completed surveys.

A supervisor at Bloomberg received a link for the survey. He forwarded it to 29 employees under his supervision. After two reminders, 18 employees completed the survey.

Table 4.8 depicts the characteristics of all respondents. Overall, 50.8 % of the respondents are male and 44.2 % are female. About 88.4 % of the respondents are aged between 18 and 34. 57.2 % of the respondents are college graduates, and 12.2 % have a graduate degree (Master's or Doctoral). Regarding the job type, 63.9 % of the respondents have an operational position, whereas 13.8% of them have tactical positions and 19.6 % have strategic jobs. About half of respondents (49.7 %) have more than five years of experience. More descriptive statistics of respondents' characteristics are presented in Table 4.8. Table 4.9 presents characteristics of respondents based on industry. Industries with a sample greater than 20 are included in the table.

Table 4.8 Respondent Characteristics (Total)		
Measure	Frequency	Percentage
Gender		
Male	250	50.8
Female	287	44.2
Age		
18-24	167	29.6
25-34	230	40.7
35-44	102	18.1
45-54	45	8.0
55-64	14	2.5
Education (highest level achieved)		
High School	160	28.3
College	323	57.2
Master	65	11.5
Doctoral	4	.7
Job Type		
Operational	361	63.9
Tactical	78	13.8
Strategic	111	19.6
Experience (in years)		
0-1	66	11.7
2-5	209	37.0
6-10	133	23.5
10-20	106	18.8
>20	42	7.4
Organization size (# of employees)		
< 500	49	8.7
500-999	21	3.7
1000-4999	217	38.4
5000-10000	26	4.6
>10000	249	44.1
Industry		
Manufacturing	12	2.1
Service	27	4.8
Education	61	10.8
Financial	329	58.2
Health	14	2.5
Telecommunication	41	7.3
Consulting	13	2.3
Government	7	1.2
Retail	56	10.4

Table 4.9 Respondent Characteristics by Industry (N> 20)

Measure	Retail		Telecommunication		Financial		Education	
	N	%	N	%	N	%	N	%
Gender								
Male	32	54.2	27	65.9	128	38.9	21	34.4
Female	22	37.3	10	24.4	188	57.1	38	62.3
Age								
18-24	28	47.5	1	2.4	117	35.6	8	13.1
25-34	15	25.4	20	48.8	140	42.6	26	42.6
35-44	7	11.9	9	22.0	52	15.8	11	18.0
45-54	8	13.6	8	19.5	11	3.3	15	24.6
55-64	0	0	3	7.3	6	1.8	0	0
Education								
High School	18	30.5	2	4.9	113	34.3	9	14.8
College	32	54.2	25	61.0	192	58.4	37	60.7
Master	5	8.5	12	29.3	19	5.8	15	24.6
Doctoral	0	0	2	4.9	0	0	0	0
Job Type								
Operational	24	40.7	21	51.2	224	68.1	45	73.8
Tactical	15	25.4	5	12.2	37	11.2	7	11.5
Strategic	19	32.2	14	34.1	58	17.6	6	9.8
Experience								
0-1	11	18.6	2	4.9	41	12.5	3	4.9
2-5	31	52.5	6	14.6	136	41.3	18	29.5
6-10	13	22.0	9	22.0	77	23.4	14	23.0
10-20	4	6.8	15	36.6	53	16.1	17	27.9
>20	0	0	8	19.5	16	4.9	9	14.8

CHAPTER V

DATA ANALYSIS AND RESULTS

In this chapter, I first describe data cleansing and descriptive statistics for measures used in this dissertation. I then describe the measurement validation methods which includes assessing reliability, construct validity, convergent validity, and discriminant validity tests explained in section 4.6 (Gefen et al., 2000; Straub et al., 2004). Next, I present the structural model which includes testing hypotheses and model fit indices such as the chi-square/df, NFI, CFI, TLI, RFI, IFI, and RMSEA (Coombs, 1976; Gefen et al., 2000; Nunnally, 1978; Schermelleh-Engel et al., 2003; Straub et al., 2004). Finally, I present the tests performed to check for common methods bias (Podsakoff and Organ, 1986; Podsakoff et al., 2003) and nonresponse bias.

5.1 Data Cleansing and Descriptive Statistics

Before applying statistical procedures, I examined the data for abnormalities such as missing data and outliers. Missing data arises when participants do not provide all the data included in the questionnaire. There are two types of missing data: “ignorable” and “not ignorable” (Hair et al., 2010; Rubin, 1976). Ignorable missing data results when collecting data from a sample and not the whole population, or because of specific data collection design such as asking respondents to answer questions before they experience an event, or when the question does not apply to them (Hair et al., 2010). Not ignorable missing data results because

respondents decide not to answer questions in the survey or do not complete the entire questionnaire (Hair et al., 2010). In the case of ignorable missing data, remedies are not needed. However, when missing data are not ignorable, the researcher has to examine the impact of missing data on the findings and find remedies to minimize any biases (Hair et al., 2010). The treatment of missing data varies depending on whether the missing values are in observations or in columns representing variables.

Assessing the effect of missing data within observations can be done by counting the number of missed values in every observation. Observations that have missing data under 10 percent can be ignored (Hair et al., 2010; Rubin, 1976). Using this criterion, I dropped 10 surveys (observations).

After checking for missing data in the observations, the researcher has to diagnose the randomness of missing values within variables (measures) to check for any systematic biases. There are two levels of randomness: (1) missing at random, and (2) missing completely at random. Missing at random results when missing data are not related to the values of the variable that has missing data but depend on another variable (Hair et al., 2010). Missing completely at random results when missing values are independent of other variables and thus occur entirely at random (Hair et al., 2010). If the missing data are missing completely at random, three types of imputations can be used as remedies (Allison, 2001; Hair et al., 2010; Rubin, 1976).

- i. Imputations using only valid data. In this case, only observations with complete data are included in the analysis. This method has two disadvantages (Hair et al., 2010). The first is the reduction of sample size because any missing values in any variable eliminate the entire observation. The second is the generalizability of the results because observations are eliminated using a nonrandom process.

- ii. Imputation using known replacement values. In this type of imputations, a known value is used to replace the missing values (Allison, 2001; Hair et al., 2010; Rubin, 1976). One main disadvantage of this method is finding a replacement value that matches all missing data (Allison, 2001; Hair et al., 2010).
- iii. Imputation by calculating replacement values from the observations that have valid data (Allison, 2001; Hair et al., 2010; Rubin, 1976). The assumption of this method “is that value derived from all other observations in the sample is the most representative replacement value” (Hair et al., 2010, p. 53).

Mean substitution, the mean value of a variable calculated from all valid responses, is a widely used method to impute missing values (Allison, 2001; Hair et al., 2010; Rubin, 1976). In this dissertation, missing values occur completely at random and the maximum number of missing values for any single variable (item) is 5. I used the mean substitution method in this dissertation.

Outliers are observations substantially different from the most of the observations (Bollen, 1989; Hair et al., 2010). Outliers can occur because of three reasons:

- i. Procedural error such as error in data entry,
- ii. Extraordinary events such as counting rainfalls during a hurricane, and
- iii. Extraordinary observations, which means that the participant has a different profile than others (Hair et al., 2010).

The ratio of Mahalanobis D^2 , an assessment that measures the position of observations to a common point divided by degrees of freedom (df), is used to detect outliers in multivariate analysis (Hair et al., 2010; Penny, 1996). Observations having a D^2/df value exceeding 2.5 in small sample size ($N < 200$) and 4 in large sample size ($N > 200$) can be designated as possible

outliers (Hair et al., 2010). Based on these criteria, no observation was detected as an outlier in this dissertation. All values of D^2/df are below 2.0.

Data were checked for normal distribution because SEM is sensitive to data distribution and normal data (Hair et al., 2010; Kline, 1998; McDonald and Ho, 2002). Normality refers to “the shape of the data distribution for an individual metric variable and its correspondence to the normal distribution” (Hair et al., 2010, p.71). Large variation from normal distribution can make statistical results invalid because normality is required for F and t statistics (Hair et al., 2010). However, studies on the robustness of the multivariate normality assumption have found that parameter estimates remain valid in large sample size ($N > 200$) even when the data are non-normal (Anderson, 1989; Browne and Shapiro, 1988; McDonald and Ho, 2002). This is because increase in sample size increases statistical power by reducing sampling error (Hair et al., 2010). Kline (1998), McDonald and Ho (2002), and Hair et al. (2010) suggested that skewness and kurtosis tests should be used to assess normality when the sample size is more than 200 because in other tests, namely Mardia’s (1985), Cox-Small test, and Shapiro-Wilk test even trivial deviations from normality are amplified due to high power. Skewness describes the shape of the distribution, meaning it shows whether the distribution is symmetrical or not (Black, 2012; Hair et al., 2010). Positive coefficient of skewness indicates that most of the values are below the mean, and negative coefficient of skewness indicates the opposite (Kline, 1998). Kurtosis describes the amount of peakedness of a distribution compared to normal distribution (Black, 2012; Hair et al., 2010). Positive coefficient of skewness indicates a peaked distribution and coefficient of skewness indicates the opposite (Black, 2012; Kline, 1998). Kline (1998) suggested absolute value of less than 3 for skewness and absolute value of less than 10 for kurtosis for treating a range of values to be considered as normally distributed. Table 5.1 shows

descriptive statistics for measurement items. Skewness and kurtosis values are all less than the standards set by Kline (1998).

Table 5.1 Descriptive for Measures

Measure	N	Mean	Std. Deviation	Variance	Skewness	Kurtosis
HAB1	560	5.55	1.402	1.965	-1.028	.645
HAB2	562	5.45	1.425	2.031	-1.000	.628
HAB3	560	5.67	1.354	1.834	-1.146	1.021
QUAL1	561	5.77	1.154	1.332	-.923	.857
QUAL2	561	5.99	1.031	1.062	-.951	.525
QUAL3	564	5.83	1.070	1.144	-.658	-.174
TMS1	560	5.84	1.084	1.176	-.870	.684
TMS2	561	5.90	1.109	1.229	-.969	.823
TMS3	563	5.89	1.056	1.115	-.672	-.257
TMS4	561	6.02	1.018	1.037	-.851	.190
TMS5	560	5.95	1.081	1.169	-1.165	1.913
TMS6	560	5.83	1.087	1.182	-.771	.277
TMS7	561	5.97	1.079	1.163	-1.007	1.009
TASK1	562	3.23	2.202	4.848	.445	-1.338
TASK2	562	3.12	1.986	3.946	.485	-1.069
TASK3	565	3.10	2.020	4.082	.511	-1.095
TASK4	561	2.96	1.969	3.877	.624	-.904
TASK5	563	3.51	2.075	4.307	.160	-1.401
PBC1	562	5.96	1.017	1.034	-.925	.647
PBC2	561	5.75	1.089	1.187	-.793	.650
PBC3	561	5.97	1.011	1.023	-1.142	2.053
PBC4	561	5.98	.991	.982	-1.012	1.326
PBC5	561	5.92	1.022	1.044	-.971	1.041
MOR1	564	6.16	.919	.845	-1.049	.833
MOR2	563	6.24	.876	.767	-1.048	.603
MOR3	563	6.16	.971	.944	-1.266	1.774
MOR4	563	6.18	.907	.822	-1.117	1.286
MOR5	562	6.18	.932	.868	-1.400	3.359
SEV1	563	5.28	1.481	2.193	-.726	-.029
SEV2	564	5.26	1.474	2.171	-.666	-.087
SEV3	564	5.26	1.428	2.038	-.618	-.102
INT1	564	6.17	.949	.900	-1.129	.951
INT2	565	6.20	.958	.918	-1.475	3.184

Measure	N	Mean	Std. Deviation	Variance	Skewness	Kurtosis
INT3	565	6.30	.909	.826	-1.375	1.663
WoM1	564	4.21	1.853	3.433	-.276	-.942
WoM2	565	4.14	1.783	3.178	-.304	-.875
WoM3	563	3.94	1.780	3.169	-.160	-1.004
WoM4	564	4.65	1.676	2.810	-.531	-.424
INJ1	565	6.10	.942	.887	-1.024	1.141
INJ2	562	6.09	.950	.903	-.833	-.135
INJ3	564	6.12	.945	.893	-.906	.236
INJ4	565	6.25	.868	.754	-1.007	.415
RES1	562	3.05	1.769	3.128	.657	-.612
RES2	561	2.88	1.691	2.859	.698	-.422
RES3	561	2.81	1.771	3.138	.754	-.506
RES4	563	2.82	1.740	3.029	.741	-.514
RES5	565	2.88	1.738	3.021	.711	-.475
RES6	564	2.88	1.779	3.166	.758	-.500
SELF1	564	5.88	1.068	1.140	-.707	-.031
SELF2	564	5.96	1.046	1.095	-.803	.195
SELF3	563	5.92	1.050	1.103	-.744	.087
SELF4	565	6.01	1.024	1.048	-1.083	1.571
DESC1	563	5.85	1.029	1.058	-.706	-.030
DESC2	563	5.89	.989	.978	-.649	-.157
DESC3	565	5.82	1.016	1.031	-.673	.154
DESC4	564	5.88	.987	.974	-.542	-.625
DESC5	561	5.89	.983	.966	-.586	-.406
CERT1	564	5.74	1.103	1.217	-.613	-.306
CERT2	563	5.56	1.136	1.290	-.396	-.551
CERT3	562	5.48	1.219	1.487	-.360	-.660
SAT1	562	5.81	1.117	1.248	-.670	-.285
SAT2	564	5.81	1.110	1.231	-.641	-.341
SAT3	563	5.80	1.132	1.282	-.744	-.022
SAT4	563	5.79	1.116	1.245	-.663	-.186

5.2 Assessment of Measurement Validation

Using multiple measures is the best way to ensure that the measures fully represent a latent construct of interest because most latent constructs cannot be measured without error, and it is difficult for a single indicator to adequately capture the breadth of a construct's domain

(Cook and Campbell, 1979; Mackenzie et al., 2005; Nunnally and Bernstein, 1994; Schwab, 1980; Shadish et al., 2002). However, it is very important for researchers to test whether the multiple measures validly and reliably represent the latent construct of interest in order to confidently generalize the results (Mackenzie et al., 2005). Using recommendations published in literature (as discussed in section 4.6), I assessed measurement validities of items using content, convergent, and discriminant validities. I also conducted a Confirmatory Factor Analysis (CFA) to confirm that the proposed factor structure fits the data (Rutner et al., 2008). Table 5.2 includes definitions, techniques used to assess each validity test, and benchmarks proposed in literature. Results of each of these tests are presented next.

