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An Investigation of Factors Motivating Employee Attitudes and Intentions to Share Knowledge in Homeland Security

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An Investigation of Factors Motivating Employee Attitudes and Intentions to
Share Knowledge in Homeland Security

by

Evette Maynard-Noel

A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in
Information Systems

College of Engineering and Computing
Nova Southeastern University

2019

We hereby certify that this dissertation, submitted by Evette Maynard-Noel conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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2019

An Abstract of a Dissertation Submitted to Nova Southeastern University in Partial
Fulfillment of the Requirements for the Degree of Doctor of Philosophy

An Investigation of Factors Motivating Employee Attitudes and Intentions to Share Knowledge in Homeland Security

by
Evette Maynard-Noel
November 2019

The terrorist events of September 11, 2001, highlighted the inability of federal employees and officials to collaborate and share actionable knowledge-based information with the right people at the right time. However, much of the literature on knowledge sharing provided insight into knowledge sharing in private sector organizations and foreign public-sector organizations, instead of domestic public sectors or the United States federal government. While the importance of knowledge sharing for homeland security has been documented in the literature, there are no established frameworks that evaluate knowledge sharing motive and intentions in this context.

The main goal of this research was to understand what motivates employee attitudes and intentions to share knowledge, by empirically assessing a model, testing the impact of the factors of expected rewards, expected contributions, expected associations, trust, and information technology (IT) type and usage on employee attitudes and intentions toward knowledge sharing in homeland security.

The technology acceptance model and the theory of reasoned action served as the theoretical framework to understand motivation factors that affect employee attitudes, intentions, and their influence on knowledge sharing behaviors, as well as the technology used in sharing knowledge.

Data were collected from employees and affiliates of the United States Department of Homeland Security ($N = 271$), using a Web-based survey. The effects of expected rewards, expected contributions, expected associations, trust, and IT type usage were studied using regression analyses. The statistical results revealed that expected contributions and expected associations were positively related to attitudes to share knowledge, but expected rewards were not significantly related to attitudes to share knowledge. Results also revealed that attitudes to share knowledge was positively related to intentions to share knowledge, but trust did not significantly moderate this relationship.

Finally, the results revealed that intentions to share knowledge was positively related to knowledge sharing, and IT-type usage positively moderated this relationship.

The research model showed significant results to support five of the seven hypotheses proposed and revealed key findings on factors that influence employee attitudes and intentions to share knowledge in homeland security. This research advances prior findings and contributes to knowledge sharing research, practice, and overall literature regarding knowledge sharing, individual behaviors, attitudes, and intentions to share knowledge, technology acceptance, and usage. This contribution to the body of knowledge provides researchers, policymakers, and decision-makers with foundations for improving collaboration through information and knowledge sharing across traditional and nontraditional organizational boundaries.

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First, I thank God for giving me the strength to overcome what seemed at times to be insurmountable obstacles leading to this moment. Thankfully, in some ways, the journey was part of the reward.

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To my beautiful and talented daughter Mickayla Jade Noel, you are the love of my life, and I thank God daily for you. I continue to wish for you all the things that a mother wants for her child. I hope that you keep striving for excellence and distinguish yourself above and beyond your wildest dreams, and mine. To my biggest supporter, my husband and my best friend, Ronald Noel. You have stood by my side, encouraging and reassuring me. I am forever grateful for both your friendship and your love.

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Chapter 1

Introduction

Background

To support federal government operations, there are thousands of people employed within the various entities of government—federal, state, local, tribal, and territorial governments, as well as the private sector and other nongovernmental organizations—generating, searching, storing, and managing multiple petabytes of data and information through thousands of information systems. The federal government, as with most public-sector organizations, functions differently than its private-sector counterparts, in that the "public sector is imbibed with rules, policies, process, procedures, hierarchy of reporting, relationships, incentive systems, and departmental boundaries that organize tasks within the organization" (Kammani & Date, 2009, p. 6).

While the goal of the government, in this regard, is to connect and process data and information in ways that help agency leaders' ability to make efficient, knowledge-based, and actionable decisions, history has shown federal agencies have failed at sharing information, which sometimes results in disastrous effects. Government organizations are "characterized as organizations dealing with dysfunctional bureaucracies and

problems with so-called red tape, referring to lengthy procedures and huge amounts of documents accompanying the many procedures" (Annic & Buelens, 2007, p. 583).

For decades, the task of providing critical decision-support to the President and other decision-makers fell to 16 federal government and military organizations making up the U.S. intelligence community. Each member organization has mission responsibilities that include tactical military intelligence and security, security responses to transnational threats (terrorism, cyber warfare, and computer security), covert employment of weapons of mass destruction, narcotics trafficking, and international organized crime. Each dedicated to the defense of the country and its national security.

The tragic events of September 11, 2001, placed greater emphasis gathering of data and information and the collection and sharing of knowledge involving risks and threats to national security. Legislative mandates on information and homeland security (e-Government Act, 2002; Homeland Security Act, 2002; Homeland Security Act Amendments, 2003; Homeland Security Information Sharing Act, 2002); Presidential Directives and Executive Orders (Executive Office of the President, Office of Management and Budget [OMB], 2000a, 2000b, 2009) call for federal agencies to develop information and knowledge sharing capabilities to not only ensure that the right information gets to the right people, but that it also facilitates the appropriate knowledge-based decisions at the right time (General Accountability Office [GAO], 2006, 2008).

On Tuesday, September 11, 2001, the world witnessed a catastrophic failure of the sharing principles entrusted to the U.S. Intelligence Community, then charged with national security and protection. The National Commission on Terrorist Attacks (2004a, 2004b), also known as the 9/11 Commission, noted,

The intelligence community struggled to collect and analyze what the Community knew, and what it did not know, followed by the development of a community-wide plan to close those gaps . . . . in large part because the community was a set of loosely associated agencies and departmental offices that lacked the incentives to cooperate, collaborate, and share (p. 12).

These terrorist events on September 11, 2001, proved how many missed opportunities the government had to draw on all available knowledge about al-Qaeda. Federal agency leaders should have ensured that information and knowledge sharing occurred, so that top leaders and decision-makers had the necessary decision support. Instead, employees (whether analyst or decision-maker), hoarded knowledge and pooled intelligence, instead of using it to guide the planning and assignment of responsibilities for joint operations to protect national security.

In 2002, to support national security and the war on terrorism, 22 formerly separate and autonomous agencies were merged into one, integrated and unified cabinet agency—the United States Department of Homeland Security (DHS, 2015a, 2019a; e-Government Act, 2002; Homeland Security Act, 2002; Homeland Security Information Sharing Act, 2002; Homeland Security Act Amendments, 2003).

DHS's mission is a combination of missions, representing the 15 remaining components and agencies, working together as one DHS (see Table 1).

Table 1

The Department of Homeland Security (DHS) Organization

DHS Mission
"With honor and integrity, we will safeguard the American people, our homeland, and our values. The Department of Homeland Security has a vital mission: to secure the nation from the many threats we face. This mission requires the dedication of more than 200,000 employees in jobs that range from aviation and border security to emergency response, from cybersecurity analyst to chemical facility inspector. Our duties are wide-ranging, and our goal is clear - keeping America safe." (DHS, 2019a).

DHS Components	DHS Component Mission
Cybersecurity and Infrastructure Security Agency (CISA) Formerly the National Protection and Programs Directorate (NPPD)	CISA partners with industry and government to understand and manage risk to our nation's critical infrastructure (DHS, 2019b).
Countering Weapons of Mass Destruction (CWMD) Office Formerly Domestic Nuclear Detection Office (DNDO)	Counter attempts by terrorists or other threat actors to carry out an attack against the United States or its interests using a weapon of mass destruction (DHS, 2018b).
Federal Emergency Management Agency (FEMA)	Helping people before, during, and after disasters (2015b).
Federal Law Enforcement Training Center (FLETC)	The Federal Law Enforcement Training Centers, through strategic partnerships, prepares the federal law enforcement community to safeguard the American people, our homeland, and our values (2017a).

DHS Components	DHS Component Mission
Office of Health Affairs (OHA)	To advise, promote, integrate, and enable a safe and secure nation in pursuit of national health security (DHS, 2015d).
Office of Intelligence and Analysis (I&A)	The mission of the Office of Intelligence and Analysis (I&A) is to equip the Homeland Security Enterprise with the timely intelligence and information it needs to keep the Homeland safe, secure, and resilient. I&A is a member of the U.S. Intelligence Community (IC) and is the only IC element statutorily charged with delivering intelligence to our state, local, tribal, territorial and private sector partners, and developing intelligence from those partners for the Department and the IC (DHS, 2018c).
Office of Operations Coordination (OPS)	The mission of the Office of Operations Coordination is to provide operations coordination, information sharing, situations awareness, the common operating picture, and Department continuity, enabling execution of the Secretary's responsibilities across the homeland security enterprise (DHS, 2018d).
Office of the Secretary	The Office of the Secretary oversees Department of Homeland Security (DHS) efforts to counter terrorism and enhance security, secure and manage our borders while facilitating trade and travel, enforce and administer our immigration laws, safeguard and secure cyberspace, build resilience to disasters, and provide essential support for national and economic security - in coordination with federal, state, local, international and private sector partners (DHS, 2019c).
Science and Technology Directorate (S&T)	S&T's mission is to enable effective, efficient, and secure operations across all homeland security missions by applying scientific, engineering, analytics, and innovative approaches to deliver timely solutions and support departmental acquisitions. Created by Congress in 2003, S&T conducts basic and applied research, development, demonstration, testing, and evaluation activities relevant to DHS (DHS, 2015e).

(continued)

DHS Components	DHS Component Mission
Transportation Security Administration (TSA)	Protects the nation's transportation systems to ensure freedom of movement for people and commerce (DHS, 2015f).
The United States Citizenship and Immigration Services (USCIS)	Provides accurate and useful information to our customers, granting immigration and citizenship benefits, promoting an awareness and understanding of citizenship, and ensuring the integrity of our immigration system (DHS, 2018e).
The United States Coast Guard (USCG)	One of the five armed forces of the United States and the only military organization within the DHS. The mission of the United States Coast Guard is to ensure our Nation's maritime safety, security, and stewardship (DHS, 2015g).
The United States Customs and Border Protection (CBP)	To safeguard America's borders, thereby protecting the public from dangerous people and materials while enhancing the Nation's global economic competitiveness by enabling legitimate trade and travel (DHS, 2019d).
The United States Immigration and Customs Enforcement (ICE)	ICE's mission is to protect America from the cross-border crime and illegal immigration that threaten national security and public safety. This mission is executed through the enforcement of more than 400 federal statutes and focuses on smart immigration enforcement, preventing terrorism and combating the illegal movement of people and goods (2018f).
The United States Secret Service (USSS)	The mission of the Secret Service contributes significantly to DHS's overarching goals of preventing terrorism and enhancing security, as well as safeguarding cyberspace and critical infrastructure. The protection of the President and Vice President, in particular, is central to the continuity of government and DHS's goal of reducing risk to the Nation's critical infrastructure, key leadership, and events (DHS, 2015h).

From Knowledge to Knowledge Sharing

Data are discrete, objective facts, or observations that are without meaning or value, because they are without context and interpretation (Bocij, Greasley, & Hickie, 2008; Chaffey & Wood, 2005; Rowley, 2007). Data are a simple observation, and information is data with relevance, purpose, meaning, and context (Davenport, 1997). Knowledge comes from information, which comes from data, and data are a collection of raw facts, events, measurements, and statistics (Davenport & Prusak, 1998; Hussain, Lucas, & Ali, 2004). Knowledge is in the mind of the knower. It is often associated with power, but no longer viewed as just an individual possession, "shifting from being one resource amongst many to becoming the primary resource" (Stenmark, 2001, p. 10). Knowledge, according to Bray (2008), "represents the most strategically valuable resource in any organization" (p. 15). In the logical hierarchy of things, knowledge exists between data and wisdom, and takes its place among the valued assets, individually as well as organizationally (Zins, 2007).

Stenmark (2001) further discussed several issues of the elusiveness of tacit knowledge, noting that knowledge transfer (implied sharing) often fails because organizations are most times unaware of who is holding the knowledge; the individual who holds the knowledge does not want to part with the knowledge, for competitive or personal reasons. Once knowledge becomes explicit, the organization could be in the position of a disadvantage if the knowledge is not used (Ranft & Lord, 2002; Stenmark, 2001).

Tacit knowledge, according to Stenmark (2001), "is knowledge that cannot easily be articulated and thus only exists in people's heads and minds and manifests itself

through their actions" (p. 10). It is the knowledge that is ingrained within an individual's consciousness and is often difficult to both convey and acquire (Nonaka & Takuechi, 1995; Polanyi, 1967).

In recent years, knowledge management has become an extreme concern (Randeree, 2006). Due to cybercrime, threats of terrorism, and catastrophic events, there is an overwhelming need to increase and improve the sharing of information and knowledge in federal government agencies (Alavi & Leidner, 2001; Kammani & Date, 2009; Randeree, 2006). Kammani and Date (2009) defined knowledge management as "the deliberate and systematic coordination of people, processes, and technology and their knowledge, to produce sustainable competitive advantage or long-term high performance for the organization" (p. 3). Organizations use knowledge management to create capital from its intellectual or knowledge-based assets, to create value in its processes, products, and services; and make the best use of the knowledge available to the organization (Bhatti, Zaheer, & Rehman, 2010; Davenport & Prusak, 1998; Supyuenyong & Swierczek, 2011).

The most crucial difference between tacit knowledge and explicit knowledge is transferability (Alavi, 2000). Tacit knowledge differs from explicit knowledge in that tacit knowledge may be considered as the concepts of skill (Berman, Down, & Hill, 2002) or practical know-how (Koskinen, Pihlanto, & Vanharanta, 2003). An individual is usually reluctant to share their tacit knowledge with others due to the potential risk of losing the advantage, and the lack of proper reward mechanism (Osterloh & Frey, 2000). Thus, Osterloh and Frey (2000) suggested that the motivational factors that lead to tacit knowledge sharing are much different from those that lead to explicit knowledge sharing.