Table 5.2 Validity Tests, Definitions, Techniques, and Benchmarks

Validity	What	Technique	Benchmarks	References
Reliability	Extent to which the respondent can answer the same or approximately the same questions the same way each time	Cronbach's alpha	Above 0.70	Gefen et al. (2000); Hair et al. (2010); Shadish et al. (2002); Straub et al. (2004)
		Composite reliability	Above 0.70	
		CFA used in covariance-based SEM only	Item loadings should be above 0.70	
Content Validity	Extent to which a set of measured variables capture the essence of a theoretical latent construct they are designed to measure	Literature review; expert panels	Judgment	Gefen et al. (2000); Hair et al. (2010); Shadish et al. (2002); Straub et al. (2004)
Discriminant Validity	Extent to which a set of measures are distinct from other measures and minimal or no correlation exists between measures of different constructs	square root of AVE	Correlation between a pair of latent variables should be less than the square root of AVE	Anderson and Gerbing (1988); Chin (1998); Gefen et al. (2000); Gefen and Straub (2005); Hair et al. (2010); Shadish et al. (2002)
		Difference of cross-loadings between constructs	Difference of cross-loadings between constructs should be at least 0.10	

Validity	What	Technique	Benchmarks	References
Convergent Validity	The degree to which measurement items related to a construct should correlate which other no matter what the many unique irrelevancies associated with each of them	CFA used in covariance-based SEM only	Item loadings should be above 0.70 to show that over half of the variance captured by the latent construct. Goodness of fit indices: NFI>0.90; RFI>0.90; IFI>0.90, TLI>0.90, CFI>0.90; RMSEA<0.08	Bentler (1990); Chin (1998); Coombs (1976); Gefen et al. (2000); Hair et al. (2010); Nunnally (1978); Schermelleh-Engel et al. (2003); Shadish et al. (2002)
		Principle component analysis	Items should load highly (above 0.40) on their assigned construct. No cross-loading (loadings ≥ 0.40) is allowed between constructs	
		Composite reliability	Above 0.70	
		AVE	Above 0.50	

5.2.1 Reliability

Reliability is the extent to which items selected for a given construct produce stable and consistent results (Straub et al., 2004). Two techniques exist to measure the reliability of measures; (1) Cronbach's alpha and (2) composite reliability (Gefen et al., 2000; Hair et al., 2010; Shadish et al., 2002; Straub et al., 2004). Values greater than 0.70 for both Cronbach's alpha and composite reliability indicate high internal consistency (reliability) (Gefen et al., 2000; Hair et al., 2010; Nunnally and Bernstein, 1994). As shown in Table 5.3, all constructs demonstrated acceptable values: the reliability coefficients of all the constructs ranged from 0.80

to 0.97. The Cronbach’s alpha coefficients are also greater than 0.86, which indicates that the measures are reliable.

Table 5.3 Reliability and AVE Scores for Latent Variables

Construct	Composite Reliability	Cronbach’s Alpha	AVE
Punishment Certainty	0.83	0.86	0.76
Descriptive Norm	0.88	0.92	0.73
Injunctive Norm	0.84	0.88	0.71
Moral Norm	0.86	0.91	0.65
Perceived Behav. Control	0.83	0.87	0.70
Self-Policing	0.91	0.93	0.88
Resistance to ISS	0.96	0.96	0.90
Satisfaction with ISS	0.97	0.97	0.92
Punishment Severity	0.95	0.95	0.88
Top Management Support	0.89	0.92	0.67
Task Dissonance	0.82	0.87	0.64
Word-of-Mouth	0.80	0.86	0.67
Habit	0.81	0.86	0.67
ISS Quality	0.81	0.86	0.67
Compliance Intention	0.88	0.91	0.77

5.2.2 Content Validity

Content validity is established by using various measures previously validated by researchers after careful literature review (Straub, 1989; Straub et al., 2004). The measurement items used in this dissertation are based on established theoretical models extracted from different streams of research literature. All the measures were pre and pilot-tested to assess their content and their relativeness to “real-world” meaning. Results and feedback from pre- and pilot-tests as well as the review of literature provided further reassurance about the adequacy of the content validity of the measures used in this dissertation (Boudreau et al., 2001; Straub, 1989; Straub et al., 2004).

5.2.3 Convergent Validity

Convergent validity is confirmed when all items measuring a construct load on one factor and correlation among these measures is high (Gefen et al., 2000; Hair et al., 2010; Shadish et al., 2002). In other words, convergent validity verifies whether measures are most closely associated with their respective construct (Straub et al., 2004). Different methods exist to assess convergent validity, shown in Table 5.2.

I first checked the composite reliability coefficients and AVE. Results are presented in Table 5.3. In this dissertation all composite reliability coefficients exceed the threshold 0.70 and all AVE coefficients exceed 0.50 which indicate that the measures have good convergent validity (Chin, 1998; Coombs, 1976; Fornell and Larcker, 1981; Gefen et al., 2000).

5.2.4 Discriminant Validity

Discriminant validity refers to the extent to which measures of a construct are distinct from measures of other constructs and no overlapping exists between measures of different constructs (Shadish et al., 2002). Discriminant validity can be assessed by comparing the correlation between pair constructs and the AVE of each construct (Fornell and Larcker, 1981). The correlation between a pair of latent variables (constructs) should be less than the square root of the AVE estimate of each variable (Anderson and Gerbing, 1988; Gefen et al., 2000; Hair et al., 2010; Straub et al., 2004). Therefore, each square root of the AVE value should be greater than the correlations in its row and column. Table 5.4 shows that discriminant validity is demonstrated by the data.

Table 5.4 Correlation of the Latent Variable Scores with the Square Root of AVE

	Certainty	Descriptive	Injunctive	Moral	PBC	Policing	Resistance	Satisfaction	Severity	TMS	Task	WoM	Habit	Quality	Compliance
Certainty	0.87														
Descriptive	0.55	0.85													
Injunctive	0.29	0.58	0.84												
Moral	0.36	0.57	0.11	0.81											
PBC	0.35	0.55	0.35	0.33	0.84										
Policing	0.39	0.57	0.47	0.57	0.47	0.94									
Resistance	-0.05	-0.23	-0.35	-0.45	-0.4	-0.19	0.95								
Satisfaction	0.39	0.43	0.39	0.4	0.42	0.37	-0.22	0.96							
Severity	0.37	0.38	0.25	0.26	0.34	0.27	0.03	0.29	0.94						
TMS	0.38	0.56	0.52	0.55	0.6	0.41	-0.3	0.46	0.31	0.82					
Task	-0.12	-0.28	-0.38	-0.46	-0.43	-0.18	0.59	-0.26	0.01	-0.32	0.8				
WoM	-0.07	-0.1	-0.11	-0.16	-0.16	-0.05	0.35	-0.18	-0.01	-0.15	0.27	0.82			
Habit	0.08	0.23	0.29	0.33	0.38	0.17	-0.27	0.14	0.03	0.32	-0.22	-0.03	0.82		
Quality	0.26	0.4	0.45	0.46	0.56	0.33	-0.31	0.31	0.31	0.43	-0.28	-0.14	0.37	0.82	
Compliance	0.29	0.43	0.62	0.7	0.6	0.45	-0.4	0.29	0.19	0.41	-0.31	-0.15	0.3	0.43	0.88

Note: Diagonal elements are the square roots of AVE. Off-diagonal elements are correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

Gefen and Straub (2005) suggested that discriminant validity is demonstrated when measures load more highly on constructs upon which they are posited to load than on other constructs upon which they should not load. The difference of loadings between constructs must be at least 0.10 (Gefen and Straub, 2005). In this dissertation, I used 0.4 as a threshold for factor analysis (Hair et al., 2010). Appendix E shows cross loadings of all measures obtained by conducting component factor analysis, which indicates that the difference between the cross-loadings is at least 0.26 (greater than 0.10) (Gefen and Straub, 2005). Therefore, I conclude that all constructs demonstrate discriminant validity.

5.2.5 Confirmatory Factor Analysis

I used AMOS version 22.0 to conduct a confirmatory factor analysis (CFA). In CFA, researchers specify both the number of latent constructs and the set of observed variables that should load on each construct (Bollen, 1989). CFA assesses the measurement theory that “specifies how measured variables logically and systematically represent constructs involved in a theoretical model” (Hair et al., 2010, p. 693). In other words, CFA assesses how well the proposed factor structure fits the data and how measured variables represent a latent construct not measured directly (Bollen, 1989; Hair et al., 2010; Straub et al., 2004). CFA provides two main outputs: the goodness-of-fit (GoF) indices which indicates the adequacy of the proposed theoretical model and the standardized loadings of measures on latent constructs which evaluate the convergent validity and reliability of the measures.

Researchers have always strived to develop and refine GoF indices that help them assess the extent to which their models fit the empirical data (Bentler, 1990; Bollen, 1989; Hu and Bentler, 1998). For this reason, numerous GoF indices have been developed to assess the good-fitting model indicating that the model is reasonably consistent with the data (Hair et al., 2010;

Schermelleh-Engel et al., 2003). GoF indices include, and are not limited to, Chi-square test, Root Mean Square Error of Approximation (RMSEA), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Relative Fit Index (RFI), and Incremental Fit Index (IFI). The chi-square test statistic is the only test associated with a statistical significance test, while the other indices are descriptive measures, ranging from 0 (no fit) to 1 (perfect fit) (Mulaik et al., 1989; Schermelleh-Engel et al., 2003). GoF indices can be used to “quantify the degree of fit along a continuum” (Hu and Bentler, 1998, p. 426). They give an overall summary statistic that indicate how well a proposed model fits the sample data. GoF indices are broadly classified to two categories: absolute and incremental (Hair et al., 2010; Hu and Bentler, 1998).

- i. Absolute-fit indices assess how well a priori model reproduce the sample data (Hu and Bentler, 1998). Absolute-fit indices do not use a reference model to assess the increment in model fit but comparisons are made based on a saturated model that exactly reproduces the observed covariance matrix (Hu and Bentler, 1998). These indices include GFI, AGFI, and RMSEA.
- ii. Incremental-fit indices assess the improvement of fit by comparing the proposed model with a restricted model called “baseline model” (Hu and Bentler, 1998; Schermelleh-Engel et al., 2003). The baseline model assumes all observed variables are uncorrelated and measured without error, which means all error variance are fixed to zero and loadings are fixed to one (Schermelleh-Engel et al., 2003). Examples of incremental-fit indices are NFI, RFI, IFI, TLI, and CFI.

Chi-square tests evaluate the null hypothesis that there is no difference between the estimated covariance matrix and the observed covariance matrix (Bollen, 1989; Schermelleh-Engel et al., 2003). Chi-square is interpreted based on its calculated value and the statistical

significance test associated with it. High values of chi-square reject the null hypothesis and indicate that the estimated and observed covariance matrices are not the same, and thus differ significantly from each other (Bollen, 1989; Hair et al., 2010; Schermelleh-Engel et al., 2003). A statistical significance (p-value) (associated with the chi-square test) that is greater than 0.05 results in accepting the null hypothesis and concluding that the model fits the data (Hair et al., 2010; Schermelleh-Engel et al., 2003). For this reason, researchers are interested in finding a relatively small chi-square with a p-value greater than 0.05 (Bollen, 1989). A disadvantage for chi-square is its sensitivity to sample size. For this reason, alternative measures of fit have been developed.

When greater sample sizes, greater values of chi-square are obtained making researcher look for alternatives that are not as sensitive to sample sizes (Bollen, 1989; Hair et al., 2010; Schermelleh-Engel et al., 2003). For this reason, it is advised to divide the chi-square by the number of degrees of freedom in order to resolve the issue of sensitivity to sample size (Hair et al., 2010). For a good model fit, the ratio of chi-square by degrees of freedom (CMIN/Df) should be as small as possible, and a ratio between 2 and 3 indicates a good data-model fit (Schermelleh-Engel et al., 2003).

In addition to CMIN/Df, it is advised to use RMSEA which is one of the most widely used measures also attempting to correct the tendency of chi-square to reject a model when a sample size is large (Bollen, 1989; Hair et al., 2010). RMSEA is regarded as a measure relatively independent of sample size (Schermelleh-Engel et al., 2003) and corrects for model complexity. In other words, RMSEA is not sensitive to sample size and complex models. It assesses whether a model fits approximately well in the population and thus the null hypothesis of “exact fit” is replaced by “close fit” (Schermelleh-Engel et al., 2003). Therefore, RMSEA is a measure of

approximate fit in the population. RMSEA values lower than 0.05 are considered to be good fit, values between 0.05 and 0.08 are adequate fit, values between 0.08 and 0.10 are mediocre, and values greater than 0.10 are not acceptable (Bentler, 1990; Hu and Bentler, 1998; Schermelleh-Engel et al., 2003).

NFI, RFI, IFI, TLI, and CFI are GoF indices that assess how well the estimated model fits a baseline model (Hair et al., 2010; Schermelleh-Engel et al., 2003). “The fit index for a baseline model usually indicate a bad fit and serves as comparison value” (Schermelleh-Engel et al., 2003, p. 40). NFI, RFI, IFI, TLI, and CFI compare whether the proposed model is an improvement of the baseline model or not (Schermelleh-Engel et al., 2003). These indices range from 0 (no fit) to 1 (perfect fit) (Bentler and Bonett, 1980; Hair et al., 2010). The null model has a value of zero; thus, the larger the value, the better the fit of the model to the data (Widaman and Thompson, 2003). Values of these indices greater than 0.90 are typically interpreted as indicating a good fit (Bentler and Bonett, 1980; Hair et al., 2010; Schermelleh-Engel et al., 2003).

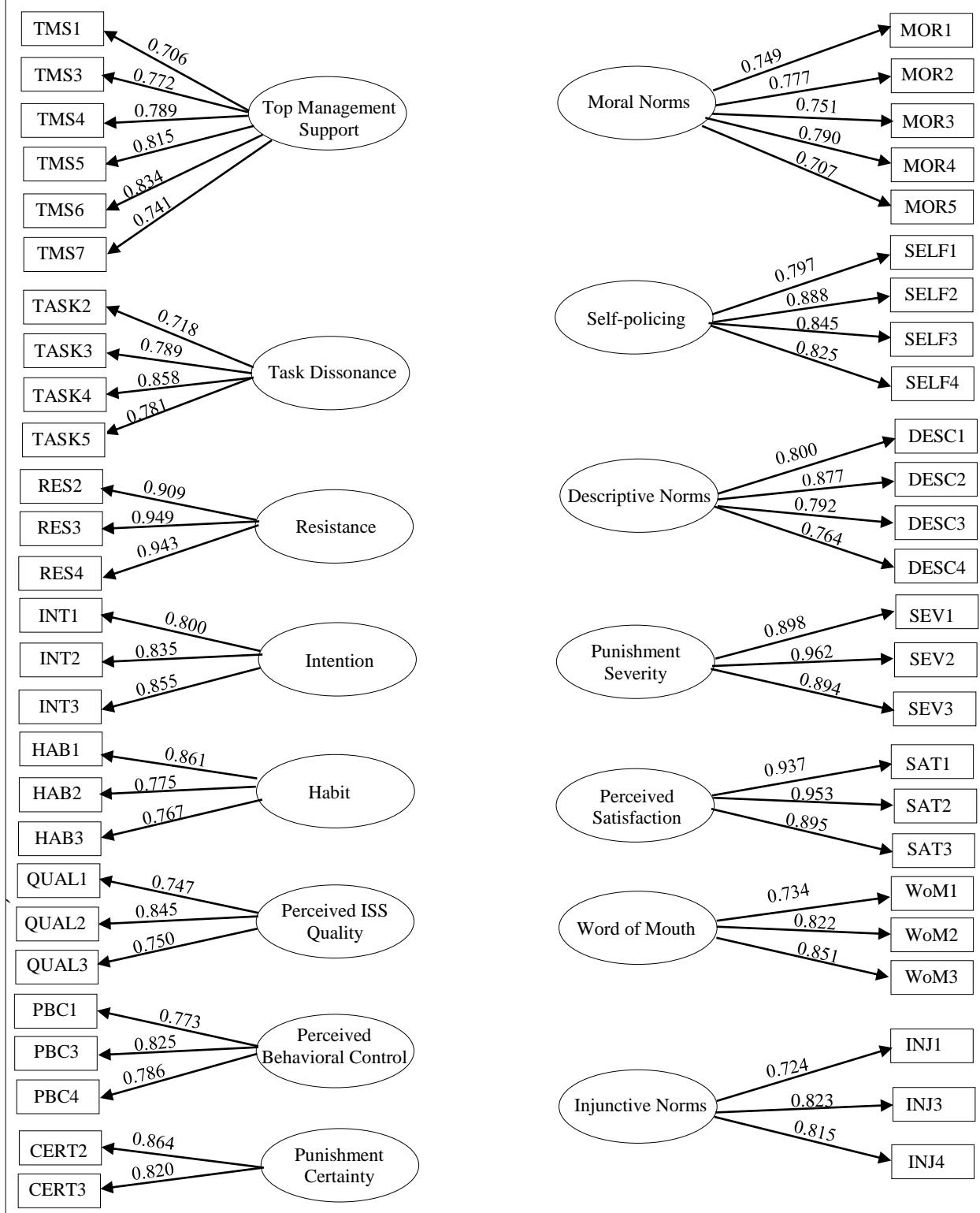
After conducting a CFA and checking the covariance matrix, I found that the error of seven items have high covariance with errors of other items, which affected the model fit (Bentler and Bonett, 1980; Bollen, 1989; Hair et al., 2010). These measures are TASK1, INJ2, RES1, RES5, SAT4, TMS2, and PBC2. Therefore, these measures were deleted in order to improve the model fit because the covariance matrix drives all tests of overall fit (Bollen, 1989; Hair et al., 2010; Straub et al., 2004; Schermelleh-Engel et al., 2003). Table 5.5 includes the GoF of the CFA. Results show that the GoF indices namely NFI, RFI, IFI, TLI, and CFI are all above 0.90 and RMSEA is lower than 0.08 indicating good model fit (Anderson and Gerbing, 1982).

GoF	Index	Threshold	References
CMIN/Df	1.61	< 3	Anderson and Gerbing, (1982);
NFI	0.93	>0.90	Bentler (1990); Bentler and
RFI	0.92	>0.90	Bonett (1980); Bollen, (1989);
IFI	0.97	>0.90	Gefen et al. (2000); Hair et al.
TLI	0.97	>0.90	(2010); Hu and Bentler (1998);
CFI	0.97	>0.90	Schermelleh-Engel et al. (2003)
RMSEA	0.03	<0.08	

CFA also indicates whether measures used to represent the latent variables are reliable (Gefen et al., 2000; Hair et al., 2010; Straub et al., 2004). This can be done by examining the loadings of measurement items on constructs upon which they are posited to load. Results indicate that all loadings are greater than the threshold 0.7 (Chin, 1998; Hair et al., 2010). These results are presented in Figure 5.1. In summary, the CFA indicated that the measurement items used in this dissertation are reliable.

Thus, I conclude that results of reliability and validity tests suggest that the scales demonstrate adequate psychometric properties.

Figure 5.1 Confirmatory Factor Analysis (Measurement Model)



5.3 Structural Model Assessment and Hypotheses Testing

I used Structural Equation Modeling (SEM) to assess the hypotheses presented in chapter 3. More details on SEM are given in section 4.4. AMOS provides results of GoF indices, standardized coefficients of relationships and their statistical significance levels. Results of GoF are included in Table 5.6.

GoF	Index	Threshold	References
CMIN/Df	1.95	<3	Bentler (1990);
NFI	0.91	>0.90	Bollen, (1989);
RFI	0.90	>0.90	Gefen et al.
IFI	0.96	>0.90	(2000); Hair et
TLI	0.95	>0.90	al. (2010); Hu
CFI	0.96	>0.90	and Bentler
RMSEA	0.04	<0.08	(1998);
Chi-square	2342.381		Schermelleh-
Degrees of freedom	1200		Engel et al.
Probability level	.000		(2003)

The overall model Chi-square is equal to 2342. 38 with 1200 degrees of freedom. The p-value associated with this result is lower than 0.05, which means that the observed covariance matrix does not match the estimated covariance matrix (Bentler and Bonett, 1980; Bollen, 1989; Hair et al., 2010; Schermelleh-Engel et al., 2003). When sample size becomes large, as is the case in this dissertation, results of the p-value become less meaningful because chi-square is affected by the sample size (Hair et al., 2010). The larger the sample, the lower the significance level will be (Schermelleh-Engel et al., 2003). For this reason, it is advised to use other indices to check for the overall model fit (Anderson and Gerbing, 1982; Bentler, 1990; Bollen, 1989; Hair et al., 2010; Schermelleh-Engel et al., 2003).

The CMIN/Df, which is the chi-square value divided by the degrees of freedom, is equal to 1.95. This index is not sensitive to sample size since it takes the degrees of freedom into consideration (Bentler, 1990; Bollen, 1989; Hair et al., 2010; Schermelleh-Engel et al., 2003). A value of CMIN/Df less than 2.0 is considered to be very good and a value between 2.0 and 5.0 is considered to be acceptable (Hair et al., 2010; Schermelleh-Engel et al., 2003). In this dissertation the CMIN/Df is equal to 1.95.

Other indices such as NFI, RFI, IFI, TLI, and CFI indicate whether the model fit is acceptable or not by assessing how well an estimated model fits an alternative model that assumes all observed variables are uncorrelated (Anderson and Gerbing, 1982; Bentler, 1990; Bollen, 1989; Hair et al., 2010; Rutner et al., 2008; Schermelleh-Engel et al., 2003). These indices should exceed 0.90 (Bentler, 1990; Hair et al., 2010; Hu and Bentler, 1998; Schermelleh-Engel et al., 2003). In this dissertation, these indices exceed 0.90, indicating a good model fit.

The RMSEA is an absolute fit index that corrects the tendency of errors of chi-square which occur when sample size is large (Hair et al., 2010; Schermelleh-Engel et al., 2003). RMSEA corrects for both model complexity and sample size by including them in the computation of the index. Thus, RMSEA better represents how well a model fits the population and not only a sample (Hair et al., 2010). RMSEA values lower than 0.05 are considered to be good fit, and values between 0.05 and 0.08 are adequate fit (Bentler, 1990; Hair et al., 2010; Hu and Bentler, 1998; Schermelleh-Engel et al., 2003). In this dissertation RMSEA is equal to 0.04, which is lower than the threshold. Therefore, the proposed model fits the sample data.

The standardized loadings and R^2 are presented in Figure 5.2 and the results of the hypotheses are shown in Table 5.7. The significance of the paths was determined using the p-value.

Table 5.7 Results of Hypotheses Tests

	Hypothesis	Supported?
H1.a	Greater top management support for ISS policies will positively influence employees' perceived behavioral control.	Yes
H1.b	Greater top management support for ISS policies will positively influence injunctive norms.	Yes
H1.c	Greater top management support for ISS policies will positively influence descriptive norms.	Yes
H2.a	Greater punishment certainty for violating ISS policies will positively influence injunctive norms.	Yes
H2.b	Greater punishment certainty for violating ISS policies will positively influence descriptive norms.	Yes
H2.c	Greater punishment certainty for violating ISS policies will positively influence moral norms.	Yes
H3.a	Greater punishment severity for violating ISS policies will positively influence injunctive norms.	No
H3.b	Greater punishment severity for violating ISS policies will positively influence descriptive norms.	Yes
H3.c	Greater punishment severity for violating ISS policies will positively influence moral norms.	Yes
H4.a	Perceived behavioral control will negatively influence employees' resistance towards IS.	Yes
H4.b	Perceived behavioral control will positively influence employees' ISS compliance.	Yes
H5.a	Injunctive norms will negatively influence employees' resistance to use ISS.	Yes
H5.b	Injunctive norms will positively influence ISS compliance intention.	Yes
H5.c	Injunctive norms will positively influence descriptive norms.	Yes
H6.a	Descriptive norms will negatively influence employees' resistance to use ISS.	Yes
H6.b	Descriptive norms will positively influence employees' ISS compliance intention.	Yes
H7.a	Moral norms will reduce employees' resistance to use ISS.	Yes
H7.b	Moral norms will positively affect employees' ISS compliance intention.	Yes
H7.c	High moral norms will positively impact self-policing.	Yes
H8	Employees' resistance to use ISS policies is negatively related to their intention to comply with ISS policies.	Yes
H9	Higher task dissonance caused by ISS policies will increase employees' resistance to use them.	Yes
H10.a	Higher level of perceived satisfaction with ISS policies will increase employees' ISS compliance.	No
H10.b	Higher of level of perceived satisfaction with ISS policies will reduce resistance towards ISS compliance.	No
H11	High perception of ISS quality will lead to higher ISS compliance intention.	Yes
H12	Word-of-mouth will positively influence ISS compliance intention.	No
H13	Stronger pre ISS implementation habits will negatively influence employees' ISS compliance.	No
H14	Self-policing will positively influence employees' ISS compliance intention.	Yes

The results show that perceived behavioral control negatively impacts resistance towards ISS policies ($\beta = -0.23$; $P < 0.05$) and positively affects ISS compliance intention ($\beta = 0.09$; $P < 0.10$). Therefore, H4.a and H4.b are supported.

The data show that injunctive norms have significant effect on resistance towards ISS policies ($\beta = -0.07$; $P < 0.05$), ISS compliance intention ($\beta = 0.26$; $P < 0.001$), and descriptive norms ($\beta = 0.40$; $P < 0.001$). Hence, H5.a, H 5.b, and H 5.c are supported.

The data indicate that descriptive norms have negative impact on resistance to use ISS policies ($\beta = -0.17$; $P < 0.05$) and positive effect on ISS compliance intention ($\beta = 0.06$; $P < 0.10$). Thus, H6.a and H6.b are supported.