Knowledge sharing is essential in organizations, as it improves organizational performance (Lesser & Storck, 2001), enhance competitive advantage (Argote & Ingram, 2000), organizational learning (Argote, 2013), and innovation (Powell, Koput, & Smith-Doerr, 1996).

Knowledge Sharing Motivation

Knowledge sharing is the exchange of knowledge between two individuals and among multiple individuals, teams, organizational units, and organizations (Cruz, 2013). Historically, knowledge is usually shared face-to-face; however, with the advancements in technology, knowledge can now also be shared using multiple forms of technology, including telephone, portals, and e-mail (Amayah Ntala, 2011, 2013). As knowledge is a critical asset, the sharing of knowledge is an essential function.

White (2013) suggested that "knowledge is especially important in the U.S. federal government" (p. 6). Federal government agencies have the need to share internally, as well as among other federal, state, and local, tribal, and territorial government agencies, foreign governments, and the private sector, to conduct daily missions and support national security (Lee & Rao, 2007). Fueled by regulatory compliance and pressure from lawmakers, the Office of Management and Budget, the President, and public agencies look to develop strategies to mitigate risk to information and systems faster than ever. Public and private organizations have found it necessary to assess their internal knowledge sharing capabilities for organizational success (S. Kim & Lee, 2005). Despite the growing literature on knowledge sharing, little attention has been paid to employee knowledge sharing in the federal government, little empirical research

conducted on employee knowledge sharing motivation in the federal government, and no published literature on knowledge sharing motivation in homeland security.

The 9/11 attacks spotlighted the need to share data, information, knowledge, and intelligence within federal government agencies charged with infrastructure, cyber and border protection, national/homeland security, and intelligence. The U.S. Departments of Homeland Security, and state and local governments, have increased their budgets for the purchase of knowledge management products and services to facilitate knowledge sharing within and among individuals, groups, programs, departments, and agencies (S. Kim & Lee, 2005). Many agencies in the federal government share a role in improving information sharing among federal, state, and local government agencies and the private sector. However, to increase the effectiveness of decisions and actions, knowledge has become increasingly important (Alavi & Leidner, 2001). Furthermore, leaders of agencies with the sole mission of defense, intelligence, and homeland security have found that it is just as important to protect information (S. Kim & Lee, 2005).

Sharing knowledge is a vitally important element in informed decision making. Effective communication leads to informed decisions, and the technologies employed to provide a means to implement knowledge sharing, which addresses organizational needs and helps to achieve mission objectives. However, in government, challenges exist in the agency's ability to communicate necessary or even critical information. The potential to motivate users to reach out to someone who knows what they want to know, or what they need to know, significantly affects knowledge sharing (Stenmark, 2001).

Chen and Hsieh (2015) argued that knowledge sharing motivation could apply specifically to describe a public servant's motivation as a unique form of civil servants'

motivation to share knowledge. Additionally, Müller, Spiliopoulou, and Lenz (2005) suggested that individuals may be conditionally cooperative based on the participation of others and maybe influenced to participate, based on their expectation of benefits, or the expectation that the knowledge they receive will be useful, if not immediately, or at some point in the future.

Problem Statement

Carrying out the national security mission of protecting the homeland needs employees who:

- Regularly interact with the public,

- are responsible for public safety and security,

- who own and operate the nation's critical infrastructures and services,

- who perform research and develop technology,

- who keep watch, prepare for, and

- respond to emerging threats and disasters.

Accomplishing this mission requires employees to have specific information and knowledge, as well as the ability to share specific information and knowledge not only with other federal agencies, state and local governments, the private sector, and partners but internally as well. Even with the growth of technology that enables organizations to access distributed resources and acquire knowledge in new and different ways, if employees' behavior does not change, and they lack the motivation and methods to share knowledge, it will be challenging to collaborate and share the information and knowledge necessary to make the necessary decisions (Bock & Kim, 2001; Ruggles, 1998).

Literature-supported research has predominately focused on private sector companies, rather than the public or federal government sector, and the existing literature supports a range of knowledge management definitions with varying levels of importance (Alavi, Kayworth, & Leidner, 2006; Alavi & Leidner, 2001; Becerra-Fernandez & Sabherwal, 2001; Berman et al., 2002; Bock, Zmud, Kim, & Lee, 2005; Schultze & Leidner, 2002). Existing studies have been primarily conducted in large private-sector corporations and have focused on finance, acquisitions, retaining competitive advantage, and collaborative e-government (Argote & Ingram, 2000; Gil-Garcia, Chengalur-Smith, & Duchessi, 2007; Ranft & Lord, 2002). Limited research exists on knowledge management or knowledge sharing in the federal government, and little attention has been paid to the role of motivation factors that influence employees' attitudes and intentions to share knowledge (Bock et al., 2005).

Additionally, the use of technology and its influence on employees' intentions to share and knowledge sharing behavior in a homeland security organization within the United States Federal Government has also received minimal attention. Knowledge sharing is inherently different within the federal government than it is within the private sector because "significant differences in human resource management policies and practices, and the management of ethical issues and decision processes still exist between the two sectors" (Cong & Pandya, 2003, p. 38).

Dissertation Goal

Due to the limited research regarding knowledge management or knowledge sharing in the federal government, and the scant attention paid to the role of motivation factors that influence employees' attitudes and intentions to share knowledge (Bock &

Kim, 2001; Bock et al., 2005), the purpose of this study was to evaluate employee attitudes and intentions to share knowledge, as well as trust and the type and use of technology and its influence on employee attitudes and intention to share knowledge in homeland security.

In addition to understanding what motivates employee attitudes and intentions to share knowledge, the goal of this research is to contribute to the body of knowledge, as well as professional and general literature on knowledge sharing, individual behaviors, attitudes, and intentions to share knowledge, information technology (IT) use and acceptance, and information systems. Study results could provide researchers, policymakers, and decision-makers with foundations to improve knowledge sharing in organizations such as the federal government, which addresses both Presidential and Congressional mandates to foster more collaboration and sharing in to provide for a more secure United States (Director of National Intelligence, 2007a, 2007b).

This study used two research models as a basis to understand the phenomena discussed. The first was the theory of reasoned action (TRA). The main application of TRA is for the prediction of intentional behavior, and the investigation of attitudes and intentions toward personal and social interactions (C.-W. Hsu, Yin, & Huang, 2017; Tarhini, Arachchilage, & Abbasi, 2015). The second model used was the technology acceptance model (TAM). TAM is a research model used to study how individuals use and accept available technology; in this case, for the sharing of knowledge (Spriggs, 2017). Figure 1 represents the research model for this study.
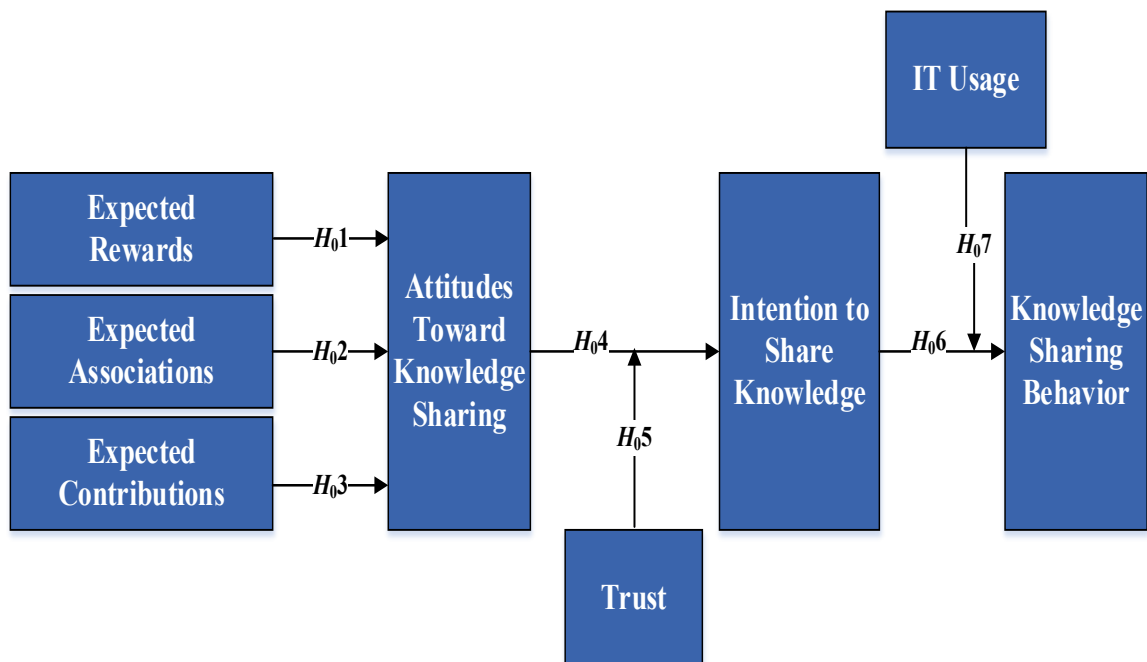
Figure 1. Research model of this study. IT = information technology.

This study contributes to the body of knowledge, and professional and general literature in the field of study of attitudes and intentions to share knowledge, trust, IT usage, and information systems. In addition to determining what beliefs affected an individual's knowledge sharing attitudes, Bock and Kim's (2001) study sought to understand what factors affected knowledge sharing behavior and how, as well as finding what role IT had as an enabler of knowledge sharing behaviors. In their study, Bock and Kim (2001) suggested that reward, contribution, and associations triggered knowledge sharing attitudes and that individuals' levels of IT usage would have a moderating effect on the knowledge sharing behavior.

Rather than focus on the limited technology for IT usage previously explored by Bock and Kim (2001), this researcher expanded the types of technology for IT usage to

include updated tools introduced in research by Ozlati (2012). According to Ozlati

(2012), the degree of complexity of the tools such as e-mail or blogs is lower, and the

newer, more collaborative technologies may generate increased knowledge sharing. The

expanded IT tools list includes Electronic mail (e-mail), telephone, or teleconferencing;

knowledge repositories or databases; content and document management systems; web

file-sharing tools; web conferencing (e.g., webinars, Adobe Connect, HSIN); instant

messaging (e.g., Skype); expertise location systems; and social media. As such, the

purpose of this study was to understand employee attitudes and intentions to share

knowledge, and the use of technology and its influence on employee intention to share

knowledge in a homeland security organization within the United States Federal

Government.

Research Questions and Hypotheses

Research Questions

The goal of this study was to answer the following research questions (RQs):

- RQ1: Does the expectation of rewards, associations, or contributions affect
  employee attitudes towards knowledge sharing in a homeland security
  organization?

- RQ2: Does trust change the relationship between employee intentions to share
  knowledge and knowledge sharing behavior in a homeland security organization?

- RQ3: Does IT type usage affect or predict employee knowledge sharing behavior?

Hypotheses

This study tested the following research hypotheses formulated by the RQs for

this study:

- $H_0$1: Expected rewards will have a positive effect on the employee's attitude toward knowledge sharing.

- $H_0$2: Expected associations will have a positive effect on the employee's attitude toward knowledge sharing.

- $H_0$3: Expected contributions will have a positive effect on the employee's attitude toward knowledge sharing.

- $H_0$4: Attitude toward knowledge sharing will have a positive effect on the employee's intention to share knowledge.

- $H_0$5: Employee trust will positively moderate the relationship between employee attitudes toward knowledge sharing and employee intentions to share knowledge, such that when employee trust is high, the relationship between employee attitudes to share, and intentions to share knowledge will be stronger

- $H_0$6: Employee's positive intentions to share knowledge positively affect knowledge sharing behavior.

  $H_0$7: Employee IT usage will positively moderate the relationship between employee intention to share knowledge and actual knowledge sharing behavior, such that When technology usage is high, it will strengthen the relationship between intention to share knowledge and knowledge sharing behavior will be strengthened and result in increased knowledge sharing behavior.

Relevance and Significance

Relevance

Knowledge sharing provides several advantages, such as improved speed and quality of collaboration and sharing for actionable decision-making inter- and intra-

organizationally. The primary intention of the study was to better understand motivation

factors that influence employee knowledge sharing, particularly in a homeland security

organization within the United States Federal Government.

Significance

The significance of this research was based on the continued presence of barriers

to collaboration in national/homeland security organizations, even spite of continual

identification of the lack of collaboration as a problem within agencies and the

intelligence community at large (Homeland Security Act, 2002). Notwithstanding the

ever-present threat of terrorist attacks on the United States and on foreign interests, and

despite a continued stream of technology devices aimed at collaboration and providing

information on the go; applying technology as a bandage, without first deciding what the

problem is and how to solve it, will continually render the same results.

The September 11, 2001, terrorist attacks highlighted the need for leaders and

lawmakers to drive sweeping changes in processes and laws designed to support, protect,

and defend the nation. At this time, several federal agencies existed as the intelligence

community, with a primary goal of creating a culture of collaboration to end the silos of

information and knowledge hoarding (McConnell, 2007; Director of National

Intelligence, 2007a, 2007b), the events of September 11, 2001, were viewed as an epic

failure of the sharing principles entrusted to those agencies, and significant actions

needed to be taken to address what had failed.

The National Commission on Terrorist Attacks (2004a; 2004b), also known as the

9/11 Commission, noted:

The intelligence community struggled to collect on and analyze what the

Community knew, and what it did not know, followed by the development of a

community-wide plan to close those gaps . . . . in large part because the

Community was a set of loosely associated agencies and departmental offices that

lacked the incentives to cooperate, collaborate, and share (p. 12).

As such, this study is relevant because there is still a lack of understanding of what

motivates employees to share knowledge, particularly in the national/homeland security

domain.

Motivation factors for sharing information must be examined first in order to

build and support a successful knowledge management program. This research fills gaps

in knowledge of factors that motivate employee attitudes and intentions toward

knowledge sharing in a homeland security organization and provides insight into the use

of technology and type of technology, and the effect it has on knowledge sharing

activities. The results of this study will provide insight into understanding employee

behavior in this critical context.