The results show that moral norms have significant strong effect on self-policing, resistance to use ISS policies, and ISS compliance intention. The data indicate that moral norms negatively affect resistance to use ISS policies ($\beta = -0.37$; $P < 0.001$), and positively affects ISS compliance intention ($\beta = 0.42$; $P < 0.001$) and self-policing ($\beta = 0.82$; $P < 0.001$). Therefore, H7.a, H7.b, and H7.c are supported.

The data indicate that resistance to use ISS policies negatively impacts ISS compliance intention ($\beta = -0.04$; $P < 0.05$). The data show that task dissonance has positive impact on resistant to use ISS policies ($\beta = 0.54$; $P < 0.001$) giving support for H9. The results also indicate that the relationships between satisfaction with ISS policies and resistance to use ISS policies and ISS compliance intention are statistically insignificant. Thus, H10.a and H10.b are not supported.

The data show that perceived ISS quality has positive impact on ISS compliance intention ($\beta = 0.06$; $P < 0.010$). Therefore, H11 is supported. The data indicate that word-of-mouth and pre-ISS habit do not have statistical significant effects on ISS compliance intention. Thus,

H12 and H13 are not supported. The results show that self-policing has a positive effect on ISS compliance intention ($\beta = 0.08$; $P < 0.05$). Therefore, H14 is supported.

In terms of the control variables (age, gender, experience, industry, and size of companies), the data indicate none of them has a statistically significant relationship with ISS compliance intention. Their presence does not explain any of the variance of ISS compliance intention.

5.4 Common Method Bias

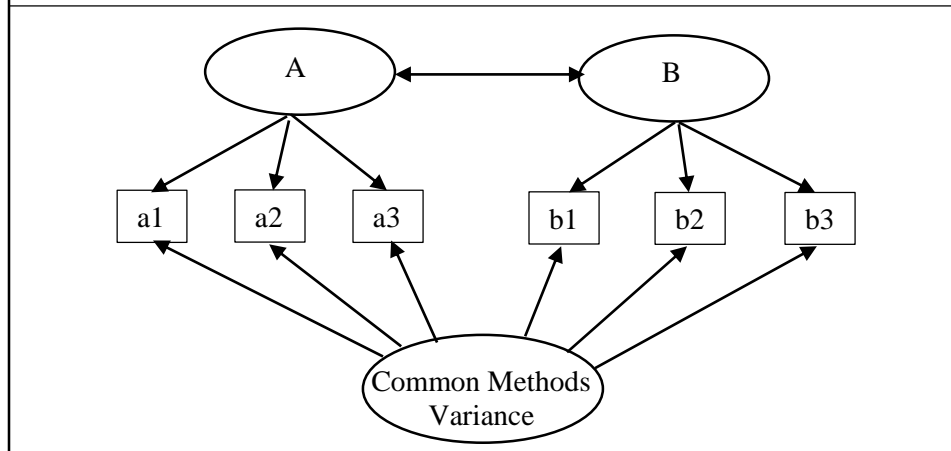
I checked for the threat of mono-method bias, or what it is known as common methods bias (Podsakoff et al., 2003; Shadish et al., 2002; Straub et al., 2004). Common methods bias refers to “variance that is attributable to the measurement method rather than to the constructs of interest” (Podsakoff et al. 2003, p. 879) and is considered to be a major contributor to systematic measurement error (Bagozzi and Yi 1991). Whenever self-reported survey data are used, the threat of common method bias has to be checked to assure that the results are not affected by participants’ social desirability (Podsakoff et al., 2003). Similar to other measurement errors, common method bias can distort the results obtained from the analysis. To reduce the likelihood of common method bias due to social desirability, I followed suggestions proposed by Podsakoff et al. (2003) by assuring the participants that their responses will be anonymous and used for research only. I also informed the participants that the study is optional and thus did not provide any incentives. Managers also informed their employees that participations in the study is optional and thus did not oblige them to participate.

In addition to the precautions taken in the instrument design and data collection, I conducted three different analyses to test if common methods bias is a significant issue. First, I performed Harman’s single-factor test (Podsakoff and Organ, 1986; Podsakoff et al., 2003). This

test is done by simultaneously loading all items of different constructs in a factor analysis with no rotation to determine whether a single factor accounts for the majority of the variance. According to this test, if one factor accounts for the majority of the covariance among all measures, it indicates that common method variance is a serious problem in the data collected. Results of this test developed 15 factors with eigenvalues greater than 1 of which the highest accounting for 31.8% of the total variance (80.77%). This result indicates that common methods bias is not an issue in this study.

Second, I performed a test proposed and used by Pavlou et al. (2007). In this test, the construct correlation matrix is examined to determine whether any two constructs correlate extremely highly (greater than 0.90). The reason is because spurious covariance between measures due to common methods bias can inflate observed correlations (Campbell and Fiske 1959). In social sciences, a response on a measure can be divided into two constituents: one represents the effect due to the fundamental construct and the other represents the effect due to numerous measurement errors, including common methods (Le et al., 2009; Podsakoff and Organ, 1986). These measurement errors introduce biases at construct-level relationships and “when common or similar methods are employed to measure two variables, measurement errors in the two scores covary, inducing a bias in their correlation. As a result, observed correlations are inflated” (Sharma et al., 2009, p. 474). In this dissertation, the correlation matrix (Table 5.4) does not indicate any highly correlated factors. The highest correlation is equal to 0.62. This finding also indicates that common methods bias is not a problem in this dissertation.

Figure 5.3 Common Method Bias Test Based on Podsakoff et al. (2003)



Finally, I performed a more rigorous test called “controlling for the effects of a single unmeasured latent method,” suggested by Podsakoff et al. (1990) and Podsakoff et al. (2003). This technique requires adding a new first-order latent construct where all the measures included in the model become indicators of this factor. An illustration of this test is presented in Figure 5.3. The “common methods variance” is the first order latent construct, whereas “A and B” are constructs of interest used in the study. The “common methods variance” construct “captures all of the additional systematic variance common to all of the measures over and above that accounted for by the “traits” themselves. This is because this factor is a composite of any systematic variance among the measures remaining after the trait variance has been accounted for” (Podsakoff et al., 1990, p. 133). To apply this technique, two CFA should be conducted: the first includes the constructs used in the study and their measures; the second, introduces the first order latent construct that captures the common variance (Podsakoff et al., 1990; Podsakoff et al., 2003). To interpret the results, the standardized regression weights of both CFA tests (with and without the common method latent factor) are compared (Podsakoff et al., 1990; Podsakoff et al., 2003). Large differences (greater than 0.200) indicate that common method bias is an issue

in the study (Gaskin, 2012). In this dissertation, the difference between the two tests (before and after including the common method latent factor) are presented in Table 5.8. The difference indicates that common method bias is very minimal. Overall, results of the three tests suggest that common method bias is minimal and is not a significant issue in this dissertation.

			Standardized Regression Weights: (With common)	Standardized Regression Weights: (NO common)	
Measures			Estimate	Estimate	Difference
TMS1	<--	TMS	0.706	0.745	0.039
TMS3	<--	TMS	0.772	0.814	0.042
TMS4	<--	TMS	0.789	0.831	0.042
TMS5	<--	TMS	0.815	0.849	0.034
TMS6	<--	TMS	0.834	0.87	0.036
TMS7	<--	TMS	0.741	0.78	0.039
TASK2	<--	Task	0.718	0.722	0.004
TASK3	<--	Task	0.789	0.801	0.012
TASK4	<--	Task	0.858	0.868	0.01
TASK5	<--	Task	0.781	0.791	0.01
MOR1	<--	Moral	0.749	0.801	0.052
MOR2	<--	Moral	0.777	0.833	0.056
MOR3	<--	Moral	0.751	0.8	0.049
MOR4	<--	Moral	0.79	0.843	0.053
MOR5	<--	Moral	0.707	0.764	0.057
SELF1	<--	Self	0.797	0.837	0.04
SELF2	<--	Self	0.888	0.921	0.033
SELF3	<--	Self	0.845	0.879	0.034
SELF4	<--	Self	0.825	0.866	0.041
DESC1	<--	Descriptive	0.8	0.839	0.039
DESC2	<--	Descriptive	0.877	0.917	0.04
DESC3	<--	Descriptive	0.792	0.835	0.043
DESC4	<--	Descriptive	0.764	0.812	0.048
SEV1	<--	Severity	0.898	0.915	0.017
SEV2	<--	Severity	0.962	0.977	0.015
SEV3	<--	Severity	0.894	0.914	0.02
SAT1	<--	Satisfaction	0.937	0.966	0.029
SAT2	<--	Satisfaction	0.953	0.983	0.03
SAT3	<--	Satisfaction	0.895	0.925	0.03
RES2	<--	Resistance	0.909	0.922	0.013

Measures			Estimate	Estimate	Difference
RES3	<--	Resistance	0.949	0.96	0.011
RES4	<--	Resistance	0.943	0.955	0.012
INT1	<--	Intention	0.8	0.845	0.045
INT2	<--	Intention	0.835	0.878	0.043
INT3	<--	Intention	0.855	0.906	0.051
HAB1	<--	Habit	0.861	0.884	0.023
HAB2	<--	Habit	0.775	0.794	0.019
HAB3	<--	Habit	0.767	0.791	0.024
QUAL1	<--	Quality	0.747	0.783	0.036
QUAL2	<--	Quality	0.845	0.882	0.037
QUAL3	<--	Quality	0.75	0.793	0.043
WoM1	<--	WoM	0.734	0.751	0.017
WoM2	<--	WoM	0.822	0.835	0.013
WoM3	<--	WoM	0.851	0.861	0.01
INJ1	<--	Injunctive	0.724	0.783	0.059
INJ3	<--	Injunctive	0.823	0.87	0.047
INJ4	<--	Injunctive	0.815	0.867	0.052
PBC1	<--	PBC	0.773	0.815	0.042
PBC3	<--	PBC	0.825	0.869	0.044
PBC4	<--	PBC	0.786	0.828	0.042
CERT2	<--	Certainty	0.864	0.896	0.032
CERT3	<--	Certainty	0.82	0.846	0.026

5.5 Nonresponse Bias

Nonresponse bias refers to the bias that exists when responses of participants in a survey differ from the answers of those who did not respond in terms of demographic or attitudinal variables (Sax et al., 2003). Nonresponse is caused because individuals fail to return completed surveys. In general, not all sample units are always willing to complete and return the questionnaires. Nonresponse is a potential source of bias in survey studies and affects the generalizability of the results found in a research; however, low response rates alone do not necessarily suggest bias (Armstrong and Overton, 1977; Sax et al., 2003). Thus, the effects of potential nonresponse bias need to be addressed (Hu et al., 1999).

To assess the effects of nonresponse bias, researchers compare the answers of those participants who respond early to the answers of those who respond late because they consider the responses of the latter group to be similar to those who did not respond (Armstrong and Overton, 1977; Hu et al., 1999; Johnson et al., 2000). In this dissertation, I did not send out the surveys at one time, which does not allow me to create two groups. Thus, I cannot use this method.

Sax et al. (2003) suggested that demographics, especially gender, can be used to assess the effects of nonresponse bias by comparing results of male and female. They also suggest that comparison of data collected from online and paper-based surveys helps in assessing the effects of nonresponse bias. In this dissertation, I did not find a statistical difference ($t = 1.82$) between responses of participants in the online versus paper-based questionnaires. I also did not find any statistical difference ($t = -0.35$) between responses of different gender of the online-based survey. Similarly, I did not find any statistical difference ($t = 0.64$) between responses of different gender of the paper-based survey. The comparison of responses based on industries, using ANOVA, did not indicate any statistical difference ($F=1.65$; $p=0.11$). Also comparisons of gender in each of the industries did not indicate any statistical significance. The results of these different tests show that the data used in this dissertation is homogeneous and the effect of the nonresponse bias is minimal. The results of the tests performed are presented in Table 5.9.

Table 5.9 Nonresponse Bias Analysis

Comparison Between	Test	Test Value (T or F)	p-value
Online vs. Paper	t-test	1.82	0.07
Online: Female vs. Male	t-test	-0.35	0.73
Paper: Female vs. Male	t-test	0.64	0.52
All Industries	ANOVA	1.65	0.11
Manufacturing: Female vs. Male	t-test	0.96	0.36
Service: Female vs. Male	t-test	0.56	0.58
Education: Female vs. Male	t-test	-1.3	0.19
Financial: Female vs. Male	t-test	0.47	0.64
Health: Female vs. Male	t-test	0.53	0.60
Telecom: Female vs. Male	t-test	-0.83	0.41
Consulting: Female vs. Male	t-test	-0.60	0.56
Retail: Female vs. Male	t-test	-1.49	0.14

CHAPTER VI

DISCUSSION

In this chapter, I analyze the results reported in the previous chapter (Chapter 5) in the context of the postulated hypotheses and theories, and literature discussed in chapters 2 and 3.

6.1 Top Management Support and Concomitant Relationships

Top management support has been identified across business disciplines as a critical success factor for projects success (Boonstra, 2013; Green, 1995; Ke and Wei, 2008; Liang et al., 2007). The role of top management in the success of ISS compliance may be similar to that in projects success. Thus, in the ISS context, top management support is reflected by allocating enough resources for the ISS of the organization and infrastructure, setting clear strategies, providing training for employees, visibly supporting the ISS, and “walking the talk” (Igbaria et al., 1997). Training helps employees improve their proficiency and skills in tackling various IS issues (Lewis et al., 2003).

This dissertation extends the body of knowledge on top management’s role in influencing employees’ beliefs and behaviors by developing top management support as a multidimensional construct. Puhakainen and Siponen (2010) provide anecdotal evidence that top management support influenced employees’ ISS policies compliance. Drawing on TPB, Hu et al. (2012) examined the influence of top management participation on employees’ attitude, perceived behavioral control, and injunctive norms. Boonstra (2013) argues that top management support is

a multidimensional construct but has been examined as a single homogeneous construct and therefore, does not capture its essence. I bridge this gap in literature by developing top management support as a multidimensional construct.

The data show that top management support significantly increases employees' normative factors, namely perceived behavioral control, injunctive norms, and descriptive norms. Results of the relationships between top management support and perceived behavioral control and injunctive norms confirm the findings in Hu et al. (2012). A multidimensional top management support construct makes it possible for the practitioners to find the relevance and strengths of individual dimensions that influence employees' normative factors. The data show that all dimensions of top management support were equally important in the ISS compliance context. The role and the degree of relevance of top management support for ISS compliance may also depend on organizational conditions. For example, in an organization that is beginning to implement ISS may require more support for allocating adequate resources for acquiring required technologies, hardware, software, and services. On the other hand, an organization where ISS policies are ongoing may require moderate resources for continued training of employees and renewing licenses of existing software etc.

The standardized coefficient of the relationship between top management support and perceived behavioral control is the strongest (0.45) among the relationships between top management support and other normative factors. Individuals tend to prefer relationships accompanied with high returns. In the ISS context, employees may acquire requisite knowledge to deal with ISS situations by receiving training enabled by top management allocating adequate resources in forms of finding and setting up organizational structure. Thus, employees are likely

to believe that they have more control and power over ISS compliance requirements (higher perceived behavioral control).

The relationship between top management support and injunctive norms is found to be significant. This relationship can be explained by the Social Exchange Theory which posits that individuals tend to base their decisions on a cost-benefit analysis when dealing with others (Blau, 1964; Kelley and Thibaut, 1959). People who give expect to receive back. When management executives provide sufficient resources and set adequate structure for ISS policies, they expect employees to comply with these policies. Expectations are communicated by “walking the talk.” Thus, when employees know that top management support certain policies and continuously talk about them, they perceive those policies to be important, and therefore pay more attention towards them.

No previous research examined the influence of top management support on descriptive norms. The data in this dissertation indicate that there is a significant relationship between top management support and descriptive norms. Good leaders become role models for members they lead (Green, 1995). Employees who want to become successful in their career tend to emulate their leaders’ behaviors. Thus, if top management executives comply with ISS policies, most employees tend to imitate their leaders’ behavior thinking that this is the right thing to do.

6.2 Organizational Punishment and Concomitant Relationships

Employees are usually deterred by punishment when facing compliance with rules and policies. Contradictory results have been found in many disciplines when studying the effects of punishment severity and punishment certainty on employees’ compliance behavior (e.g. D’Arcy and Hovav, 2009; Herath and Rao, 2009 a; b; Hoffer and Straub, 1989; Sims 1980). Extant literature has only investigated the direct influence of punishment severity and punishment

certainty on individuals' behavior (e.g. Herath and Rao, 2009 a; b; Siponen et al., 2010). Results of this dissertation show that punishment severity and punishment certainty exert an indirect influence on ISS compliance intention through normative factors. The three relationships posited between punishment certainty and injunctive norms, descriptive norms, and moral norms are found to be significant. The data also show that punishment severity influences descriptive norms and moral norms, but does not impact injunctive norms. I discuss these findings in the next few paragraphs.

The data show that punishment certainty influences injunctive norms. This relationship can be explained by the General Deterrence and Protection Motivation theories. The General Deterrence Theory (GDT) suggests that undesirable behaviors (e.g. crimes, ISS con-compliance, piracy) can be deterred by certain and severe sanctions (Williams and Hawkins, 1986). When the probability of punishment is high and the sanction is severe, potential violators will be deterred from committing undesirable acts (Blumstein, 1978; Hoffer and Straub, 1989). Protection Motivation Theory (PMT) posits that perceived severity of a threatening event and perceived probability of the occurrence influence violators' behaviors (Rogers, 1975). Punishment creates an anxiety in the minds of employees because they want to minimize losses (Kahneman and Tversky, 1979). When workers are punished for not complying with ISS policies, they know what is expected from them (injunctive norms). By widely communicating policies that clearly state consequences of not complying with ISS policies, employees perceive policies to be important and therefore pay more attention towards them.

The data suggest that punishment severity does not influence injunctive norms. This study is the first attempt to investigate this relationship. This result suggests that punishment severity does not necessarily influence employees' perception of important others' expectations.

Evidently, further theoretical and empirical research is needed to investigate and assess this relationship.

The relationships between the two punishment dimensions (punishment certainty and punishment severity) and descriptive norms were found to be significant. Trevino (1992) argues that the deterrent effect of organizational punishment is raised significantly when employees observe a punishment event. The rationale behind this argument is that observers can now imagine potentially facing the punishment if they participated in non-compliant acts. The Social Learning Theory asserts that people learn by observing others' attitudes and behaviors (Bandura and Simon, 1977). For this reason, employees who are aware that non-compliant employees receive punishment tend to adjust their behaviors by imitating those who were not punished before (Atwater et al., 2001; Bandura, 1971). The rationale behind this act is because employees believe that those who were not punished are doing the right thing and that is why they have not been punished.

The influences of punishment severity and punishment certainty on moral norms are found to be significant. When implemented for a certain period of time, organizational punishment may emphasize a behavior standard that is considered appropriate, right, and just; and should be followed by employees. In other words, punishment policies and rules may help in creating group norms by distinguishing between acceptable and unacceptable behaviors in an environment perceived as fair (O'Reillys and Puffer, 1989). After a post-hoc analysis, D'Arcy et al. (2009) reported that punishment certainty has a greater influence on intention to comply with ISS policies than punishment severity for those who exhibit high level of moral commitment. D'Arcy et al. (2009) divided their sample into two groups with high and low levels of moral commitment in order to conduct a within group analysis. In other words, D'Arcy et al. (2009) did

not examine the mediating relationships between certainty of punishment, moral norms, and ISS compliance intention.

The data in this dissertation indicated that the standardized coefficient of the relationship between punishment certainty and moral norms is greater (0.24) than the coefficient of the relationship between punishment severity and moral norms (0.05). These results suggest that when punishments are certain, employees may distinguish between acceptable and unacceptable behaviors. ISS policies are important and thus certain punishment for non-compliance makes employees aware that following these policies is the correct behavior.

The results suggest that the relationships between punishment factors (punishment severity and punishment certainty) and normative factors are significant. The data suggest that the relationships between the three normative factors and ISS compliance intention are also significant. This indicates that the normative factors may mediate the relationships between punishment factors and ISS compliance intention.

6.3 Perceived Behavioral Control and Concomitant Relationships

The data analyzed in this dissertation suggest that perceived behavioral control influences ISS compliance intention. Perceived behavioral control is defined as the aggregate sum of product of control factors and associated perceived power (Ajzen, 1991). The Theory of Planned Behavior (TPB) posits that individuals' perceptions of their ability to perform a given behavior positively influence their behavior (Ajzen, 1991). The results are consistent with other research based on the TPB framework (e.g., Bulgurcu et al., 2010; Dinev and Hu, 2007; Hu et al., 2012; Pavlou and Fygenson, 2006). The more the employees feel in control of their ability to meet the requirements of ISS policies, more they are likely to comply with these policies. There may be a way to accomplish this through extensive training to improve people's self-efficacy with ISS

policies, the technologies related to ISS, and the skills needed to use the technologies and comply with ISS policies.

The results also show that perceived behavioral control has a negative impact on resistance towards ISS. Resistance is defined as “challenge or disruption to process or initiatives” (Ferney and Sobreperez, 2006; Jermier et al., 1994). Thomson et al. (2006) suggest that invoking new ISS policies require changes from the status-quo in organizations, which cause employees to oppose the changes. Status-quo bias theory explains individuals’ preference for maintaining the current situation (Samuelson and Zeckhauser, 1988). Employees want to feel that they have control over the current situation (PBC) in order to adopt the new changes (Kim and Kankanhalli, 2009). Employees who perceive a high control over tasks assigned to them are likely to exhibit lower resistance towards accepting and undertaking such tasks. Therefore, employees’ resistance to use ISS policies is more likely to diminish if employees perceive that they have high control over ISS tasks.

6.4 Injunctive Norms and Concomitant Relationships

The results show that the relationship between injunctive norms and ISS compliance is significant. Injunctive norm is defined as individuals’ perception that “important others” expect them to behave in a specific way. The Theory of Reasoned Action (TRA) and TPB posit that individuals are subject to influences of standards of social behavior implicitly established by the group (Ajzen, 1975; Ajzen, 1991). Extant studies argue that IT managers or ISS specialists frequently provide directions and counseling to employees for securely operating their computing resources (Anderson and Agarwal, 2010; Bulgurcu et al., 2010; Dinev and Hu, 2007; Ifinedo, 2012; Li et al., 2010; Siponen et al., 2010). In general, this guidance typically originates from individuals in positions of authority and indicates what employees ought to be doing in

order to comply with ISS. This result is consistent with other research based on the TPB framework (e.g., Bulgurcu et al., 2010; Hu et al., 2012; Cialdini et al. 1990; Kallgren et al., 2000). The relationship between injunctive norms and intention to comply with ISS was found to be significant in several earlier studies (e.g. Herath and Rao, 2009a; Hu et al., 2012; Ifinedo, 2012). This finding suggests that organizations referents' expectations do affect employees' behaviors. In other words, the belief/expectations of important others (e.g. supervisors, managers, etc.) on whether employees should comply with ISS policies are likely to increase employees' intentions to comply.

The data show that injunctive norms negatively influence resistance towards ISS policies. This suggests that when employees know what they ought to be doing, their opposition reduces. Social norms are standards of behavior that are accepted by a group of people to guide their behaviors (Cialdini and Trost, 1998). In general, social norms factors are aligned to desirable outcomes and resistance is just the opposite of desirable outcomes. Thus, injunctive norms diminish resistance towards ISS policies—if employees believe that their supervisors expect them to use the ISS policies. The negative relationship indicates that the higher the injunctive norms, the lower the resistance towards ISS would be.

The results show that injunctive norms positively affect descriptive norms. The data show that injunctive norms exert an indirect significant effect on ISS compliance intention through descriptive norms. The standardized coefficient of the relationship between injunctive norms and descriptive norms is strong (0.40) and positive, which means that the higher injunctive norms are, the higher descriptive norms would be. This result points out that if employees believe that important others are expecting them to comply with ISS policies; they most likely follow what most others around them are doing. In a longitudinal perspective, more and more people would

do what important others expect them to do. After practicing important others' expectations, it becomes very natural for employees to believe that this is the right thing to do. Thus, increasing the descriptive norms.

6.5 Descriptive Norms and Concomitant Relationships

The hypothesized relationship between descriptive norms and ISS compliance intention is found to be significant. The results show the importance of descriptive norms in affecting behavioral intention. Descriptive norms represent what most people do, and refer to what an individual thinks what most others will do in a particular situation (Cialdini et al., 1991). Social learning theory suggests that individuals learn by observing others' attitudes and behaviors (Bandura and Simon, 1977). Extant literature across disciplines has shown that descriptive norms have a direct and positive statistical impact on individual's intention towards a certain behavior (Nolan et al., 2008; Schultz, 1999). The finding of this dissertation is consistent with previous studies that assessed the influence of descriptive norms on ISS compliance intention (e.g. Anderson and Agarwal, 2010; Herath and Rao, 2009a).

The results also show that descriptive norms negatively affect resistance towards ISS. The higher the descriptive norms are, the lower the resistance towards ISS would be. I argue that employees accept the changes due to ISS policies if they perceive that others do not oppose them.

6.6 Moral Norms and Concomitant Relationships

Moral norm is defined as the individual's perception of the moral correctness or incorrectness of performing a certain action (Ajzen, 1991). The data show that moral norms positively influenced intention to comply with ISS. The standardized coefficient of the

relationship between moral norms and ISS compliance intention is the strongest among other relationships between normative factors and ISS compliance. This result is consistent with previous studies, which examined the impact of moral norms on intention to comply with different rules/policies (e.g. Gezelius, 2002; Riahi-Belkaoui, 2004). In ISS studies, D'Arcy et al. (2009) reported that moral commitment impacts intention to misuse IS. The results of this dissertation confirmed the findings of several previous studies that asserted positive relation between moral norms and intention to comply.

The results also suggest that moral norms are an antecedent of self-policing. The standardized coefficient of this relationship is 0.82. This means that those employees who can differentiate between right/wrong decisions are more likely to be able to exert control on their behaviors.

The data show that moral norms negatively impact resistance towards ISS. The standardized coefficient of the relationship between moral norms and resistance towards ISS is the strongest among other relationships between normative factors and resistance. Resistance is a consequence of threat of lost freedoms (Edwards et al., 2002). Moral norms are aligned to desirable outcomes. Thus, moral forces imbibed by employees may act to diminish the resistance based on how the group norms are framed.

6.7 Resistance and Concomitant Relationships

The data support the hypothesized relationship between resistance towards ISS and ISS compliance intention. Reactance theory posits that individuals desire freedom of choice and oppose such actions that threaten their freedoms (Brehm, 1966; Edwards et al., 2002). Employees' resistance to change in organizations has been identified as a major barrier to the successful implementation of IS projects (Bhattacharjee and Hikmet, 2007; Ferneley and

Sobreperez, 2006; Polites and Karahanna, 2012). Workers resist when they feel that the project is likely to diminish their freedom. Therefore, employees want to maintain status-quo which makes them oppose changes caused by new technologies (Brehm, 1966; Samuelson and Zeckhauser, 1988). The changes caused by ISS policies cause anxiety and resistance to change in employees (Thomson et al., 2006). The result found in this dissertation is consistent with previous research (e.g. Bhattacharjee and Hikmet, 2007; Lewin, 1947), though not in ISS domain. Those employees who want to maintain status-quo and oppose changes are less likely to comply with ISS policies.