Research Implications

The results of this study could aid public sector organizations in improving

employees' job performances; hence, they get better service delivery by increasing

quality, productivity, processes, innovations, and better decision-making in protecting the

homeland. Without sufficient knowledge, critical employees with homeland security

responsibilities may not be able to (1) perform duties and responsibilities to serve the

nation with excellence, and higher standards of service, and (2) provide the necessary

knowledge and intelligence-based services to stakeholders and decision-makers. This

lack of knowledge in delivering critical services will lead to poor quality of service, and

the lack of knowledge in delivering critical intelligence could lead to 9/11-level disasters

or worst. Therefore, the researcher intended to examine employees' intentions toward

knowledge sharing behavior within a homeland security organization to provide insight

on motivation to share information and knowledge to protect the nation.

Barriers and Issues

The researcher intended to evaluate employee attitudes and intentions to share

knowledge and study the usage of technology and its influence on employee intention to

share knowledge in a homeland security organization within the United States Federal

Government.   A review of the current literature revealed the potential for multiple

barriers to the realization of the goal of this researcher. One potential barrier for this

study was obtaining access to a sufficient number of respondents across the organization.

This could have included not being granted access to clusters of employees for various

reasons, including employee restrictions due to organizational mission requirements.

Other factors outside of the control of the researcher included the willingness of

participants to complete a survey, and low response rates (Leedy & Ormrod, 2013).

Sue and Ritter (2012) recommended respondent prenotification, which is said to

increase response numbers and speed. To address low response rate, a minimal amount

of prenotification occurred, and the researcher engaged 15 employee points-of-contact,

familiar with, and to employees in their agencies and components within the department,

who aided in the distribution of multiple solicitation e-mails. The researcher chose this

method so that the potential respondents were "primed to the purpose and importance of

the survey, and the value of each respondent's participation . . . . Which also aided in

establishing the legitimacy of the study with the potential respondent" (Sue & Ritter, 2012, p. 131).

Another method of addressing the low response rate is to send out follow-up reminder messages, which is said to increase responses by 25% (Sheehan, 2001). Reminder messages were sent half-way through the collection period and three days before the close of the survey period. This method is also useful in addressing the potential for respondents to ignore generic solicitation emails. Unsolicited email or "spam" is common in personal and business email alike, the use of the 15 employee points-of-contact gave employees a "known entity" from which the emails were sent (Stanton, 1998).

Assumptions, Limitations, and Delimitations

Assumptions

For this study, the researcher made the following assumptions:

- All participants asked to take part in the study will answer all questions truthfully and to the best of their ability.

- Valid and reliable questions were developed to measure motivational factors.

- All participants are knowledge workers and able to understand the terminology.

- The data collection process and sample selected are appropriate for the study.

- The Likert-type scale questionnaires leveraged from the literature, though validated separately, may need to be validated together for this study.

Limitations

The scope of a research study illustrates boundaries established by the researcher for the study (Creswell, 2014). Limitations refer to threats to internal validity and reflect

weaknesses in a study. According to Ellis and Levy (2009), a study limitation is defined as an "uncontrollable threat to the internal validity of the study" (p. 332). Defining limitations of a study establish the "boundaries, exceptions, reservations, and qualifications inherent in every study" (Creswell, 2014, p. 110). While the issue of the lack of knowledge and information sharing is prevalent across the United States Federal Government, it was not feasible to conduct this research across the entire national security, intelligence, and homeland security communities, nor would it have been feasible to conduct this study to include the entire United States Federal Government.

This being the case, this study was limited to one United States Federal Government agency with a primary mission of homeland security. Second, participants were limited to U.S. federal employees in civilian government service and military equivalent.

Delimitations

Delimitations narrow the scope of the study or refer to what is not included or intended in the study (Creswell, 2014; Leedy & Ormrod, 2013). Employees in other categories, such as temporary hires, volunteers, contractors, and consultants, were excluded from participating in this study. The scope of the research included quantitative data obtained from the survey. Given the nature of the organization, the homeland security mission, and the employee's positions within the organization, many employees may have had time constraints hindering their participation.

While there are multiple elements identified in the literature as potential influences and motivations on knowledge sharing behavior, this researcher investigated only five motivations, expected rewards, expected associations, expected contributions,

trust, and IT type and usage, as they influenced attitudes, intentions, and the knowledge sharing behavior itself.

Definition of Terms

- *Explicit knowledge:* Explicit knowledge is described as the knowledge that is easily captured and codified into manuals, procedures, and rules (Nonaka, 1994; Polanyi, 1967). Explicit knowledge can also be articulated to disseminate, making it easier to transfer (Ranft & Lord, 2002; Stenmark, 2001).

- *Extrinsic motivation:* Doing something because it leads to a separate outcome or consequence (Deci & Ryan, 2000).

- *Intrinsic motivation:* Doing something because it is inherently interesting or enjoyable, not for a separate outcome or consequence (Deci & Ryan, 2000).

- *Homeland security:* A concerted national effort by federal, state, and local governments is to prevent terrorist attacks within the United States. In the federal government, this responsibility is headed up by the United States DHS (Bellavita, 2008).

- *Knowledge management:* Knowledge management is capturing prior knowledge to make current decisions and is a "justified belief that gives us the capacity for effective action" (Alavi & Leidner, 2001, p. 109).

- *Knowledge sharing:* The act of making knowledge available to others within an organization (Ipe, 2003, 2004); individuals sharing information, ideas, suggestions, and expertise with one another (Bartol & Srivastava, 2002).

- *Perceived value:* Perceived value can also be described as perceived importance, wherein if a worker does not think that their participation matters or has worth, then there is no incentive to participate and share (Majchrzak & Jarvenpaa, 2004).

- *Subjective norm:* A person's perceived social pressure to engage or not engage in a particular behavior (Bock et al., 2005).

- *Social exchange model:* The social exchange model explains a process for social exchanges among individuals and implies that there is value in what is being exchanged (Goyder & Boyer, 2008).

- *Tacit knowledge:* Knowledge ingrained within an individual's consciousness and is difficult to both convey and acquire (Nonaka & Takuechi, 1995; Polanyi, 1967). "Tacit knowledge is knowledge that cannot easily be articulated and thus only exists in people's hands and minds, and manifests itself through their actions" (Stenmark, 2001, p. 10).

- *Trust:* Within the context of this study, trust is defined as a critical determinant of employee participation and sharing knowledge (Paroutis & Al Saleh, 2009). Trust contributes to a positive working environment characterized by honest, supportive relationships (Moye & Henkin, 2006).

Summary

Chapter 1 presented the background, problem, and purpose of this study, including a discussion regarding employee attitudes and intentions to share knowledge, in addition to the use of technology and its influence on employee intention to share knowledge in homeland security. Following defining the foundation of the study were the research questions, hypotheses, and the relevance and significance of the study.

Finally, the remainder of the first chapter included the research implications, the

assumptions, limitations, and delimitations, and the definition of terms.

The remainder of this study is organized as follows: Chapter 2, the Literature

Review, contains an exhaustive and in-depth review of the literature on knowledge

sharing, knowledge management, and attitudes and intentions to share knowledge.

Chapter 3 contains information about the methodological design of the study. Chapter 4

includes the results and findings. Chapter 5 includes the conclusions and limitations of

the study, implications to the practice and research, contributions to the literature, and

recommendations for further research.

Chapter 2

Review of the Literature

Introduction

Carrying out the critical national security mission of protecting the homeland requires employees who regularly interact with the public, are responsible for public safety and security, engage with owners and operators of the nation's critical infrastructures and services, who perform research and develop technology, and who keep watch, prepare for, and respond to emerging threats and disasters. Accomplishing this mission requires employees to have specific information and knowledge, as well as the ability to share specific information and knowledge, not only with other federal agencies, state and local governments, the private sector, and partners but also internally among component organizations. Even with the growth of technology that enables organizations to access distributed resources and acquire knowledge in new and different ways if employees lack the motivation and methods to share knowledge, it will be challenging to collaborate and share the required information and knowledge to make the necessary decisions (Bock & Kim, 2001; Ruggles, 1998).

The articles found and cited for this literature review were discovered through searches using the following structure of words: *employee motivation to share*

knowledge, knowledge sharing, knowledge sharing in national security, knowledge sharing in homeland security, motivation to share knowledge in national security, motivation to share knowledge in homeland security, types of knowledge, economic exchange theory, expected rewards, expected associations, expected contributions, social exchange theory, social cognitive theory, theory of planned behavior, theory of reasoned action, and *trust and knowledge sharing*. The results from the above search terms led to various scholarly publications such as *Organizational Behavior and Human Decision Processes*, *Journal of Business*, *Journal of Management Information Systems*, *Information Resources Management Journal*, *Management Information System Quarterly*, and the *Electronic Journal of Knowledge Management*, among others.

Intention to Use and Actual Use of Information Technology: User Acceptance Models

According to the literature, in the last two decades, information systems researchers have suggested intention-based models from social psychology as a potential theoretical foundation for research on the determinants of user behavior. Various behavioral and theoretical models support this to explain individuals' use of technology (Hong & Tam, 2006; Limayem & Hirt, 2003), including Ajzen and Fishbein's (1981) TRA, Ajzen's (1985) theory of planned behavior, and Davis's (1989) TAM, each emphasizing factors that influence individuals' use of IT (Ferdousi, 2009).

For this research, two research models were used as a basis to understand the phenomena discussed. TRA and TAM are well researched intention-based models in predicting and explaining behavior across a wide variety of domains (Tha & Khet, 2011, p. 5). TRA is used to study the prediction of intentional behavior, and TAM is used to

study how users accept and use available technology; in this case, for the sharing of knowledge (see Spriggs, 2017). The research model of this study is presented in Figure 1.

Theory of Reasoned Action

TRA, depicted in Figure 2, is a model that explains human attitudes and behavior. TRA has been used in knowledge sharing research to predict an individual's knowledge sharing intention (Bock & Kim, 2001; Bock et al., 2005; Casimir et al., 2012). Knowledge sharing practices, according to Liebowitz (2007), "can be studied by applying the TRA, wherein attitudes are predicted by evaluating an individual's intention to perform certain behaviors" (p. 15). An individual's intention to act or perform a task is determined by the individual's attitude toward the task (Arpaci & Baloğlu 2016). In a knowledge sharing context such as that presented in this study, an individual may demonstrate more knowledge sharing behavior if they exhibit a positive attitude toward knowledge sharing. This attitude towards the task directly affects a person's intention toward performing a task (Bock & Kim, 2001; Bock et al., 2005; Casimir et al., 2012).

Information systems researchers suggested that other researchers turn to "intention-based models from social psychology as a potential theoretical foundation for research on the determinants of user behavior" (Tha & Khet, 2011, p. 5). They asserted that the two prime models for this undertaking consisted of Fishbein and Ajzen's (1981) TRA, as well as Davis's (1989) TAM.
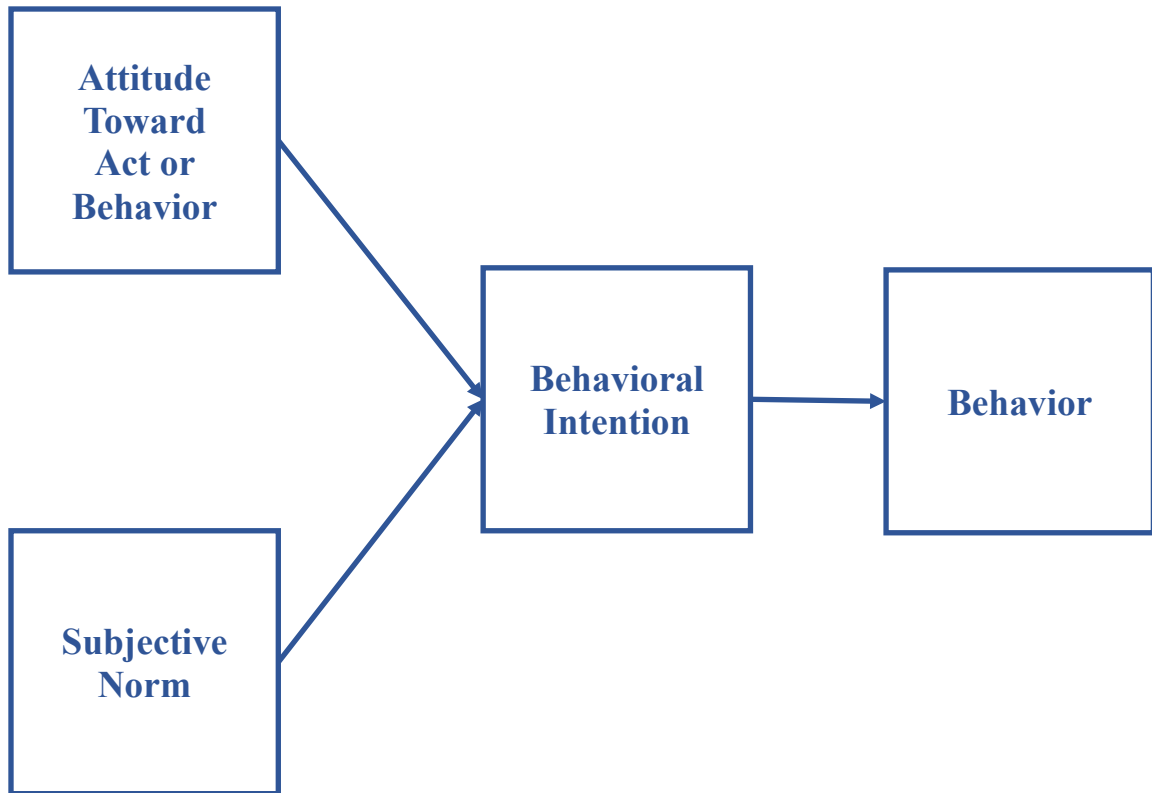
Figure 2. *Theory of reasoned action (Fishbein & Ajzen, 1981).*

Fishbein and Ajzen (1981) argued that several external variables could have an effect when an intention to perform a specific behavior was realized. Since IT is considered an important enabler in knowledge management (Ajzen, 1991; Davenport, 1997; O'Dell & Grayson, 1998), the individual's level of technology usage affects the knowledge sharing behavior. Technology plays an increasingly significant role in managing data and information before they are transformed into knowledge. Technology is an enabler of an organization's business or mission, whether within the public or private sector. Therefore, the central role of technology in managing shared knowledge is not only to support the capture, storage, retrieval, and distribution of explicitly documented knowledge, but to also supply the necessary collaborative, communication,

and networking capabilities needed for accelerating the speed of knowledge creation and sharing (Al-Ammary, Fung, & Goulding, 2005).