The hypothesized relationship between task dissonance and resistance towards ISS is found to be significant. Dissonance refers to discrepancies between individual's cognition and reality. The Cognitive Dissonance Theory (CDT) explains the relationships among cognitions which influence the individuals' subsequent behaviors (Festinger, 1962). According to CDT, individuals strive to find a consistency between both types of cognitions, but when these two cognitions contradict, dissonance occurs. The fact that ISS policies increase the task complexity creates a mental dissonance in employees, which is created by the contradiction between a desire to perform a given task efficiently (cognition 1), and suffer task efficiency because of complying with ISS policies (cognition 2). In most organizations, compliance of ISS policies is not specified among the main task responsibilities of most employees. For example, the main role of a cashier in the bank may be to serve a certain number of customers in a day. The fact that she should do this securely is an add-on requirement, not specified as her main responsibility. This means employees may perceive the ISS policies as a deterrent to their productivity. Workman et al. (2008) suggest that employees may think of ISS as a net negative if they perceive that the compliance of ISS policies will make them less efficient in carrying out their primary

responsibilities. Puhakainen (2006), based on qualitative interviews, reported that employees do not comply with ISS policies because they perceive that:

- i. ISS policies slow them down
- ii. Their workload is high
- iii. They are busy with other assignments which they believe are more important.

During the pre-test stage, I interviewed two groups (6 and 4 members) of employees to find their opinion on the task dissonance measures. Here are some direct quotes from these interviews:

- *There is always a line between security and task performance. In my job, I have to enter my username and password four times to get to a customer's information. Information Security policies slow me down.*
- *I always look for ways to avoid the information security policies when I have deadlines because they slow me down.*
- *I know it is a must to follow the information security policies but they affect my job performance, I look for ways to avoid them.*
- *I avoid the information security policies to improve my performance and efficiency especially when I know about promotions.*
- *Information systems security policies make things complicated and affect my performance.*
- *I try to take permission from my supervisor to avoid security policies when I have a limited time in a project.*

Therefore, it appears that employees are likely to face dissonance and take actions (resist the changes) to reduce this dissonance if the ISS requirements were to inhibit their primary task

performance. Task dissonance seems to be an important factor that both researchers and practitioners need to take into consideration when assessing ISS policies compliance.

6.8 Self-Policing and Concomitant Relationships

The results support the hypothesis that self-policing exerts a positive influence on ISS compliance intention. This is the first study to develop self-policing as a new construct as an antecedent to ISS compliance intention. Thaler and Shefrin (1981, p. 394) describe a two-self person as “having two sets of preferences that are in conflict at a single point in time.” Self-policing is activated when individuals face a choice set involving control of one’s own (self) behavior. In the ISS context, the two sets of preferences can be denoted as pro-ISS and anti-ISS. The fact that ISS policies increase complexity and change how things are done make employees decide between two options: whether to comply or not to comply.

The two-self situation is illustrated by the following example. For instance, an employee may face a deadline to finish a task that requires staying two hours longer in the office after regular work hours. Two options may arise in the mind of the employee: (1) comply with the policies by staying longer in the office to finish the work and (2) violate the policies by taking official data out of the office using unauthorized methods.

6.9 Quality, Satisfaction, and Word-of-Mouth and Concomitant Relationships

The data confirm the hypothesized relationship between perceived ISS quality and ISS compliance intention. The positive coefficient indicates the higher the perceived ISS quality is, the higher the ISS compliance intention would be. Perceived system quality is identified as a key element that affects the success of an IS (DeLone and McLean, 1992). Perceived quality is based

on employees' evaluation of different attributes of the products and their relative preference to the user (Zeithaml, 1988).

The Expectation-Disconfirmation Theory explains a process model of individual behavior comprising of three stages:

- i. The initial pre-usage belief of a product/technology,
- ii. Experience during usage,
- iii. Perceptions of post-usage (Oliver, 1980).

The difference between the first and last stage is the disconfirmation which could be positive or negative, depending on whether the disconfirmation is positive or negative.

Individuals perceive the product to be of a good quality if the disconfirmation is positive. The previous research on ISS compliance did not examine the role of quality in affecting compliance. The results show that perceived ISS quality does have a significant effect in the ISS compliance context. This result is consistent with findings of previous studies (e.g. Anton et al., 2007; Gotlieb et al., 1994), though not in ISS domain.

The data failed to confirm the hypothesized relationships between perceived satisfaction with ISS and compliance intention; and word-of-mouth and compliance intention. The results are surprising because the hypotheses are based on logical reasoning and theoretical support. These results contradict with those reported in most of the existing literature, albeit not in ISS domain (e.g. Bhattacharjee, 2001; Brown and Reingen, 1987; Herr et al., 1991; Limayem et al., 2007; Thong et al., 2006). I call upon future research to investigate these relationships. One plausible explanation may be that in most existing literature, perceived satisfaction and word-of-mouth constructs were examined in non-mandatory situations. For example, satisfaction describes a state of mind after some experience, typically using a product or a service. In most of these

situations, the individual acts of her own volition. However, in the ISS compliance context, policies are mandatory. Another potential explanation for this result comes from the Correspondence Principle in the social psychological attitudes literature, which suggests that the attitude measures should correspond very directly to the behavior of interest for best prediction of behavior from attitude. (Ajzen and Timko, 1986). This is because correspondence of measures between attitude and behavior is an important precondition for strong correlations (Ajzen and Timko, p. 260). For instance, while general satisfaction with ISS policies might not significantly affect (predict) ISS compliance, satisfaction towards ISS compliance should be a better predictor because measure of satisfaction and compliance correspond to each other. Therefore, the measurements of these two constructs also need to be looked at again. Evidently, further theoretical and empirical research is needed to investigate and assess these important relationships.

The data indicated that word-of-mouth does not have a significant influence on ISS compliance intention. It seems that researchers should differentiate between organizational IT use and personal IT use. Employees behavior towards personal ISS may be different from that toward organizational ISS because in case of organizational IT use, they may attribute the responsibility of securing the IT systems on the IT department at work. However, at the personal level, individuals themselves are responsible for securing their IT resources.

6.10 Habit and Concomitant Relationships

The findings reveal that the hypothesized relationship between pre-ISS habit and employees' intention to comply with ISS policies is not significant. One potential reason for this result can be attributed to the difficulty in measuring pre-ISS habit. Pre-ISS habit was defined as the employees' learned actions before ISS policies were put into effect, which became automatic

responses to cues. It is likely that the measures used for pre-ISS habit did not truly measure the full essence of what they were expected to measure, thus did not capture the habit employees developed before ISS policies. For instance, two of the measures used are: “I did not have to think twice before using information systems to perform my tasks”; and “Using information systems had become a habit for me.” These measures require employees to think about how they interacted with IS before the implementation of ISS policies. It could be that employees failed to remember how they had used the IS before the ISS policies were put into effect. I suggest an experiment method may be used to examine the impact of habit on ISS compliance.

In this chapter, I discussed the analyzed results reported in previous chapter. I discuss the conclusion, contributions, limitations, and future research directions in the next chapter.

CHAPTER VII

CONCLUSION

In this chapter, I discuss the conclusion of the dissertation followed by the theoretical contributions. I then present practical implications followed by limitations. I finally discuss future research directions.

7.1 Conclusions

The effectiveness of ISS policies in any organization depends on the behavior of the users of IT systems. Compliance with ISS policies is necessary to ensure the security of critical information resource of an organization. The existing research in ISS compliance, though not scarce, focuses on narrow areas. Therefore, examination of employee behavior towards ISS compliance in a comprehensive integrated manner is necessary to gain a better understanding of how multiple factors interact and influence each other. Specifically, an integrated model that shows a process perspective of ISS compliance within organization is called for. This dissertation developed and empirically validated an “Integrated Process Model of ISS Compliance” based on various social, organizational, and criminological theories. This dissertation complements a long stream of research on ISS compliance.

Guided by the Reciprocal Determinism Theory, this dissertation proposed a model comprising of organizational, attitudinal, normative, environmental, and psychological factors

relevant in influencing worker behaviors in organizations. Many theories inform the formulation of the process model examined in this dissertation. These are: General Deterrence Theory, Social-Exchange Theory, Social Learning Theory, Expectation-Disconfirmation Theory, Rational Choice Theory, Cognitive Dissonance Theory, Reactance Theory, and Status-Quo Bias Theory.

This dissertation made many new contributions to the ISS research. Four new constructs namely task dissonance, self-policing, word-of-mouth, and habit were introduced to the ISS research stream. Also, the top management support was used as a multi-dimensional construct. New scale measures were developed for multidimensional top management support, task dissonance, and self-policing. . The process model examined the interactions between punishment severity, punishment certainty and top management support and normative factors. The interactions between normative and psychological factors and their effects on ISS compliance were investigated.

The model was empirically evaluated using employee level data collected from twenty one organizations located in the United States. Structural Equation Modeling was used to assess the research model. The hypothesized relationships of the integrated model are generally supported by the data.

The study yielded some important results. The relationships between ISS personal norms and compliance intention: perceived behavioral control, injunctive, descriptive, and moral are confirmed. The data confirmed the postulations of this study that normative factors mediate the relationships between top management support and punishment factors and ISS compliance. The results suggested that normative factors affect ISS compliance directly as well as through resistance. Resistance, as an attitudinal factor, was found to be an antecedent to ISS compliance

intention and decreased compliance intention. Task dissonance, self-policing, and perceived ISS quality were also found to affect ISS compliance intention.

7.2 Theoretical Contributions

I believe my dissertation makes important contributions to the ISS literature. This dissertation contributes four new constructs—namely task dissonance, self-policing, word-of-mouth, and pre-ISS habit to the ISS compliance literature. I discuss each of these separately in the following paragraphs.

Task dissonance refers to discrepancies arising in employees' cognition because of conflicting utilities between their primary responsibilities and ISS compliance tasks. Employees do not consider ISS policies compliance to be among their primary responsibilities. Having to comply with ISS policies most often increases task complexity, creating a mental dissonance in users. The inconsistency between the employees' attitudes or beliefs about what is valuable for them and the obligation of complying with ISS policies creates a dissonance (Festinger, 1962). Those employees who perceive that doing their primary jobs is more important than complying with ISS policies are likely to experience a dissonance. The cognitive dissonance theory posits that individuals take actions which they believe will reduce dissonance (Festinger, 1962). These actions may be manifested in increased resistance towards ISS compliance. Therefore, greater task dissonance may cause increased resistance. The analytic results reported in Chapter 5 support this relationship. Thus, this dissertation makes a significant contribution by adding task dissonance as a new construct to the ISS literature.

Self-policing refers to the exertion of power over the self by the self. Self-policing is activated when employees face a choice set that involves controlling one's behavior. In ISS context, self-policing can be conceptualized as the conscious compliance with ISS policies to

protect organizations' systems and data. The two sets of preferences can be denoted as pro-ISS and anti-ISS. Most IS scholars have, until now, focused on adoption, implementing change, and diffusion issues because of their concern on the increasing use of information technologies (e.g. Pavlou et al 2006; Peace et al., 2003). Theories of reasoned action, planned behavior, and diffusion of innovation did a good job in explaining most phenomena related to adoption, use, and diffusion. I believe that it is important to find other factors that influence employees' behaviors. Thus, by introducing self-policing to ISS literature, I have made a significant contribution to theory.

Word-of-mouth refers to the interpersonal communication between people regarding their personal experiences in dealing with ISS policies. Word-of-mouth has been found to significantly influence people's behavior because informal channels are considered more creditworthy because of apparent lack of conflict of interest (e.g. Brancheau and Wetherbe, 1990; Brown and Reingen, 1987; Herr et al., 1991). In ISS, stories and anecdotes narrated by non-formal social actors may have a significant influence on employees' behavior towards complying with ISS policies. This dissertation is the first attempt to investigate the role of word-of-mouth on employees' compliance with ISS policies. This dissertation highlighted the importance of word-of-mouth in the ISS context and I believe it is a notable contribution, although the relationship was not significant.

Pre-ISS habit is defined as employees' learned actions before the implementation of ISS policies, which have become automatic responses to cues to specific situations. Across disciplines, habit has always been considered to be at least partly responsible for influencing individuals' behavior (e.g. Lindbladh and Lyttkens, 2002; Bargh, 2002; Aarts et al., 1998; Bagozzi, 1981). Once an individual acquires a habit, based on previous repeated behaviors,

performance of future behaviors require little (if any) conscious attention (Wood et al., 2002). The role of the acquired habit before ISS policies implementation has not been examined in the ISS context. This dissertation is the first attempt to examine the role of pre-ISS habit. Even though the analytic results did not confirm the effect of habit on intention to comply, I believe it is a significant antecedent of employee behavior. I call upon future research to examine the measurement of habit and investigate other potential reasons for why this relationship failed to confirm in my dissertation. A qualitative study could help explain this question because interview method provides opportunity to clarify the context as well as follow up question in order to capture true participants' responses where memory biases have taken hold.

This dissertation also explores the role of perceived ISS quality and perceived satisfaction with ISS policies in the ISS compliance context. Perceived system quality and perceived satisfaction with technology have been identified as key antecedents influencing IT success and adoption (e.g. Bhattacharjee, 2001; DeLone and McLean, 1992). Perceived quality and perceived satisfaction are based on the expectation disconfirmation model. Employees can have high perceptions of satisfaction and quality if expectations exceed outcomes. While perceived satisfaction is a short-run evaluation and more transactional in nature, perceived quality is long-run evaluation of different attributes. This dissertation is the first attempt to examine the role of perceived ISS satisfaction in ISS compliance literature. I believe, despite the results found in this dissertation, I contributed to the literature by introducing and highlighting an important factor which may affect employees' behavioral intention to comply with ISS policies. Future research may have to theoretically and empirically examine the role of perceived satisfaction using other research methods. Especially, the role of satisfaction in restricted choice situations require more investigation.

The extant literature has investigated factors rooted in criminology, social, and behavioral theories from narrow perspectives, but this research is the first to offer a theoretical explanation and empirical support for an integrated model demonstrating a process perspective of creating an ISS culture. The “Integrated Process Model of ISS Compliance” integrates organizational, normative, psychological, and attitudinal factors that influence employees’ ISS compliance. This dissertation demonstrates that organizational factors can influence normative factors, which directly and indirectly influence employees’ behavioral intention towards ISS. The indirect relationships are mediated by psychological factors, namely resistance towards using ISS policies and self-policing.

This dissertation contributes to the body of knowledge by empirically measuring top management support using a multi-dimensional construct thus answering the call for research by Boonstra (2013).

Hu et al. (2012) examined the influence of top management participation on perceived behavioral control and injunctive norms. This dissertation extends the work by Hu et al. (2012) by studying the role of top management support in creating descriptive norms. The data affirmed this relationship.

The extant literature suggests that punishment severity and punishment certainty, rooted in GDT and PMT, affect ISS compliance (e.g. Hoffer and Straub, 1989; Siponen et al., 2010). This dissertation argues that punishment severity and punishment certainty influence ISS compliance via normative factors as well. Results supported this argument. Thus, this dissertation presents new relationships which extend the current research.

This dissertation suggests that resistance towards using ISS policies mediate the relationships between normative factors, namely perceived behavioral control, injunctive norms,

descriptive norms, and moral norms and intention to comply with ISS policies. Thus, this dissertation presents new relationships that extends the current research.

This dissertation investigates the impact of injunctive norms on descriptive norms. Current research considers these factors as two independent factors and did not investigate their antecedents (e.g. Anderson and Agarwal, 2010; Bulgurcu et al., 2010; Dinev and Hu, 2007; Herath and Rao, 2009a, b). Findings of this dissertation show that injunctive norms affect descriptive norms. This result is important for behavioral literature in general and not only for ISS.

In this dissertation, I argue that top management support, punishment certainty, and punishment severity are antecedents to injunctive, descriptive, and moral norms. These normative factors have been always used as exogenous factors (e.g. Anderson and Agarwal, 2010; Bulgurcu et al., 2010; Dinev and Hu, 2007; Herath and Rao, 2009a, b). I extended the research in Merhi and Midha (2013), which examined the role of training on the normative factors. The findings reported in chapter 5 support these relationships. Thus, this dissertation contribute to theory by presenting new relationships that add to the current research.

The role of resistance towards ISS policies has not been assessed in ISS literature as an attitudinal factor but as a behavioral factor. Ferneley and Sobreperéz (2006) argue that resistance is a cognitive process that leads to an opposing behaviors. Thus, resistance is an antecedent to behavior and opposes the desirable outcomes (Piderit, 2000). For this reason, in this dissertation I examined the role of resistance as an attitudinal factor.

7.3 Practical Implications

I believe my dissertation offers important practical implications to ISS practitioners.

The concept of task dissonance offers important implications for ISS management practices. Managers can look for ways to integrate primary tasks of employees with ISS procedures in order to reduce dissonance. For example, ISS policies compliance could be explicitly added as a part of the job description and thus made a part of the employees' main responsibilities. IT Managers could design ISS policies in a manner so that the policies do not appear to conflicting with primary tasks and responsibilities of employees.

A multidimensional top management support construct provides a diagnostic tool to managers. It makes it possible for practitioners to find the relevance and strengths of individual dimensions that influence employees' normative factors. Managers can pay more attention to those dimensions that are more important than others.

Top management support can take various forms, such as encouraging employees' compliance, offering educational and training programs, visibly practicing ISS compliance, and demonstrating the vision and goal of the ISS policies to the organization. These various types of top management support are used as dimensions to measure the multidimensional construct. The data showed that these dimensions influence employees' normative factors. Because training is one of the dimensions, I suggest that there is a need for top management to provide necessary training to employees so that they can effectively master the ISS policies and apply it to their jobs. During training, employees should be given the right level and standard of education so that they can understand the ISS concepts. This helps them build skills and competencies allowing them to feel comfortable when dealing with ISS policies. Training should be tied to the need of employees and should focus on shaping their personal norms. Top managers should actively

listen to feedback from employees in order to adapt their level and content of support to fit what is needed, rather than relying solely on standardized training programs.

Visibility is another dimension of top management support. I also suggest that top managers should always demonstrate the importance of the ISS policies in order to make it an obligation for employees. Top managers should not assume that employees are aware of their support, but must publicly demonstrate their determination, vision, and appreciation of the ISS policies in order for employees to perceive what is expected from them. Also by “walking the talk,” top managers can communicate what it is expected from employees. This can be done through internal organizational newsletters, meetings, events etc. where short stories are described about how executive managers are responding to different ISS problems.

Top managers tend to become role models for a wide cross-section of employees who want to be successful in their careers (Green, 1995). The social learning theory posits that individuals acquire skills and new pattern by observing others’ behaviors and then emulate them. Employees who perceive their managers as role models are more likely to emulate them into thinking that this is the right thing to do. Thus, it seems that managers may have to watch their behaviors and emphasize ISS policies compliance.

The results on the effects of punishment severity and punishment certainty on normative factors have important implications for practitioners. By widely communicating policies that clearly state consequences of violating required behavior, (1) employees know what is expected from them, (2) employees can determine the standards of right and wrong, and (3) large number of employees fall in line. Stories of employees who received organizational punishment because of non-compliance can be spread-using blogs, newsletters, and e-mails, so others become aware

of the consequences of non-compliance. This makes employees know that ISS compliance is the right thing to do and supervisors expect them to comply with ISS policies.

The role of resistance in affecting compliance intention has implications for practitioners. The IT managers should pay specific attention to those changes in ISS that may cause resistance by facilitating employee participation in ISS changes. Literature about change management suggests that employees' involvement in the implementation and procedures may reduce resistance (Markus, 1983).

7.4 Limitations

Although this dissertation makes significant contributions, its few limitations need to be reported so that they can be addressed in future research.

The convenience sampling method limits the generalizability of the findings of this dissertation.

The dependent variable intention to comply with ISS was measured using direct measures which might cause bias in the response because of social desirability (Trevino, 1992). Individuals tend to be reluctant to tell the truth when it comes to provide ethically or socially desirable answers such those related to ISS policies violations especially if they have committed any violation. This issue leads to bias in the responses. In ISS, researchers have used direct measures and hypothetical scenarios to measure intention to comply with ISS policies (e.g. D'Arcy et al., 2009; Hu et al., 2012; Siponen and Vance, 2010). Scenarios represent an indirect way for measuring intention to commit unethical behavior (Trevino, 1992). Because scenarios describe someone else's behavior in a hypothetical way, participants might feel less intimidated to report an intention to act similarly to the person described in the scenario and may help them to tell their true intentions (D'Arcy et al., 2009; Siponen and Vance, 2010). I measured intention

to comply using both methods and found that the variance of intention explained by other factors using the scenario method is lower ($R^2 = 25\%$) than in direct measures ($R^2 = 49\%$). I used one item to measure intention in the scenario method and this may be the reason for the low variance explained.

The data show that the hypothesized relationship between pre-ISS habit and ISS compliance intention is not significant. One potential reason for this result can be attributed to the difficulty in measuring pre-ISS habit. Future research might have to look at the measures of pre-ISS habit in this dissertation and improve them to capture the essence of the construct. Using experimental method can help capture the pre-ISS habit and examine its effect on ISS compliance intention. Employees can be given the same task for a long period of time, and then have the task changed.

The research model examined in this dissertation is complex. SEM analysis required a large sample size which forced me to collect data from different organizations. Pooling data from many organizations can be considered as a limitation because different organizations are likely to exhibit varying degree of tolerance for ISS policies violation. To minimize the effect of this limitation on the results, I collected data from different organizations representing different industries and are of various sizes. Participants were also from different levels and different departments.

7.5 Future Research Directions

This dissertation investigated the impact of only two organizational factors, namely top management support and organizational punishment, on normative factors. Future research can extend the model by taking other organizational factors into consideration, such as reward and training. Employees may need encouragement to comply with ISS policies and reward can be

considered to be a critical factor that motivate employees. Employees also need requisite knowledge and skills to deal with ISS policies; which they can acquire during training. The effects of training and rewards on normative factors have not been investigated in the extant literature.

While this dissertation examined normative factors, future research can consider other individual factors such as personality traits and organizational commitment (Gelade et al, 2006). Personality psychologists agree that personality is linked to actual behavior through cognitive processes that determine one's motivation to engage in a particular act (Barrick et al., 2002). This is because personality reflects the unique facets of each human being, and it is reflected in all of the humans' thoughts and actions (Korzaan and Boswell, 2008). It seems that these factors can provide more insights into the interaction between individual and organizational factors, and ISS compliance.

Organizational punishment is defined as "the application of a negative consequence to, or the withdrawal of a positive consequence from, an employee" (Trevino, 1992, p. 649). Previous studies, including this dissertation, examining the role of punishment on individuals' behaviors have assessed the impact of the application of negative consequence. The withdrawal of a positive consequence might influence individuals' behaviors. Future research might have to examine the role of withdrawal of positive consequence from individuals.

Dimensions of top management support were used as indicators for the construct. Future research may examine each dimension as a construct and use the top management support as a first-order level construct. This gives more insights on the importance of each of the dimensions used.

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APPENDIX A

APPENDIX A

INSTANCES OF ATTACKS, THEIR CONSEQUENCES AND CAUSES

<p>A recent Price Waterhouse Cooper consumer survey found that 61% of respondents would stop using a company's products or services after a breach Source: http://www.pwc.com/gx/en/consultingservices/information-security-survey/assets/2013-giss-report.pdf</p>
<p>In 2011, 46% of organizations have identified increased threats within their own organizations. Source: http://www.ey.com/Publication/vwLUAssets/Into_the_cloud_out_of_the_fog-2011_GISS/FILE/Into_the_cloud_out_of_the_fog-2011%20GISS.pdf</p>
<p>The survey for Cisco, released late in 2011, found that 70% of next-generation workers admitted knowingly breaking IT policies, 32% believed they were not doing anything wrong, and 61% believed responsibility for protecting information and devices fell on the IT function, not individual employees Source: http://www.cisco.com/en/US/netsol/ns1120/index.html</p>
<p>In Australia, a privacy breach closed Telstra BigPond email for up to one million accounts after 60,000 passwords were inadvertently displayed on the Internet. Businesses and individuals lost all email for about four days. Source: http://www.theage.com.au/it-pro/security-it/telstra-customer-database-exposed-20111209-1on60.html#ixzz1g1s9nsSY</p>
<p>Someone at domain name registrar Melbourne IT inadvertently emailed details of more than 28,000 accounts to the wrong people. Source: http://www.theage.com.au/it-pro/security-it/thousands-of-domain-registrars-customer-details-exposed-20111223-1p8us.html</p>
<p>New York Times intended to send an email to about 300 subscribers who had cancelled their subscription, and offer them a discount to renew. The email went instead to 8.6 million email addresses on their database. The newspaper initially claimed the emails were spam, and later admitted it was an employee error. Source: http://www.theaustralian.com.au/news/world/new-york-timess-mass-email-gaffe/story-e6frg6so-1226232442276</p>
<p>A privacy breach at Sony Playstation exposed 77 million personal files, and a month later a second breach exposed a further 24 million, including more than 12,000 debit and credit card details. Source: http://www.ft.com/intl/cms/s/2/07978e8a-750f-11e0-a4b7-00144feabdc0.html#axzz1IDMLjJsO</p>
<p>When Sony was hacked in 2011, the company spent more than \$171 million cleaning up the mess, and analysts predict the total could end up in the billions after calculating lost business and the cost of the investigations, make-goods, and the additional security investments the hack inspired Source: http://www.pwc.com/en_US/us/risk-assurance-services/assets/pwc-internal-audit-assuring-data-security-privacy.pdf</p>
<p>Over the past 6 years, the number of incidents reported by federal agencies to US-CERT has increased from 5,503 incidents in fiscal year 2006 to 42,887 incidents in fiscal year 2011, an increase of nearly 680 percent. Source: http://www.gao.gov/assets/600/590367.pdf</p>

APPENDIX B

APPENDIX B

INSTRUMENT OF 1ST PILOT

Perceived ISS Quality:

Information security policies in my company ...

- ... make computer systems dependable
- ... make computer systems a safe and secure computing environment
- ... are capable of responding to most threats to systems and data

Perceived Behavioral Control:

Thinking about the information security policies in my company ...

- ... I find it easy to follow the information security rules and policies
- ... complying with the information security policies is entirely under my control
- ... I have the resources and the knowledge to comply with information security policies
- ... complying with information security policies is easy for me

Top Management Support:

In my company, the top management...

- ... provides adequate resources (financial, human, etc.) to support information security policies
- ... frequently communicates with employees about the importance of information security policies
- ... **has set up adequate organizational structure to enforce and promote information security policies** (changed in pilot 2)
- ... encourages compliance of information security policies

Self-Policing:

When at work ...