The use of technology strengthens the relationship between intention to share knowledge and actual knowledge due to Ajzen and Fishbein's (1981) and Ajzen's (1991) TRA. The TRA assumes the more favorable the attitude of an individual toward a behavior, the stronger the intention will be of the individual to engage in the behavior (Ajzen, 1991; Ajzen & Fishbein, 1980). The greater the subjective norm, the stronger the intention of the individual to perform the behavior; additionally, the stronger the intention of the individual to engage in a behavior, the more likely the individual will be to perform it (Alavi & Leidner, 2001).

Fishbein and Ajzen (1981) are credited with expanding TRA for studying knowledge sharing behaviors. One critical aspect of TRA is the underlying assumption that people, being rational beings, are in control of making their own choices about their behaviors, and—individual intentions are determined by an individuals' attitude about the behavior (Fishbein & Ajzen, 1981). Given the fact that knowledge sharing is a voluntary behavior, this also makes TRA a relevant model in the study of knowledge sharing (Bock & Kim, 2001; Davenport & Prusak, 1998; C.-L. Hsu & Lin, 2008).

The TRA has been used in the fields of psychology, health care, and business (Chang, 1998; Shipp, 2010). Depending on the specific behaviors and populations studied using TRA (Ajzen & Fishbein, 1980), possible predictors of knowledge sharing include attitude, subjective norms (Bock & Kim, 2001, Bock et al., 2005; Chang, 1988; Smith, 2017), use of social networks (Awazu, 2004; Chow & Chan, 2008), expert systems, website usage behavior, and shared goals (C.-L. Hsu & Lin, 2008; Shipp, 2010).

Technology Acceptance Model

TAM is a model used to explain the user's behavioral intention to use technological innovations (Davis, 1989). Davis (1989) also noted that TAM, depicted in Figure 3, is an information systems model that looks at external environments and how they influence individual intentions. The seminal work of Davis (1989) propositioned that TAM could explain why individuals, or users, of technology, would either accept or reject a technology product, tool, or service was developed to explain the determinants of user acceptance specifically for IT, whereas TRA is a general theory of human behavior (Ferdousi, 2009; Mathieson & Chin, 2001; Spriggs, 2017).
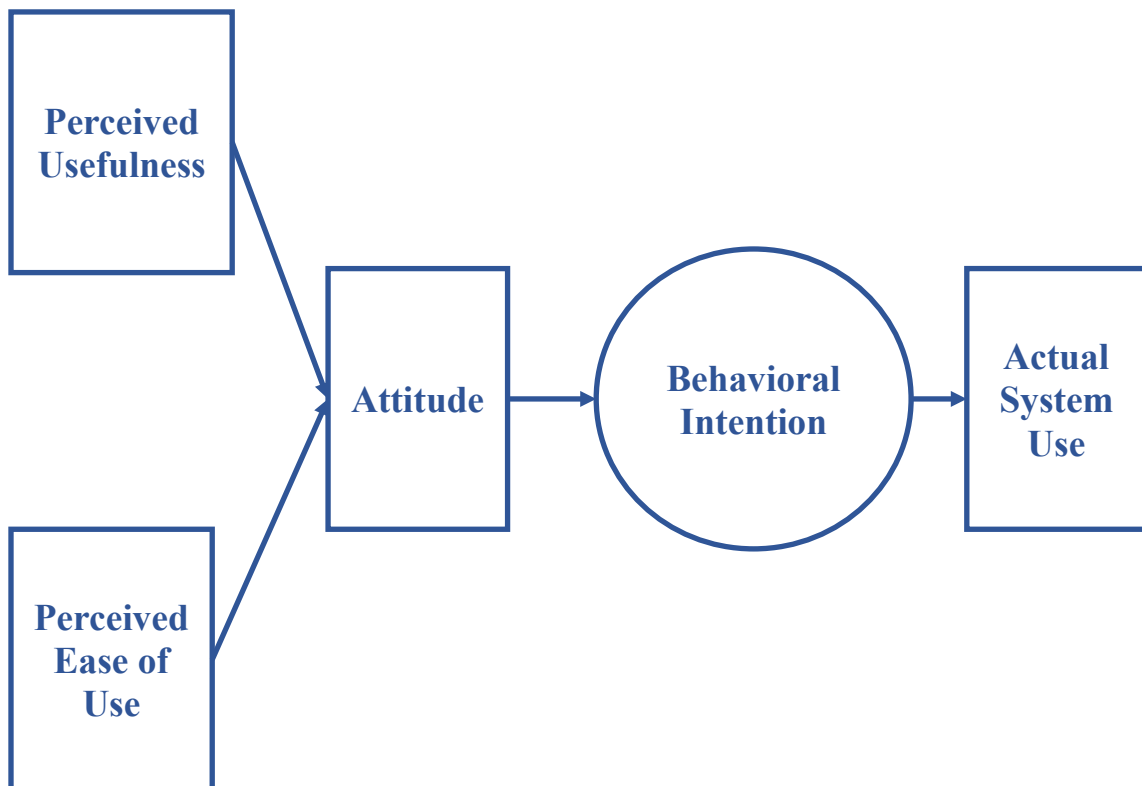
Figure 3. Technology acceptance model (Davis, 1989).

There are those employees who use technology and those who wish to be excluded from using technology, as there are also employees who are willing to share knowledge and use technology in doing so. It is a safe assumption to state that sharing may not occur because there is either a lack of sufficient or useful technology to share knowledge or a lack of knowledge about the technology available to share knowledge, and the benefits of using it (Pardo, Cresswell, Thompson, & Zhang, 2006; Riege, 2005). "No matter how sophisticated technology becomes, the knowledge to develop technology and to make business decisions resides in the minds of humans" (Bhatt, 2001, p. 68).

According to Ozlati (2012),

Knowledge sharing behavior is about people, not technology, though the decision to share knowledge can be indirectly influenced by technology . . . . and technology acceptance by users may enhance and support collaborative behaviors, including sharing knowledge with other organizational members.   (p. 23)

In line with the research within this model, Bock and Kim (2001) studied the factors affecting the individual's knowledge sharing behavior in an organizational context. They examined the role of extrinsic motivators for understanding behavioral intention formations in knowledge sharing by studying 467 employees in 75 departments of four large public organizations in Korea. They found that external variables affecting the behavioral intention were realized; further, employees' level of IT usage and the type of technology may affect knowledge sharing behavior (Bock & Kim 2001, p. 1115).

If an individual intends to share knowledge with their coworkers, they are likely to share by any means—technical or manually. From a technology perspective, there are multiple means of facilitating knowledge sharing individual-to-individual, individual-to-

group/community, or the entire organization. Knowledge can be shared via electronic

mail (e-mail), telephone, or teleconferencing; knowledge repositories or databases;

content and document management systems; web file-sharing tools; web conferencing

(e.g., webinars, Adobe Connect, HSIN); seminars/conferences; meetings; instant

messaging (e.g., Skype); expertise location systems; and social media (e.g., Twitter, etc.)

(Ozlati, 2012).

Attitude Toward Knowledge Sharing

The main argument underlying much of the literature is that sharing knowledge

can also threaten autonomy, levels of trust, and fear of safety. As such, sanctions for

poor performance can influence employees' perspectives on knowledge sharing.

Additionally, formal management and policy structures that include lack of higher-level

support introduce barriers that prevent government agencies from achieving

organizational and political benefits of knowledge sharing, particularly in multilevel

government settings (Pardo et al., 2006).

> According to Marshall, Prusak, and Shpilberg (1996), policy-makers know that it
>
> is no longer enough to leave critical knowledge sitting passively in the minds of
>
> individual employees. Instead, the knowledge trapped within the employee base
>
> must be leveraged to the organizational level, where it can be accessed,
>
> synthesized, augmented, and deployed for the benefit of all (p. 80).

However, if workers do not believe that their participation matters or has worth, then

there is no incentive to take part in sharing. According to Pardo et al. (2006), knowledge

sharing allows individuals to "achieve greater benefit" from working collaboratively,

allowing for increased "effectiveness, efficiency, and responsiveness" (p. 296). Attitude

towards knowledge sharing is formed from behavioral beliefs and refers to the degree of positive/negative feelings an individual has towards the intention to share knowledge (Khalil, Atieh, Mohammad, & Bagdadlian, 2014). Higher attitudinal disposition towards knowledge sharing should increase knowledge sharing intention. The TRA suggests that intention is determined by attitudes, and the more favorable the attitudes, the greater favorable intention toward the behavior (Arpaci & Baloğlu, 2016). These include expected rewards, expected contributions, and expected associations (Bock & Kim, 2001).

Expected rewards, defined as "the degree to which one believes that one can receive extrinsic incentives based on one's knowledge sharing" (Bock & Kim, 2001, p. 1116), is believed by many to be one of the most important motivating factors for knowledge sharing. Thus, expected reward implies employees would develop a more positive attitude toward knowledge sharing if they believe they will receive some type of monetary reward, promotion, or educational opportunities from their knowledge sharing, thereby encouraging knowledge sharing (Aliakbar, Yusoff, & Mahmood, 2012; Liebowitz, 2003; H.-F. Lin, 2007a, 2007b; Tha & Khet, 2011; Wang & Noe, 2010; Yao, Kam, & Chan, 2007).

Expected contributions, on the other hand, is defined as "the degree to which one believes that one can improve the organization's performance through one's knowledge sharing" (Bock & Kim, 2001, p. 1116). Expected contribution, is a significant determinant of individual's attitude toward knowledge sharing, refers to the idea that if employees believe they could make contributions to the organization's performance, they

will develop a more positive attitude toward knowledge sharing (Chiu, Hsu, & Wang, 2006; M. H. Hsu, Ju, Yen, & Chang, 2007).

According to Bock and Kim (2001), expected associations constitute a significant determinant of an individual's attitude toward knowledge sharing. Expected associations assume that if employees believe they could improve relationships with other employees by offering their knowledge, they will develop a more positive attitude toward knowledge sharing. Expected associations are defined as "the degree to which one believes one can improve the mutual relationship through one's knowledge sharing" (Bock & Kim, 2001, p. 1116).

Expected associations occur through social exchanges. Social exchanges are personal and tend to generate personal connections between individuals, such as gratitude and trust. Through expected associations, assumptions can be made that employees may be able to maintain or improve relationships through social interactions that could include mentoring and coaching with other employees to offer their knowledge, with the expectation of reciprocal benefits through knowledge sharing (Gupta, 2012).

Trust

From the literature review, emerge important factors relating to knowledge sharing. A key argument underlying much of this literature is that sharing knowledge is mitigated by trust, which can influence employees' perspectives on knowledge sharing, particularly in a government organizational setting, and trust plays a significant role as to whether knowledge sharing occurs in organizations (Pardo et al., 2006). Trust is when one party expects that a second party will do what it has promised, and, according to Robbins (2006), they will not be opportunistic about it. M. H. Hsu et al. (2007) defined

trust as "an implicit set of beliefs that the other party will behave in a dependent manner and will not take advantage of the situation" (p. 154).

Paroutis and Al Saleh (2009) asserted that trust is a crucial determinant of employee participation and sharing knowledge. "Trust is viewed as a medium through which knowledge can be exchanged smoothly" (Tan, Lye, Ng, & Lim, 2010, p. 194). Additionally, trust is considered one of the most important motivators for successful knowledge sharing process (Rolland & Chauvel, 2000), one of the necessary first steps to effective knowledge sharing (Tan et al., 2010), and is noted to increase goodwill among employees (Lee & Choi, 2003). While it is expected that there are varying levels of trust between employees at different levels of organizations, in an organization with a national security mission, the expectation of high levels of trust is expected to facilitate the sharing of knowledge.

In an organizational context, learning behavior—such as seeking feedback or learning from one's mistakes, asking for help, talking about errors, and experimenting— fosters a safe feeling. The absence of that safety, which may cause underreporting of incidents, leads to mistaken perceptions of the threats and security situation of the organization (Majchrzak & Jarvenpaa, 2004; Sveen, Rich, & Jager, 2007). These mistaken perceptions include the fear of being viewed as disloyal or untrustworthy and being punished publicly or privately for any mistakes made, which causes sensitivity and fear of coming forward (Sveen et al., 2007).

In a thriving sharing environment, however, any mistake would be an opportunity to learn from failure, where the lessons-learned approach of learning from what works and what does not work would be used. In instances where employees trusted and were

satisfied with their supervisor, these employees showed increased innovative behavior and were likely to help their coworkers. Therefore, when employees trusted their supervisors, they were likely to share knowledge (Usoro, Sharratt, Tsui, & Shekhar (2007).

Federal agencies have the need to share individually and organizationally, internally, as well as with other federal, state, and local government agencies and the private sector, to conduct its daily mission (Lee & Rao, 2007). Fueled by regulatory compliance and pressure from lawmakers, reports published by the United States GAO acknowledged improvements made by DHS in their sharing efforts and recommended developing strong partnerships for information and knowledge sharing (GAO, 2012). United States Representative Bennie G. Thompson, former ranking member and current Chairman of Committee on Homeland Security, issued this statement on the release of the GAO report:

> This report shows that DHS has come a long way since the Department was created in 2001. I am hopeful that DHS will reach its 2015 goal. . . . to ensure that the right information gets to the right people at the right time. . . . Every DHS component plays an essential role in this goal. It is imperative that these efforts are funded to ensure that the kind of errors and stove-piped information, which permitted the tragic circumstances of September 11, 2001, do not happen again. (Thompson, 2012)

The existence of trust and the formation of trust, whether in actions and behaviors, intentions and perceptions, or ideas and beliefs, affect knowledge sharing and the willingness or motivation to share on individual and organizational levels (Majchrzak

& Jarvenpaa, 2004; Milovanovic, 2006; Pardo et al., 2006). Trust "develops from having some familiarity and prior interaction" (Majchrzak & Jarvenpaa, 2004, p. 8) and "is both an initial condition for the formation of a relationship as well as the result of positive interaction" (Pardo et al., 2006, p. 297). The concepts of trust, fear, and role that management plays in creating an environment that fosters sharing on some level were identified as barriers to knowledge sharing. The literature also suggests that that managers and leaders in the government public sector "commit to promoting informal and formal networks and knowledge-oriented management practices" (Kim & Lee, 2005, p. 256).

Cultivating higher levels of trust can lead to better knowledge sharing, shared goals, and lower transaction costs, promoting more active and trustworthy knowledge sharing behavior among employees, enhancing communication speed by empowering members to share their knowledge (p. 251). Managers must convey the vision of the importance of sharing knowledge. Management commitment is essential in ensuring that the staff "has a clear and compelling reason to embrace sharing" (Taylor & Wright, 2004, p. 33). Lack of management commitment reduces the motivation to participate in sharing activities, and hindering reporting increase quality concerns negatively (Sveen et al., 2007).

Overview of the Research Model and Hypothesis Development

Expected Rewards

Knowledge sharing is a social interaction among people. Two principal theories that explain the social interaction of people are economic exchange theory and social exchange theory. According to the economic exchange theory, individuals will behave

by rational self-interest. Thus, knowledge sharing will occur when it is determined that rewards for sharing exceed its costs to share (Constant, Kiesler, & Sproull, 1994; Kelley & Thibaut, 1978). That is why many researchers have emphasized incentive systems for successful knowledge management.

Expected rewards, defined as "the degree to which one believes that one can have extrinsic incentives, because of one's own knowledge sharing" (Bock & Kim, 2001, p. 1116), is believed by many to be one of the most important motivating factors for knowledge sharing. Organizations with incentive programs, which may include rewards, training programs, and promotions, share knowledge more freely (Yao et al., 2007), and the lack of incentives may be a barrier to sharing across the organization (Casimir et al., 2012). Many studies show that a positive attitude toward knowledge sharing was found to lead to positive intention to share knowledge and, finally, to actual knowledge sharing behaviors. Kling and Lamb (1999) found that rewards such as incentive and recognition influenced the user's use of technology to share knowledge. Accordingly, expected reward implies employees would develop a more positive attitude toward knowledge sharing if they believe they will receive some type of monetary reward, promotion, or educational opportunities from their knowledge sharing, thereby encouraging knowledge sharing.

Many organizations have established reward systems to motivate employees to share their knowledge (Bartol & Srivastava, 2002). Rewards are likely to affect people's behavior, according to Homans (1974). The creation of a reward system to recognize knowledge sharing found improved opportunities to foster an informal exchange of knowledge and information (Goh & Hooper, 2009; Vuori & Okkonen, 2012). However,

the absence of clear reward and recognition systems may frustrate employees and interfere with existing or potential knowledge sharing (Riege, 2005).

Introducing a proper knowledge sharing incentive system can promote organizational members' knowledge contribution. Hence, expected rewards imply that if employees believe they will receive extrinsic benefits such as monetary rewards, promotion, or educational opportunity from their knowledge sharing, they will develop a more positive attitude toward knowledge sharing (Tohidinia & Mosakhani, 2010). Thus, the researcher hypothesized:

- $H_0 1$: Expected rewards will have a positive effect on the employee's attitude toward knowledge sharing.

Expected Associations

Building relationships take time (Huang, 2009). Some studies have shown that the anticipation of future interaction in a relationship has a positive effect on sharing behavior (Bakker, Cambré, & Provan, 2009; Bock & Kim, 2001). The exchanges generate feelings of personal obligation, gratitude, and trust. These expected associations assume that if employees believe they could improve relationships through social interactions and mentoring with other employees by offering their knowledge, with the expectation of reciprocal favors, they will develop a more positive attitude toward knowledge sharing. If a person assumes that they may develop lasting relationships with other employees, they are likely to share their knowledge due to the expected association (Bock & Kim, 2001; Ozlati, 2012; Tohidinia & Mosakhani, 2010). Thus, the researcher hypothesized:

- $H_0 2$: Expected association will have a positive effect on the employee's attitude

toward knowledge sharing.

Expected Contributions

Expected contribution refers to the idea that if employees believe they could make contributions to the organization's performance, they will develop a more positive attitude toward knowledge sharing (Bock & Kim, 2001). It is defined as "the degree to which one believes that one can improve the organization's performance through one's knowledge sharing" (Bock & Kim, 2001, p. 1116). Based on their knowledge sharing contributions, employees believe they could improve relationships with other employees, resulting in the development of a more positive attitude toward knowledge sharing.

An employee's judgment of their own capabilities, called *self-efficacy*, refers to the idea that if employees believe they could make contributions, they will develop a more positive attitude toward a behavior (Bandura, 1986), in this case, the employee would have a more positive attitude toward knowledge sharing, and are generally self-motivated to do so (Chiu et al., 2006; H. T. Tsai & Bagozzi, 2014). Thus, the researcher hypothesized:

- $H_0 3$: Expected contribution will have a positive effect on the employee's attitude toward knowledge sharing.

Attitudes Toward Knowledge Sharing

Behavioral control describes the individual's perception of the extent they have control over the specified behavior (Ajzen & Fishbein, 2005). Knowledge sharing is the specified behavior, and that behavior is affected by an individual's confidence in the opportunities and resources that enable them to share their knowledge (Ajzen, 1991; Hung, Lai, & Chou, 2015; T. Kim & Lee, 2012, 2013; Tohidinia & Mosakhani, 2010).

Previous studies have examined attitudes toward knowledge sharing, notably Bock et al. (2005), H.-F. Lin and Lee (2004) and Sabbir Rahman and Hussain (2014). Attitudes influence a person's evaluation or perception of behavior and are a significant part "of the cognitive system and have the potential to influence the intention to share knowledge" (Tohidinia & Mosakhani, 2010, p. 614).

As the TRA suggests that attitudes determine intention, and the greater or more favorable the attitude toward the action, the greater or more favorable the intention toward the behavior (Arpaci & Baloğlu, 2016). Thus, the researcher hypothesized:

- $H_0$4: Attitude toward knowledge sharing will positively influence the intention to share knowledge.

Trust

Although the majority of studies have shown that trust is a critical element in sharing knowledge, few studies have argued the role given to trust in previous knowledge sharing models was not correct, and trust in knowledge sharing models was considered an antecedent or a requirement for knowledge sharing (Chiu et al., 2006; Chow & Chan, 2008; C.-L. Hsu & Lin, 2008; Renzl, 2008) or as a mediator (H.-F. Lin, 2006). This study presents trust as a moderator in a knowledge sharing model — results from C.-L. Hsu and Lin's (2008) study supports this point of view. They found out that blog users and participants share their knowledge for altruistic reasons and that trust had no effect on their knowledge sharing motivation. It seems that when people share their knowledge for the joy and engagement, trust is no longer a concern. While Ryan and Deci's (2000a, 2000b) research said that trust is not necessarily a requirement in motivating people to share their knowledge, results from C.-L. Hsu and Lin (2008) and Ozlati (2012) support

the view that employee attitudes and intention to share knowledge are facilitated or affected (moderated) by trust (Ozlati, 2012).

Milovanovic (2006) noted that "beliefs, suspicions, and fears, being more sensitive, require more trust" (p. 55), thereby "making trust the overarching factor to be considered. . . . In fact, trust is the main ingredient in the knowledge sharing" (p. 57). Even if employees want to share knowledge and experiences, according to Gupta (2012), the likelihood of knowledge sharing will reduce if there were previous interactions where trust is low or nonexistent. According to the literature, sharing will not occur if employees are not confident in the recipient's objectives for the use of the knowledge, meaning the participant is untrustworthy (Casimir et al., 2012). Alternatively, the recipient may not use the actual shared knowledge if they determine that the individual or organization is untrustworthy or unreliable based on the source or the technology that stores the knowledge (Amayah Ntala, 2011, 2013; Roth, 2016).

In homeland security, lack of trust and the inability to conduct all mission business by methods including knowledge sharing is a critical issue. Trust facilitates knowledge sharing, especially when sharing is voluntary; however, given the mission of homeland security and the requirements of working intra- and interorganizationally with similar mission organization, state, local, tribal, territorial governments and private sector partners, the mission itself dictates that trust is required, and knowledge sharing is necessary (Tongo, 2013; Wickramasinghe & Widyaratne, 2012). Thus, the researcher hypothesized:

- $H_0$5: Employee trust will positively moderate the relationship between employee attitudes toward knowledge sharing and employee intentions to share knowledge,

such that when employee trust is high, the relationship between employee attitudes to share, and intentions to share knowledge will be stronger.

Knowledge Sharing Intention

Several studies (Bock & Kim, 2001; Casimir et al., 2012; M.-T. Tsai et al., 2012) used the TRA or its extension, the theory of planned behavior, to explore knowledge sharing. According to the TRA, the behavior is determined by sharing attitudes toward sharing, and the best predictor of behavior is intention (Shih & Farn, 2008a, 2008b). Bock and Kim (2001) defined knowledge sharing intention as "the degree to which one believes that one will engage in a knowledge sharing act" (p. 1115); it is the indication of how hard an individual is willing to try, or how much effort they are willing to exert to perform an action—in this case, to share knowledge (Ajzen, 1991). According to the TRA, the behavior is determined by attitudes toward sharing, and the best predictor of behavior is intention (Shih & Farn, 2008a, 2008b; Zhang & Fai Ng, 2012).

Intentions are formed by the motivational factors that affect behavior; they are indicators of people's willingness to try hard (Ajzen, 1991). Individual intention to share knowledge is a determiner factor of desired individual behavior (Ryu, Ho, & Han, 2003). Intention to share knowledge can have a significant effect on knowledge sharing behavior. Findings in earlier studies show the positive effect of intention on knowledge sharing behavior (Tohidinia & Mosakhani, 2010). Thus, the researcher hypothesized:

- *$H_0 6$*: Employee's positive intentions to share knowledge positively affect knowledge sharing behavior.

Information Technology Type Usage

According to Bock and Kim (2001), expected rewards would positively influence behavior; however, they found that attitude toward knowledge sharing is negatively correlated with external expected rewards. For example, an individual might be less likely to share knowledge with a colleague if a bonus tied to performance metrics is in place. Fishbein and Ajzen (1981) argued that several external variables could have an effect when an intention to perform a behavior is realized. IT is considered a vital business enabler in knowledge management (Davenport, 1997; O'Dell & Grayson, 1998; Ruggles, 1998), the influence that IT types and usage may have on the relationship between knowledge sharing intentions and actual knowledge sharing behavior should be studied.

As a vital business enabler, organizations should implement and use technology to complement or enhance knowledge sharing efforts. Technology that is antiquated, inconsistent, or nonintuitive (e.g., not user-friendly), may cause employees to resist knowledge sharing or resist using the technology for knowledge sharing (Goh & Hooper, 2009; Roth, 2016; Sandhu, Jain, & Ahmad, 2011; Santos, Soares, & Carvalho, 2012; Susser, 2012). If technology is not user-friendly or believed to give distrustful and unorganized information, employees will not spend time using the technology (Roth, 2016). When employees feel that technology is easily usable, it is more likely that they will share their knowledge; thus, IT type and usage will affect an individual's knowledge sharing behavior (Alotaibi, Crowder, & Wills, 2013). Thus, the researcher hypothesized:

- $H_0 7$: Employee IT usage will positively moderate the relationship between employee intention to share knowledge and actual knowledge sharing behavior, such that when technology usage is high, it will strengthen the relationship between intention to share

knowledge and knowledge sharing behavior will be strengthened and result in increased knowledge sharing behavior.

Summary of Literature Review

The Literature Review discussed the associated theories of the TRA and the TAM, attitudes toward knowledge sharing, trust, intentions to share knowledge, IT usage, and knowledge sharing behavior. Based on the review, the variables related to the study include expected rewards such as incentives, expected associations, expected contributions, trust, IT usage, and a brief discussion of the TRA, as well as the TAM.

Increasing levels of politically motivated scrutiny reinforce agency employees' sensitivity and fear about sharing information and knowledge. The DHS, because of its primary external mission, is in a unique position of having the ability to collect and analyze terror threats, infrastructure protection, cyber and physical security data, and information; however, internally, factors exist that increase employees' tendencies not to share. The literature has established that government agencies need to share information about threats and vulnerabilities, and knowledge about risk and risk mitigation strategies that are useful in reducing those threats and vulnerabilities. The concepts of trust, fear, and role that management plays in creating an environment that fosters sharing on some level were identified as barriers to knowledge sharing. The literature also suggested that managers and leaders in the government public sector "commit to promoting informal and formal networks and knowledge-oriented management practices" (S. Kim & Lee, 2005, p. 256). Cultivating higher levels of trust can lead to better knowledge sharing, shared goals, lower transaction costs, and promoting a more active and trustworthy

knowledge sharing behavior among employees, which enhances communication speed and productivity by empowering members to share their knowledge.

In summary, the literature established that the government needs to share information and knowledge to protect the homeland. Expected rewards, expected contributions, expected associations, trust, and technology use were identified as motivational factors to share knowledge. This research intended to fill gaps in the research into employee knowledge sharing motivation and intended to show that the lack of empirical studies in knowledge sharing motivation in the federal public sector, specifically in a homeland security organization. The research methodology by which the research questions and hypotheses were examined are presented in the next chapter.

Chapter 3

Methodology

Overview

Chapters 1 and 2 identified the research questions, defined the scope of the variables, and justified the hypotheses to be tested. The purpose of this chapter is to offer an overview of the research methodology of the study. First, this chapter discusses processes, the design of the study, methods, population sample, ethical considerations, data collection, and the data analysis employed in this study. Finally, this chapter concludes with a statement of resource requirements and a summary.

Research Setting

The data analyzed in this study were collected from employees of the DHS, an agency of the United States Federal Government. In November 2001, the DHS was born as a response to the 9/11 terror attacks. This new cabinet-level agency reorganized over 22 formerly separate and autonomous agencies into a single agency for the sole purpose of collaborating to remedy disparities in mission-critical knowledge sharing and coordinating actions, and to prevent future terrorist attacks, thereby protecting people and infrastructure from threats (Rhoads, O'Sullivan, & Stankosky (2009).