- ... I always think about the appropriateness of my actions before interacting with the information systems/technologies
- ... I always think about the consequences of my actions before using information systems
- ... I always consider whether my actions will put my organization at risk before using information systems

Moral Norms:

In my company ...

- ... **I think it is right for everyone to follow information security policies** (changed in pilot 2)
- ... I think complying with the information security policies is the right thing to do
- ... I think not complying with the information security policies is wrong

Injunctive Norms:

In my company ...

- ... **people who are important to me think that I should follow the information security policies** (changed in pilot 2)
- ... **the IT department thinks that I should follow the information security policies** (changed in pilot 2)
- ... **my colleagues think that I should comply with the information security policies** (changed in pilot 2)

Descriptive Norms:

In my company ...

- ... it is common to find other employees complying with information security policies
- ... most employees generally comply with the information security policies
- ... I am convinced other employees comply with the information security policies

Punishment Certainty:

In my company ...

- ... employees are effectively monitored for information security policies compliance
- ... information security policies violations are generally known to the IT department
- ... people who violate security policies would be definitely caught

Resistance towards ISS:

In my company ...

- ... **I do not concur with information security rules and conditions** (changed in pilot 2)
- ... **I don't agree with the information security rules and conditions** (changed in pilot 2)
- ... **If left to myself, I would resist complying with information security policies** (changed in pilot 2)
- ... **If left to myself, I oppose complying with information security policies** (changed in pilot 2)

Punishment Severity:

In my company, those found violating information security policies would ...
... be severely punished
... receive tangible/intangible sanctions
... be severely reprimanded

Task Dissonance:

Thinking about my roles/responsibilities in my company. ...
... I believe that complying with information security policies is not among my main responsibilities
... doing my job is more important than worrying about information security compliance
... I think my performance will be negatively affected if I were to follow all information security policies
... I think strictly complying with information security policies makes me inefficient
... complying with information security policies makes my tasks more complex

Word-of-Mouth:

Within and outside my company ...
... I mostly hear negative things/stories about risks to information systems
... I hear about information security breaches quite frequently
... most people have bad things to say about information security breaches

ISS Satisfaction:

I am ----- with my organization's information security policies

Extremely dissatisfied	①	②	③	④	⑤	⑥	⑦	Extremely satisfied
Extremely displeased	①	②	③	④	⑤	⑥	⑦	Extremely pleased
Extremely frustrated	①	②	③	④	⑤	⑥	⑦	Extremely contented
Extremely unhappy	①	②	③	④	⑤	⑥	⑦	Extremely delighted

Pre-ISS Habit:

Please answer the following set of questions thinking about how you interacted with the information systems/technologies before you became aware of information security policies in your company:

- Using information systems/technologies was fairly automatic to me in performing my tasks
- I did not have to think twice before using information systems to perform my tasks
- Using information systems had become a habit for me

APPENDIX C

APPENDIX C

INSTRUMENT OF 2nd PILOT:

Perceived ISS Quality:

Information security policies in my company ...

... make computer systems dependable

... **make computer systems a safe and secure computing environment** (Changed in 3rd pilot)

... are capable of responding to most threats to systems and data

Top Management Support:

In my company, the top management...

... provides adequate resources (financial, human, etc.) to support information security policies

... frequently communicates with employees about the importance of information security policies

... **has created organizational structure to enforce information security policies** (Changed in 3rd pilot)

... encourages compliance of information security policies

... **words and actions demonstrate that information security is a priority** (new) (Changed in 3rd pilot)

... **support for information security policies is clear** (new) (Changed in 3rd pilot)

... **considers information security issues when planning organizational strategies** (new) (deleted in 3rd pilot)

... **strongly supports information security** (new)

Self-Policing:

When at work ...

... I always think about the appropriateness of my actions before interacting with the information systems/technologies

... I always think about the consequences of my actions before using information systems

... I always consider whether my actions will put my organization at risk before using information systems

... **I feel a sense of personal obligation to protect organizational information systems** (new) (Changed in 3rd pilot)

Perceived Behavioral Control:

Thinking about the information security policies in my company ...

... I find it easy to follow the information security rules and policies

... **complying with the information security policies is under my control** (Changed in 3rd pilot)

... I have the resources and the knowledge to comply with information security policies

... complying with information security policies is easy for me

... **I would be able to follow most of the information security policies even if there was no one around to help me** (new) (Changed in 3rd pilot)

Task Dissonance:

Thinking about my roles/responsibilities in my company ...

... **I believe that complying with information security policies is not among my main responsibilities** (Changed in 3rd pilot)

... doing my job is more important than worrying about information security compliance

... **I think my performance will be negatively affected if I were to follow all information security policies** (Changed in 3rd pilot)

... I think strictly complying with information security policies makes me inefficient

... **complying with information security policies makes my tasks more complex** (Changed in 3rd pilot)

Moral Norms:

In my company ...

... I think it is morally right for all employees to follow information security policies

... I think complying with the information security policies is the right thing to do

... I think not complying with the information security policies is wrong

... **I think employees should always adhere to information security policies** (new)

... **I think employees should do whatever they can to follow information security policies** (new)

Resistance towards ISS:

In my company ...

... **I oppose the changes that the information security policies require us to follow when dealing with information systems** (new) (Changed in 3rd pilot)

... **I raise objections about the changes that the information security policies require us to follow when dealing with information systems** (new) (Changed in 3rd pilot)

... **I complain about the new changes that the information security policies require us to follow when dealing with information systems** (new) (Changed in 3rd pilot)

... **I look for ways to show my resistance to the changes that the information security policies require us to follow when dealing with information systems** (new) (Changed in 3rd pilot)

... **I am against the changes that the information security policies require us to follow when dealing with information systems** (new) (Changed in 3rd pilot)

Punishment Severity:

In my company, those found violating information security policies ...

- ... **are severely punished** (Changed in 3rd pilot)
- ... **receive tangible/intangible sanctions** (Changed in 3rd pilot)
- ... **are severely reprimanded** (Changed in 3rd pilot)
- ... **repeatedly are terminated** (new) (deleted in 3rd pilot)

Punishment Certainty:

In my company ...

- ... employees are effectively monitored for information security policies compliance
- ... information security policies violations are mostly known to the relevant IT department
- ... people who violate security policies are definitely known to the relevant IT department
- ... **if employees violate security policies, the chance they would be caught is high** (new)

Word-of-Mouth:

Within and outside my company ...

- ... I mostly hear negative things/stories about risks to information systems
- ... I hear about information security breaches quite frequently
- ... **most people have bad things to say about information security breaches** (Changed in 3rd pilot)
- ... **most people warn others after having information security breaches** (new) (Changed in 3rd pilot)

Injunctive Norms:

In my organization ...

- ... the IT department expects that I should comply with information security policies
- ... people who are important to me expect that I should comply with security policies
- ... my colleagues expect that I should comply with the information security policies
- ... my supervisors expect that I should adhere to information security policies

Descriptive Norms:

In my organization ...

- ... it is common to find other employees complying with information security policies
- ... most employees generally comply with the information security policies
- ... it is likely that most employees follow the information security policies
- ... I believe other employees comply with the information security policies
- ... **I am convinced other employees comply with the information security policies** (new) (Changed in 3rd pilot)

Pre-ISS Habit:

Please answer the following set of questions thinking about how you interacted with the information systems/technologies before you became aware of information security policies in your company:

- Using information systems/technologies was fairly automatic to me in performing my tasks
- I did not have to think twice before using information systems to perform my tasks
- Using information systems had become a habit for me

ISS Satisfaction:

I am _____ with my organization's information security policies

Extremely dissatisfied	①	②	③	④	⑤	⑥	⑦	Extremely satisfied
Extremely displeased	①	②	③	④	⑤	⑥	⑦	Extremely pleased
Extremely frustrated	①	②	③	④	⑤	⑥	⑦	Extremely contented
Extremely unhappy	①	②	③	④	⑤	⑥	⑦	Extremely delighted

APPENDIX D

APPENDIX D

INSTRUMENT OF 3rd PILOT:

Note: measures on **bold** were changed from 2nd pilot.

Pre-ISS Habit:

Think about how you interacted with the information systems/technologies BEFORE you became aware of the current information security policies in your organization:

- Using information systems/technologies was fairly automatic to me in performing my tasks
- I did not have to think twice before using information systems to perform my tasks
- Using information systems had become a habit for me

Perceived ISS Quality:

Information security policies in my organization ...
... make computer systems dependable
... **make computing environment safe and secure**
... are capable of responding to most threats to systems and data

Top Management Support:

In my organization, the top management...
... provides adequate resources (financial, human, etc.) to support information security policies
... frequently communicates with employees about the importance of information security policies
... **has created adequate organizational structure to enforce information security policies**
... encourages compliance of information security policies
... **demonstrates that information security is a priority by their words and actions**
... **support for information security policies is visible**
... strongly supports information security

Task Dissonance:

Thinking about my job description ...

- ... **complying with information security policies is not among my main responsibilities**
- ... doing my job is more important to me than strictly adhering to all information security policies
- ... **My performance is likely to be negatively affected if I were to adhere to all security policies**
- ... I think strictly complying with information security policies is likely to make me less efficient
- ... **complying with information security policies probably makes my work more complex**

Perceived Behavioral Control:

In my organization...

- ... I find it easy to comply with information security rules and policies
- ... **complying with the information security policies is mostly under my control**
- ... I have the resources and the knowledge to comply with information security policies
- ... complying with information security policies is easy for me
- ... **I can comply with most of the information security policies without needing any help**

Moral Norms:

In my organization...

- ... I think it is morally right for employees to comply with information security policies
- ... I think complying with information security policies is the right thing to do
- ... I think not complying with information security policies is wrong
- ... I think employees should always adhere to information security policies
- ... I think employees should do whatever they can to comply with information security policies

Punishment Severity:

In my organization...

- ... **employees who are found violating information security policies are severely punished**
- ... **employees who are found violating information security policies receive severe penalty**
- ... **employees who are found violating information security policies are severely reprimanded**

Word-of-Mouth:

Within and outside my organization...

- ... I mostly hear negative things/stories about risks to information systems
- ... I hear about information security breaches quite frequently
- ... **most people have negative things to say about information security environment**
- ... **most people warn others about consequences of information security breaches**

Injunctive Norms:

In my organization...

- ... the IT department expects that I should comply with information security policies
- ... people who are important to me expect that I should comply with security policies
- ... my colleagues expect that I should comply with the information security policies
- ... my supervisors expect that I should adhere to information security policies.

Resistance towards ISS:

In my organization...

- ... **I am stressed by the changes brought about because of information security policies**
- ... **I am upset by the changes brought about because of information security policies**
- ... **I complain to my friends about the changes that are necessitated because of information security policies**
- ... **I express my resistance to changes that are necessitated because of information security policies to my friends**
- ... **I believe the changes that are brought about because of information security policies do not personally benefit me**
- ... **I believe the changes that are brought about because of information security policies make my job harder**

Self-Policing:

When at work ...

- ... I always consider whether my actions will protect organizational information systems
- ... I always think about the consequences of my actions before using information systems
- ... **I always consider risk to my organization before using information systems**
- ... I always think about the appropriateness of my actions before interacting with information systems

Descriptive Norms:

In my organization...

- ... it is common to find other employees complying with information security policies
- ... most employees generally comply with the information security policies
- ... **I am certain other employees comply with the information security policies**
- ... it is likely that most employees follow the information security policies
- ... I believe other employees comply with the information security policies

Punishment Certainty:

- ... employees are effectively monitored for information security policies compliance
- ... violations of information security policies are mostly known to the relevant IT department
- ... people who violate security policies are definitely known to the relevant IT department

ISS Satisfaction:

I am _____ with my organization's information security policies

Extremely dissatisfied	①	②	③	④	⑤	⑥	⑦	Extremely satisfied
Extremely displeased	①	②	③	④	⑤	⑥	⑦	Extremely pleased
Extremely frustrated	①	②	③	④	⑤	⑥	⑦	Extremely contented
Extremely unhappy	①	②	③	④	⑤	⑥	⑦	Extremely delighted

ISS Compliance Intention:

Thinking of my organization and job ...

... I am likely to follow the organization's information security policies

... It is possible that I will comply with the organization's information security policies

... I intend to follow the organization's information security policies

BIOGRAPHICAL SKETCH

Dr. Mohammad I. Merhi earned his Doctor of Philosophy in Business Administration, with a major in Computer Information Systems, from the University of Texas Pan-American (UTPA) in 2014. He received his Master of Business Administration with a concentration in Information Systems, from Emporia State University, in 2009. He earned his Bachelor Degree in Business Computer from the Business and Computer University, Beirut-Lebanon, in 2006.

Dr. Merhi worked as a research assistant and assistant instructor for the department of Computer Information Systems and Quantitative Methods at UTPA. Dr. Merhi also worked as assistant manager and system analyst at Amwaj Lebanon Company, Taanayel, Lebanon.

Dr. Merhi's research interests include behavioral aspects of information security and privacy, implementation of health information technologies and e-government systems.

Dr. Merhi has published his research in several leading journals including Information Management and Computer Security, International Journal of Business and Systems Research, and International Journal of Electronic Government Research. He has also presented his research at leading international and national conference meetings and workshops including the International Conference on Information Systems (ICIS), Americas Conference on Information Systems (AMCIS), Decision Sciences Institute (DSI), and Southwest Decision Sciences Institute.

At UTPA, Dr. Merhi won several honors and awards. These are: two research excellence awards at UTPA; two second place awards in the student research day at UTPA; 2013 AMCIS doctoral student consortium; and 2012 DSI annual doctoral student consortium.