Individuals from the DHS agencies and components who were invited to take part in this study were a representative sample of the department. The agencies and components that constitute the DHS are:

- Cybersecurity and Infrastructure Security Agency (formerly National Protection and Programs Directorate,

- Countering Weapons of Mass Destruction (formerly the Domestic Nuclear Detection Office),

- Federal Emergency Management Agency,

- Federal Law Enforcement Training Center,

- Management Directorate.

- Office of Health Affairs,

- Office of Intelligence and Analysis,

- Office of Operations Coordination,

- Office of the Secretary,

- Science and Technology Directorate,

- Transportation Security Administration,

- The United States Citizenship and Immigration Services,

- The United States Coast Guard,

- The United States Customs and Border Protection,

- The United States Immigration and Customs Enforcement, and

- The United States Secret Service.

Instructions and background information on the study were provided to the participants via e-mail, and the respondents had 37 days to respond to a Web-based

survey. Potential participants from within these DHS agencies and components had an equal chance of and opportunity to take part in this study.

Research Method

The research method was a quantitative study using a correlational survey method. A quantitative approach is appropriate when the goal of the study is to examine relationships among variables that are objectively and numerically measurable (Howell, 2010). The constructs under investigation in this study were numerically measurable using validated survey instruments, making the quantitative method appropriate.

Furthermore, when the goal of the study is to assess relationships between variables, a correlational design is appropriate.

Additionally, researchers have previously used correlational survey methods to successfully examine attitudes toward knowledge sharing in other contexts (e.g., Bock & Kim, 2001). According to Leedy and Ormrod (2013), good survey design and appropriate selection of the survey audience contributes to the reliability of the survey instrument. Surveys are appropriate when the researcher wants to sample a population and to make inferences about a characteristic, attitude, or behavior.

Due to the geographically dispersed nature of the workforce, paper-based surveys would have posed a challenge. Web-based surveys are widely used in academic, behavioral research, and offer multiple benefits over paper-based surveys, including efficiency and cost-effectiveness (Tuten, 2010). Therefore, using a web-based survey was the most preferred method for this study (Roztocki & Lahri, 2003; Evans & Mathur, 2005; Ritter & Sue, 2007). In addition to being easy to administer, web-based surveys offer a wider reach, faster implementation, and distribution time, and offers convenience

to the respondent, making a web-based survey a more appropriate choice over interviews or observations (Creswell, 2014).

Sample Design

The population under investigation in this study were employees of the DHS. In its mission to keep the nation secure, DHS employs approximately 240,000 employees throughout the United States and its territories (DHS, 2019c), which is an expansive membership. However, the largest concentration of DHS employees (12% or 24,000 employees) work in the National Capitol Region (NCR) (DHS, 2016). The NCR is comprised of the states of Maryland and Virginia and the District of Columbia.

Participants included in the sample were from DHS employee organizations and affiliates. Convenience sampling is appropriate in this case, as "(1) the agency is representative of several federal agencies of the U.S. government, (2) detailed demographic data on the membership is readily available and (3) there is considerable variation in the expansiveness of the memberships" (Spriggs, 2017, p. 51).

Using this population sample was intended to gather employees' perspective through a web-based survey on how motivation factors and technology influence on employee attitudes and intention to share knowledge in this context. The subject organization granted permission to conduct the study (See Appendix A).

To determine the minimum response rate, appropriate literature, and a previous study conducted by the Federal Government at the DHS were reviewed. In the fall of 2017, DHS embarked on its annual Federal Employee Viewpoint Survey (FEVS). The purpose of the FEVS was to measures employees' perceptions of whether, and to what extent, conditions represent the views of employees within the department (DHS, 2017b).

The FEVS was conducted over one month, was anonymous, and no incentives were given for participation or completion of the survey. Of the approximately 240,000 DHS employees, a sample of 96,776 employees was randomly selected to take part in the 2017 survey, which resulted in 47,414 responses a 49% response rate (DHS, 2017c). In 2018, 178,801 randomly employees participated in the 2018 survey, which resulted in 73,899 responses for a 41.3% response rate (2018f). While the FEVS for 2017 and 2018 returned response rates of 49% and 41.3%, respectively (DHS, 2017c; 2018h), in general, according to Nulty (2008), response rates for web-based surveys are much lower than paper-based surveys.

According to Lightspeed Research (2009), the level of respondent engagement can affect the likelihood of participation in the survey, thus affecting the response rates. Their study looked at the level of engagement and survey length/time and found that surveys completed in a shorter amount of time yielded a higher level of engagement and higher response rates, and in some cases, longer surveys were tolerated where respondents found them enjoyable (as cited in Sue & Ritter, 2012).

Aguinis, Beaty, Boik, and Pierce (2005) found that, on average, effect sizes for moderation in multiple linear regression are small; therefore, a small effect size, or f^2, was initially assumed for this study. The smaller the effect size, the larger the required sample, and the larger the effect size, the smaller the required sample, per the calculation. For example, a small effect size, or f^2, is equal to .02; using a .05 probability of error needs a sample of 550 to yield a power of 80%. A moderate or medium effect size or f^2, equal to .15 using the same .05 probability of error would require a sample of 97 for a power of 80%, and a large effect size, or f^2, equal to .35, using the same .05 probability of

error, would require a sample of 36 for a power of 80% (Faul, Erdfelder, Buchner, &

Lang, 2009). A power analysis using G*Power 3.1.9.2 was conducted t determine the

desired sample size for this study (see Appendix B). The parameters of the power

analysis were based on a multiple linear regression with a maximum of three predictors.

The desired power and significance levels were .80 and .05, respectively, per the

recommendations of Cohen (1992).

The researcher conducted a multiple regression analysis of the three independent

variables and performed the significance test where the probability error equaled .05.

The potential for respondent accessibility limitations could have resulted in a required

sample that exceeded the resources available to the researcher, based on the size of the

population. Therefore, a medium or moderate expected effect size equal to .15 was used,

resulting in an expected sample size of 77, which was an adequate and significant sample

size, appropriate for this study (see Appendix B).

In estimating the expected response rate, several methods to boost survey

response rates were considered. The most widely used methods of boosting response

rates for surveys conducted online are the use of (a) prenotification messages via e-mail,

websites, newsletters, or verbally; (b) well-timed reminder messages via e-mail; and (c)

incentives to the respondents (Nulty, 2008).

In conducting the annual FEVS, the participating federal agencies such as DHS

used carefully timed and well-crafted communication sent via known communication

channels within the department. Communication medium included general email, email

direct from agency leadership, electronic newsletters and announcements, via intranet

sites and web portals. Follow-up messages are also implemented as part of the

communication strategy. While the agency does not use incentives to solicit participation

in the FEVS, results may also be used to implement future changes that reward

employees (Office of Personnel Management, 2018).

For this study, prenotification, follow-up, and reminders messages were sent

through direct solicitation emails from the researcher, and several internal points-of-

contact who were familiar to employees within their respective offices within the

department (see Appendices B through D). This method was chosen so that the potential

respondents were "primed to the purpose and importance of the survey, and the value of

their participation . . . . this also aided in establishing the legitimacy of the study with the

potential respondent (Sue & Ritter, 2012, p. 131)."

The survey was distributed in a population upwards of 240,000 or more

individuals. The sample was chosen as a representation of the entire spectrum or

population of employees in DHS. The expectation was for a low-to-medium level of

engagement (response rate), and a medium or moderate effect size (f^2). The intent of this

study, however, was not to generalize findings to all levels and types of DHS employees,

which would have required further demographic examination of the target population.

Future studies could be extended to include expanded distribution, more locations, and

similar and dissimilar organizations. For instance, future studies could be expanded to

other federal, state, local, tribal, and territorial governments. The use of the same

instrument across a more diverse population would contribute to making the results more

generalizable, as the survey instruments become more refined with use and time (Leavitt,

2001).

The primary work of DHS employees requires the communication and coordination of complex sets of activities and tasks and requires employees to establish a common understanding of the problems at hand among themselves and with others to support the DHS mission. Also, given the need to collaborate with others within the homeland security community, there may exist individuals who do not necessarily have all the requisite knowledge within their workgroups so that they may seek knowledge from other individuals, groups, teams, and organizations, internal and external to the organization. Thus, knowledge sharing behavior is an integral aspect of homeland security; and the aim of using this sample population was to be able to collect real data about knowledge sharing behavior across the department.

Instrument and Measures

The multisection survey instrument (Appendix F) measured aspects of participant's knowledge sharing behavior, specifically attitudes and intentions, to share knowledge in homeland security. The survey for this study was developed using previously validated survey instruments as a foundation for the survey content: expected rewards, expected associations, expected contributions, attitudes to share, intention to share (Bock & Kim, 2001); trust and knowledge sharing (Usoro et al., 2007); and IT usage (Ozlati, 2012), followed by general demographic information regarding the number of years of employment with the organization, education age, gender, year of birth, nationality, and duty location, to determine representativeness of the population. Whenever possible, using preexisting survey instruments from previously validated studies is recommended because they are easier to verify (Kitchenham & Pfleeger, 2002); this has been done often in the literature (Leidner & Jarvenpaa, 1995; Straub, 1989).

Overall survey design, including the length of the survey, is crucial. A long and lengthy survey can lead to incomplete questions or complete disregard for the survey altogether. As for the survey instrument itself, the decision on whether to conduct the survey using paper surveys or web-based survey was critical. With paper surveys, decisions on whether the survey would be delivered in person, mailed, or sent as an e-mail was also made. Participants need time to complete the survey and return it to the researcher, then these steps, along with the time needed to complete and receive the completed survey, must be incorporated into the research timeline (Simon & Goes, 2014a).

Web-based surveys, on the other hand, can be quickly developed and deployed by choosing an online survey solution. Creating and conducting the survey in this manner is cost-effective, eased data entry and the analysis of data, and allows the data to be collected faster, from a broader and more geographically disbursed audience (Evans & Mathur, 2005; Rhodes, Bowie, & Hergenrather, 2003; Ritter & Sue, 2007). According to Roztocki and Lahri (2003) and Sue and Ritter (2012), the response time using a web-based survey is shorter than traditional paper-based surveys. Additionally, given the size and geographically disbursed nature of the DHS organization, the advantages of using web-based surveys include swift access to respondents, ability to reach a higher number of participants in different geographical areas, and previously hidden populations (Rhodes, Bowie, & Hergenrather, 2003; Roztocki & Lahri, 2003; Fleming & Bowden, 2009).

While there may be a cost for using services that support web-based surveys, survey development, site maintenance, and other costs associated with web-based surveys

are estimated to be lower than those incurred through traditional "paper-and-pencil"

surveys. The researcher used SurveyMonkey to create, edit, and administer the expert

panel test, pilot study, and formal survey instruments for this study. Participants in each

phase could conveniently complete their respective surveys via computer, tablet, or

smartphone.   Using a web-based survey tool was particularly useful in not only the

development and delivery of the survey but the administration and preparation for data

analysis phases as well (Roztocki & Lahri, 2003).

According to Roztocki & Lahri (2003) and Evans & Mathur (2005) online survey

tools are likely to yield more useable data than other data collection methodologies by

reducing human errors in data handling after collection, by way of direct raw data

download, which can be easily ingested by tools like Microsoft Excel for data cleansing,

and SPSS for data analysis.

Operationalization of Variables

The survey employed multiple Likert-type scale response anchors (Vagias, 2006),

ranging from 1 to 5 and 1 to 7, representing levels of agreement, likelihood, or frequency

(see Appendix F). For this study, the survey items were slightly modified to measure the

model constructs, which will are discussed in the following section. The instrument

Knowledge Sharing Motivation Survey solicited feedback from employees about factors

affecting their attitudes, intentions, and knowledge sharing behavior, and a limited

amount of demographic data were also collected at the end of the primary survey. The

operationalization of the variables for this study is summarized in Table 2. The table lists

the construct, definition, operationalization of the variables, scale response anchors, and

citation sources of the original instruments.

Table 2

Variable Operationalization

Construct / Variable	Operationalization			
	Expected rewards were measured with three items, adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 *strongly disagree* to *strongly agree*) was used to measure an employee's opinions and beliefs that incentives were believed to be a motivating factor for knowledge sharing. Appendix G contains three items (ER1-1 to ER3-1) to investigate expected rewards in this study.			
	Definition	**#**	**Question**	**Citation**
Expected Rewards	The belief that one would receive tangible extrinsic benefits such as monetary rewards, promotion, or educational opportunity from sharing knowledge (Bock & Kim, 2001).		The following questions are about your belief in the possibility of receiving rewards in return for your knowledge sharing. Please select the most appropriate response for each question:	Bock & Kim (2001); Casimir, Ng, & Cheng (2012)
		ER1	I expect to receive monetary rewards in return for my knowledge sharing.	
		ER2	I expect to receive additional points for promotion in return for my knowledge sharing.	
		ER3	I expect to receive an honor or educational opportunity in return for my knowledge sharing.	

Construct / Variable	Operationalization			
	Expected contributions were measured with five items, adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 "Strongly Disagree" to 5 "Strongly Agree") was used to measure an employee's opinions and beliefs that one believes that one can improve the organization's performance through one's knowledge sharing. Appendix G contains five items (EC1-2 to EC5-2) to investigate expected contributions in this study.			
	Definition	**#**	**Question**	**Citation**
Expected Contributions	If employees believe they could make contributions to the organization's performance, they will develop a more positive attitude toward knowledge sharing (Bock & Kim, 2001).		The following questions are about your belief in the possibility of your organization's improvement in its performance after sharing your knowledge. Please select the most appropriate response for each question:	Bock and Kim (2001); Casimir, Ng, and Cheng (2012)
		EC1	My knowledge sharing would help other members in the organization to solve problems.	
		EC2	My knowledge sharing would create new business opportunities for the organization.	
		EC3	My knowledge sharing would improve work processes in the organization.	
		EC4	My knowledge sharing would increase productivity in the organization.	
		EC5	My knowledge sharing would help the organization to achieve its performance objectives.	

Construct / Variable	Operationalization			
	Expected associations were measured with five items, adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 "Strongly Disagree" to 5 "Strongly Agree") was used to measure an employee's opinions and beliefs that one can improve mutual relationships through one's knowledge sharing. Appendix G contains five items (EA1-3 to EA5-3) to investigate expected contributions in this study.			
	Definition	**#**	**Question**	**Citation**
Expected Associations	One's belief that one could improve associations with others-- their relationships with other employees or the organization, holistically-- by sharing their knowledge (Bock & Kim, 2001).		The following questions are about your belief in the possibility of changes in the relationship between you and other organizational members after sharing your knowledge. Please select the most appropriate response for each question:	Bock and Kim (2001); Casimir, Ng, and Cheng (2012)
		EA1	My knowledge sharing would strengthen the tie between me and existing members in the organization.	
		EA2	My knowledge sharing would get me well acquainted with new members of the organization.	
		EA3	My knowledge sharing would expand the scope of my associations with other members of the organization.	
		EA4	My knowledge sharing would draw smooth cooperation from able members in the future.	
		EA5	My knowledge sharing would make strong relationships with members who have common interests in the organization	

Construct / Variable	Operationalization			
	Knowledge sharing attitudes were measured with five items, adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 "Strongly Disagree" to 5 "Strongly Agree") was used to measure employee's opinions and beliefs on their degree of willingness to share her/his knowledge with others. Appendix G contains five items (AS1-4 to AS5-4) to investigate knowledge sharing attitudes in this study.			
	Definition	**#**	**Question**	**Citation**
Attitude to Share Knowledge	The degree of one's positive feelings about sharing one's knowledge (Bock & Kim, 2001)		There are many reasons why people share their knowledge with members of their organization. Knowledge sharing refers to the behavior of an individual who willingly shares or transfers her/his knowledge to others. Please select the most appropriate response for each question:	Primary: Bock and Kim (2001) Secondary: Casimir, Ng, and Cheng (2012)
		AS1	My knowledge sharing with other organizational members is good.	
		AS2	My knowledge sharing with other organizational members is harmful.	
		AS3	My knowledge sharing with other organizational members is an enjoyable experience.	
		AS4	My knowledge sharing with other organizational members is valuable to me.	
		AS5	My knowledge sharing with other organizational members is a wise move.	

Construct / Variable	Operationalization			
	Trust was measured with 12 items adopted from Usoro et al., 2007). A 5-point Likert-type scale (from 1 "Strongly Disagree" to 5 "Strongly Agree") was used to measure an employee's opinions and beliefs that the one-party will behave in a dependent manner and will not take advantage of a situation when sharing knowledge. Appendix G contains seven items (TR1-5 to TR7-5) to investigate trust in this study.			
	Definition	**#**	**Question**	**Citation**
Trust	According to Usoro, Sharratt, Tsui, and Shekhar (2007), trust is the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform an action		Please select the most appropriate response for each question:	Primary: Usoro, Sharratt, Tsui, and Shekhar (2007) Secondary: Mayer, Davis, and Schoorman (1995)
		TR1	I believe that members of my organization would act in my best interest.	
		TR2	If I required help, members of my organization would do their best to help me.	
		TR3	Members of my organization are truthful in their dealings with me.	
		TR4	I would characterize members of my organization as honest.	
		TR5	Members of my organization would keep their commitments.	
		TR6	Members of my organization are genuine and sincere.	

	important to the trustor, irrespective of the ability to monitor or control that other party. Further, to be vulnerable, one must be willing to take a risk-based on the trusting relationship.	TR7	I trust members of my organization when I ask them not to forward or share any component sensitive material

Construct / Variable	Operationalization		
Intentions to Share Knowledge	Intentions to share knowledge, or knowledge sharing intentions were measured with five items, adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 "Extremely Unlikely" to 5 "Extremely Likely") is used to measure an employee's opinions and beliefs regarding intentions, aim, or plan to share knowledge. Appendix G contains five items (IS1-6 to IS5-6) to investigate intentions to share knowledge in this study.		
	Definition	**#**	**Question**	**Citation**
	The degree to which one believes that one will engage in a knowledge sharing act (Bock and Kim 2001)		The following questions are about your general intention to share your knowledge with other members of the organization. Please select the most appropriate response for each question:	Primary: Bock and Kim (2001) Secondary: Casimir, Ng, and Cheng (2012)
		IS1	I will share my knowledge with more organizational members.	
		IS2	I will always provide my knowledge at the request of other organizational members who will always provide my knowledge at the request of other organizational members.	
		IS3	I intend to share my knowledge with other organizational members more frequently in the future	
		IS4	I try to share my knowledge with other organizational members in an effective way.	
		IS5	I will share my knowledge with anyone in the organization if it is helpful to the organization.	

Construct / Variable	Operationalization			
	The types of technology used for sharing knowledge were measured with five items, adopted from survey items developed and validated by Orlati (2012), and adjusted for this study. A 7-point Likert-type scale (from 1 "Never" to 7 "All of the Time") was used to measure how frequently specific technology items are used in the workplace for sharing knowledge. Appendix G contains five items (TT1-7 to TT5-7) to investigate trust in this study.			
IT Tech Type Usage	**Definition**	**#**	**Question**	**Citation**
	IT Usage measures the frequency of use of the specific type of technology (email, phone, social media, repositories, etc.) is used, and the frequency of its use (Ozlati, 2012).		Please indicate how often you use each tool or type of technology to share your knowledge with your co-workers by selecting the most appropriate response for each question:	Ozlati (2012)
		TT1	Electronic Mail (Email)	
		TT2	Phone or teleconferencing	
		TT3	Web Conferencing (Adobe Connect, etc.)	
		TT4	Content Management, knowledge repositories (Databases, SharePoint, etc.)	
		TT5	Instant Messaging/Skype, etc.	

Construct / Variable	Operationalization			
	Knowledge sharing behaviors are measured with five items, adopted from survey items developed and validated by Usoro, Sharratt, Tsui, & Shekhar (2007), and adjusted for this study. A 5-point Likert-type scale (from 1 "Strongly Disagree" to 5 "Strongly Agree") was used to measure how frequently participants share their knowledge with their coworkers. Appendix G contains five items (KS1-8 to KS5-8) to investigate knowledge sharing behavior in this study.			
	Definition	**#**	**Question**	**Citation**
Knowledge Sharing Behavior	Lee (2001) defined knowledge sharing as "activities of transferring or disseminating knowledge from one person, group or organization to another" (p. 324). Knowledge sharing behavior is a combination of both tacit and explicit knowledge sharing (Bock, Zmud, Young-		In this survey, knowledge refers to what you know, such as the individual's know-how, skills, or important information. Knowledge sharing refers to the behavior of an individual who willingly shares or transfers her/his knowledge to others. Please select the most appropriate response for each question:	Primary: Usoro, Sharratt, Tsui, & Shekhar (2007); Secondary: Bock, Zmud, Young-Gul, & Jae-Nam, (2005);
		KS1	I frequently share my knowledge with others in the community.	
		KS2	I try to share my knowledge with my coworkers.	
		KS3	My contributions to the organization enable others to develop new knowledge.	
		KS4	I am a knowledgeable contributor to virtual communities within my organization.	

	Gul, & Jae-Nam, 2005.		
		KS5	Overall, I feel the frequency and quality of my knowledge-sharing efforts are of great value to the organization.

Demographics

Demographic information was captured for each respondent to examine personal characteristics information such as age, gender, and years of work experience. "Surveys allow for gathering demographic data that describes the composition of the sample" (Spriggs, 2017, pp. 54-55). The items in Table 3 present the demographic questions that were included in the survey for this study

Table 3

Participant Demographic Questions

Number of years of work experience (for example 36 to represent the period of time between the first job to current job, or type "Prefer not to answer")
Please indicate your highest level of education: 　　　　High school graduate 　　　　Some college 　　　　Associate degree 　　　　Bachelor's degree 　　　　Master's degree 　　　　Doctoral degree 　　　　Professional degree 　　　　Other (please specify) 　　　　Prefer not to answer
Please indicate your geographical duty location: 　　　　National Capitol Region (NCR) 　　　　Outside of the NCR 　　　　Prefer not to answer
Please indicate your gender: 　　　　Male 　　　　Female 　　　　Nonbinary/Third gender 　　　　Prefer not to answer

In what year were you born? (enter 4-digit birth year; for example, 1976; a blank response assumes you prefer not to answer).

What is your ethnicity?
> American Indian
> Alaska Native
> Black or African American
> Hispanic or Latino
> White/Caucasian
> Prefer not to answer
> Other (please specify)
> Prefer not to answer

What is your country of birth
> United States
> Other (please specify)
> Prefer not to answer

Survey Validation

A valid instrument measures what the researcher intends for it to measure (Fowler, 2009; Neuman, 2011). Validity is the ability of a researcher to draw valid and significant conclusions about a population from a data sample collected (Creswell, 2005; Ellis & Levy, 2009). According to Creswell (2014), developing, modifying, and validating a survey instrument includes the following processes:

- Study the current validity and reliability scores from the current research and make inferences.

- Ensure construct and content validity.

- Decide on the type of scale that will be used, such as continuous or categorical.

- Design the survey and provided it to a panel of external experts, along with the rubric.

- Incorporate feedback from the panel of experts.

- Plan a pilot study of the survey instrument to establish content validity and to make improvements to the survey.

- Choose the number of people for the pilot study.

- Conduct the pilot study.

- Incorporate feedback from the panel of experts using the conclusions drawn and data collected from the pilot study.

Content Validity

Content validity of the instrument was verified based on the generation of constructs because of an extensive study of prior literature in the related fields of study, and the adaptation of measurement items confirmed in earlier empirical studies. It refers to the relevance of the instrument or measurement strategy to the construct being measured. Establishing content validity begins with defining the variables so that it can be quantitatively measured or expressed quantitatively.

Creswell (2014) said that content validity proves how well the items or survey questions represent the entire range of items the survey should cover. Simon and Goes (2014a) note that "a measure has content validity when the items represent the construct being measured" (p. 70), and to enhance content validity, they further suggested using a panel of external experts for a review process to evaluate the survey instrument until the panel reaches a consensus on the final survey.

Construct Validity

Construct validity, according to Cronbach, and Meehl (1955), is an issue of operationalization or measurement between constructs. It is defined as "the extent to which the results of a test are related to an underlying psychological construct" (Salkind, 2006, p. 116). Straub (1989) wrote that construct validity determines whether measures used are actual constructs describing the event and referred to how well the elements of a concept have been defined in the research or survey. An instrument that has content validity is one that uses representative, validated questions from a vast pool of appropriate questions.

Reliability

The survey instrument for this study was adapted from valid and reliable measurements, from previously tested and researched literature, then modified for the specifications of this study (Sekaran & Bougie, 2013; Creswell, 2014;). Permission to use these specific measures in the current study was requested from and granted by Bock and Kim (2001) (see Appendix I), Davis (1989) (see Appendix H), Ozlat (2012) (See Appendix K), and Usoro et al., (2007) (see Appendix J).

Reliability addresses the consistency within a constructor scale (Straub, Boudreau, & Gefen, 2004, p. 399). The internal consistency of items reflects the reliability of a measuring instrument. Internal consistency assures that the items within the construct or scale focus on the extent to which respondents are consistent in how they answer questions that are related to each other.

Cronbach's alpha was used to assess the internal consistency reliability for reflective measures of the survey (Gay et al., 2009; Trochim & Donnelly, 2008). Internal

consistency reliability for reflective measures is "the extent to which items in a single test are consistent among themselves, and with the test as a whole" (Gay et al., 2009, p. 160). "The most common statistical method for this in use is Cronbach's alpha model, which is used by 79% of the 63% of information systems researchers when developing their instrument" (Straub et al., 2004, p. 400).

Further, Cronbach's alpha is an appropriate choice for determining internal consistency reliability for reflective measures (Gay et al., 2009). The Cronbach's alpha for internal consistency reliability in confirmatory research should be at least .70 (Gefen, Straub, & Boudreau, 2000; Straub et al., 2004; Thompson, Barclay, & Higgins, 1995). Therefore, the lower limit for Cronbach's alpha is .70 for internal consistency reliability of the items in the constructs.

Using SPSS to calculate Cronbach's alpha, the instrument was checked against the study population to determine acceptable reliability of at least 0.7 or higher (Bonett & Wright, 2015; Cho & Kim, 2015).

Expected Rewards Measure

Expected rewards were measured with three items adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 *strongly disagree* to 5 *strongly agree*) was used to measure an employee's opinions and beliefs that rewards are believed to be a motivating factor for knowledge sharing. The Cronbach's alpha for this measure by Bock and Kim (2001) was 0.8276. Appendix G contains three items (ER1-1 to ER3-1) used to investigate expected rewards in this study.

Expected Contributions Measure

Expected contribution was measured with five items adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 *strongly disagree* to 5 *strongly agree*) was used to measure an employee's opinions and beliefs that one believes that one can improve the organization's performance through one's knowledge sharing. The Cronbach's alpha for this measure by Bock and Kim (2001) was 0.8924. Appendix G contains five items (EC1-2 to EC5-2) used to investigate expected contributions in this study.

Expected Associations Measure

Expected associations were measured with five items adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 *extremely unlikely* to 5 *extremely likely*) was used to measure an employee's opinions and beliefs that one can improve the mutual relationship through one's knowledge sharing. The Cronbach's alpha for this measure by Bock and Kim (2001) was 0.9335. Appendix G contains five items (EA1-3 to EA5-3) used to investigate expected contributions in this study.

Attitudes to Share Knowledge Measure

Attitudes toward knowledge sharing were measured with five items adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 *strongly disagree* to 5 *strongly agree*) was used to measure employee's opinions and beliefs on their degree of willingness to share her/his knowledge with others. The Cronbach's alpha for this measure by Bock and Kim was 0.8737. Appendix

G contains five items (AS1-4 to AS5-4) used to investigate attitudes toward knowledge sharing in this study.

Trust Measure

In this study, trust was measured by seven items adopted from Usoro et al. (2007). A 7-point Likert-type scale (from 1 *strongly disagree* to 7 *strongly agree*) was used to measure an employee's opinions and beliefs that the one-party will behave in a dependent manner and will not take advantage of a situation when sharing knowledge. The Cronbach's alpha for this composite measure by Usoro et al. (2005) was 0.91. Appendix G contains seven items (TR1-5 to TR7-5) used to investigate trust in this study.

Intention to Share Knowledge Measure

Intention to share knowledge, or knowledge sharing intentions, was measured with five items adopted from survey items developed and validated by Bock and Kim (2001). A 5-point Likert-type scale (from 1 *extremely unlikely* to 5 *extremely likely*) was used to measure an employee's opinions and beliefs about intentions, aim or plan to share knowledge. The Cronbach's alpha for this measure by Bock and Kim was 0.8886. Appendix G contains five items (IS1-6 to IS5-6) used to investigate intentions to share knowledge in this study.

Information Technology Type Usage Measure

IT type usage in sharing knowledge was measured with five items adopted from survey items developed and validated by Bock and Kim (2001) and Ozlati (2012), which were adjusted for this study. A 7-point Likert-type scale (from 1 *never* to 7 *all of the time*) was used to measure how frequently employees use specific technology items for sharing knowledge in the workplace. Ozlati (2012) reported a Cronbach's alpha of 0.94

for technology types in use by users. A Cronbach's alpha of 0.94 was adapted for this study. For this study. The types of technology were adapted from Ozlati (2012) The list of selected technologies included e-mails, phone or teleconferencing, knowledge repository or databases, content and document management systems, Web file-sharing tools, Web conferencing (e.g., electronic mail, phone or teleconferencing, web conferencing (i.e., Adobe Connect, HSIN, etc.), content management, knowledge repositories (Databases, SharePoint, etc.), and Instant Messaging (Skype, Microsoft Teams, etc.) Appendix G contains five items (TT1-7 to TT5-7) used to investigate IT usage in this study.

Knowledge Sharing Behavior Measure

Knowledge sharing behavior was measured with nine items, adopted from survey items developed and validated by Bock and Kim (2001) and adjusted for this study. A 7-point Likert-type scale (from 1 *strongly disagree* to 7 *strongly agree*) was used to measure how frequently participants share their knowledge with their coworkers. Appendix G contains nine items (KS1-8 to KS9-8) used to investigate knowledge sharing behavior in this study.

Expert Test Panel

A cadre of experts was used to assess the instrument, to determine the validity of the instrument. Their areas of expertise include business, IT, knowledge management, cybersecurity, law enforcement, critical infrastructure protection, and homeland security and have taken part in different knowledge management activities in their daily job functions. They have 10-20 or more years of experience in their field, and in

government, have earned master's, doctoral, and law degrees, and hold industry

certifications in their fields of expertise.

The test panel participants received a copy of the survey (see Appendix F).

Simon and Goes (2014b) Survey/Interview Validation Rubric for Expert Panel tool (see

Appendix L) was used to assess the validity and credibility of the instrument and the data

resulting from the use of the instrument, to ensure that all aspects of the instrument were

validated. The validation tool applied a repeatable process for structured analysis and

evaluation criteria for testing the survey instruments and conducting duplicate tests if

necessary. Based on feedback from tests conducted by the expert panel, changes were

made to the instructions and or questions for clarity, structure, etc., as well as adjustment

of the estimated completion time if necessary. The expert panel assessments and

recommendations resulted in the creation of an interim instrument for use in the pilot

study, conducted for construct validation and overall reliability.

Pilot Study

Pilot studies are meant to reveal flaws and deficiencies in studies (Davis, 1989).

In this case, to increase the reliability of the instrument and the study, as well as to

determine the average length of time required to complete the survey, the pilot was

administered to participants to test the reliability of the instrument. Participants of the

pilot study used this interim instrument to ensure appropriate measures and clarity. This

process ensured that the instrument met understandability, answerability, and readability

requirements (see Fowler, 1991).

Survey Respondent Fatigue

"Survey fatigue is one component of respondent burden, generally defined as the time and effort involved in participating in a survey" (Porter, Whitcomb, & Weitzer, 2004, p.6 4); and "non-respondents often cite time concerns as reasons for nonresponse, implying that as the amount of time spent participating in surveys increases, survey nonresponse will increase" (Porter et al., 2004, p. 66). To address potential respondent fatigue or survey fatigue, and elicit participation, the following were addressed or implemented as a part of this study:

- The survey solicitations were routed to respondents from 15 points-of-contact, who served as trusted internal sources to reduce the likelihood that the respondent would ignore the solicitation e-mails.

- A web-based survey tool was used instead of a pen and paper.

- The survey was designed such that a participant could stop and return to the survey later. The researcher used this technique in the survey design, participants from becoming bored or fatigued.

- Multiple Likert-type scales with varying measures were used throughout the instrument to reduce the likelihood that the respondent would randomly select answers.

Data Collection Procedures

Web-based survey implementation procedures involve several steps. An e-mail message was sent to the sample of the population asking for their participation (see Appendices C and D). The e-mail contained an introduction and description of the study, as well as a web link to access the secure website hosting the online survey. The

researcher created, administered the survey, and maintained the data the SurveyMonkey online survey creation and administration tool.

Participants accessed the survey via a link, which delivered them to the main survey page. The main survey page contained the informed consent, where participants were informed that the survey was voluntary and that all information would be kept confidential. Participants were also informed of the expected amount of time they would need to complete the survey. The survey completion time estimated was from the average completion time of the pilot testing.

After agreeing to the informed consent, the participants then proceeded to answer the survey questions regarding attitudes, intentions, motivation, trust, and technology. Additionally, the survey collected demographic information such as age, gender, level of education, organization, and the number of years of work experience. Upon completion of the survey, participants were thanked for their participation and given contact information should they wish to obtain a final copy of the study results. The survey was scheduled to remain active for 30 days. Within four days of the closing date of the survey, follow-up e-mail messages were sent, notifying the community that the survey link would be closing in 4 days. (see Appendix E).

Once the data collection period concluded, the results were downloaded to a Microsoft Excel spreadsheet, and then data were loaded into SPSS. A log of all steps, timestamps, and backups of data along with comparison data from SurveyMonkey to Excel to SPSS was kept, ensuring data consistency. After the study, the raw and analyzed data were saved electronically on an encrypted drive and will be stored for 36 months after publication. After the 36 months, the data will be permanently destroyed.

Pre-analysis Data Cleansing Procedures

Data cleansing is the process of detecting and removing errors, diagnosing

inconsistencies to remove faulty data and improve data quality, or editing (Rahm & Do,

2000). The data were inspected to find incomplete surveys. Using incomplete surveys

with missing data can result in incorrect or misleading statistics (Rahm & Do, 2000).

One of the features of the SurveyMonkey tool is that participants were required to answer

a question before proceeding to the next question. This is a design feature used as a

method to eliminate incomplete surveys from being counted as complete responses. In

cases where this occurred, those surveys were not used in the analysis. However, if a

participant starts the survey and stops by closing the survey without returning to complete

the survey, a completion attempt with incomplete data was captured and recorded as

incomplete.

Plans for Data Analysis

Prior to data analysis, the researcher determined if a sufficient number of

responses (i.e., at least 77) had been collected for the data analysis. If enough data had

not been collected, the data collection period would remain open, and an additional

reminder would have been sent to solicit addition responses. After the final data

collection was complete, the electronic survey data were downloaded and saved in an

electronic spreadsheet format and uploaded for analysis using SPSS software.

Before conducting the primary analysis, however, the data were checked for

missing responses. Cases with non-random patterns of missing data (i.e., several

consecutive questions with missing responses) were excluded from the analysis.

Descriptive statistics were computed and reported for the demographic variables.

Specifically, means and standard deviations were computed for continuous variables, and frequencies and percentages were computed for categorical variables. The demographic information was collected and reported to characterize the sample so that the representativeness of the sample could be determined. Additionally, the interitem reliability of each latent construct was assessed using Cronbach's alpha. Reliability coefficients were evaluated based on the recommendations of George and Mallery (2016), who noted that coefficients of .70 or higher are acceptable.

A series of multiple linear regression analyses were conducted to test the research hypotheses. The first multiple linear regression was conducted to test Hypotheses 1-3. In this regression, the independent variables were expected rewards, expected association, and expected contribution. The dependent variable was attitude toward knowledge sharing. All variables were entered in this regression model in the same step. Individual regression coefficients were evaluated at a significance level of .05 to test the hypotheses.

The second multiple linear regression was conducted to test Hypotheses 4-6. In this regression, the independent variable was attitude towards knowledge sharing and trust. The dependent variable was intention to share knowledge. Variables were entered in this regression model in steps. The independent variables were entered in this regression model in the first step. In the second step, the interaction terms (i.e., attitude towards knowledge sharing x trust) were entered in the model. The interaction terms assessed the moderating effects of trust on the relationship between attitude towards knowledge sharing and intention to share knowledge. Individual regression coefficients were evaluated at a significance level of .05 to test the hypotheses.

The third multiple linear regression was conducted to test Hypothesis 7. In this regression, the independent variables were intention to share knowledge, and IT type usage. The dependent variable was knowledge sharing behavior. Variables were entered in this regression model in steps. The independent variables were entered in this regression model in the first step. In the second step, the interaction term (i.e., intention to share knowledge x IT type usage) were entered in the model. The interaction term assessed the moderating effects of IT type usage on the relationship between intention to share knowledge and knowledge sharing behavior. Individual regression coefficients were evaluated at a significance level of .05 to test the hypotheses.

Prior to interpreting the results of each regression, the assumptions of normality, homoscedasticity, and absence of multicollinearity were tested. The assumption of normality requires that the regression residuals follow a normal distribution. Visual examination of a normal P-P plot tested this. The assumption of homoscedasticity requires that the data are equally distributed across values of the independent and dependent variables. This was tested by visual examination of a scatterplot of residuals versus predicted values. Finally, multiple linear regression requires that the independent variables are not too highly correlated with each other (i.e., multicollinearity). This was tested by computing variance inflation factors (VIFs). Stevens (2009) suggested that VIFs greater than 10 indicates that multicollinearity is a problem.

Ethical Consideration

Institutional Review Board Process

Before validating, testing, or implementing the survey, approval from the Nova Southeastern University Institutional Review Board (IRB) was required. The required

online IRB training modules from the Collaborative Institutional Training Initiative at the University of Miami were completed on 10/26/2016. A certificate of IRB approval is in Appendix M.

Confidentiality and Anonymity

Before participating, and at the start of the survey, participants were informed that their participation was voluntary and that their responses would be kept confidential. Informed consent was provided to each potential participant as a part of the survey instrument. An informed consent indicates the purpose of the research being conducted, the risks and benefits to the participant, assurance that participation will be confidential and voluntary, as well as the guarantee that the participant can withdraw from the study at any time (Fink, 1995, 2009: Fraenkel & Wallen, 2006; Leedy & Ormrod, 2013; Terrell, 2015).

Participants were informed that there would be no direct benefits from taking part in this study, and there would be no cost for participation in this study. Any information obtained in this study is confidential unless a law requires disclosure. All data securely stored on encrypted servers and computers. The data will be securely destroyed 36 months after the conclusion of this study.

Participation in the survey, required acceptance of the informed consent statement, by clicking the "NEXT" button to proceed. Study participants had the right to leave the study at any time or refuse to take part. The respondent's consent request was located at the beginning of the survey and required that the respondent answer "YES" to acknowledge that they were 18 years of age or older and consented to participate, or answer "NO" to decline. Should the respondent have answered no, declining to

participate, the survey ended immediately, displaying the "Thank You" page, without recording a completion attempt.   See Appendix F for the survey instrument.

Resource Requirements

The resources for this research included people, support, and software, which are detailed in this section and shown in Table 5.

People

Outside of the primary researcher, the only people who were required for this research were the 15 individual points-of-contact within the DHS components and agencies who sent out the initial e-mail invitation (see Appendix C) and follow-up invitations (see Appendix D) at the predetermined intervals, with the solicitation letter (see Appendix E) from the researcher. The follow-up e-mails were sent four days before the survey was scheduled to close.

Human resources were needed for the expert test panel. A total of five individuals took part as experts to review the instrument and provide feedback. In addition to the expert test panel, a small cadre of individuals took part in a pilot test of the instrument. The use of both the expert test panel and the pilot testers was to ensure that the instrument captured what it was intended to measure.

Support

While there are multiple websites such as SurveyMonkey.com that offer users the ability to create and administer free surveys to accommodate a limited number of survey questions and responses. The questionnaire used in this study required more question configuration than could be accommodated in the free version, so an upgraded variation of the tool was used to publish an appropriate and worthwhile survey.

Software

Participants were able to complete the web-based survey, created in the online survey tool SurveyMonkey, by accessing the link to complete the survey. Following data collection, the raw data were downloaded to Microsoft Excel to be sanitized, then uploaded into a statistical data analysis software. SPSS was used to conduct the pre-analysis data screening, reliability, and validity analyses, and to aid with the interpretation and presentation of the data. Table 4 summarizes the required software tools for this study.

Table 4

Software Tool Name/Type and Purpose

Software tool name/type	Purpose
SurveyMonkey	Survey building, facilitation, and management
G*Power 3.1.9.2	Statistical power analysis for samples
SPSS	Statistical analysis for results
Microsoft Excel	Spreadsheet/statistical work
Microsoft Project	Project plan
Microsoft PowerPoint	Presentations
Microsoft Visio	Diagrams
Microsoft Word	Documents, survey mockups, etc.

Summary

The study was created to provide insight into factors that influence employee attitudes, intentions, and behaviors to share knowledge in the DHS. This quantitative

study employed a web-based, Likert-type survey instrument to ascertain DHS employees'

perceptions of nine motivation factors often listed in the literature as being associated

with motivating employee knowledge sharing behavior in other contexts. The study

sample was conducted using a sample of employees within the DHS. The research

hypotheses were tested by conducting multiple linear regression analyses. Chapter 4

contains a description of the collected data and the results of the data analysis.

Chapter 4

Results

Introduction

The purpose of this study was to determine the extent that certain factors motivated employee attitudes and intentions to share knowledge, whether trust had an impact on individuals' intention to share knowledge, and whether IT usage affected the relationship between intention to share knowledge and actual knowledge sharing behavior, by answering the following research questions:

1. Does the expectation of rewards, associations, or contributions affect employee attitudes towards knowledge sharing in a homeland security organization?

2. Does trust change the relationship between employee intentions to share knowledge and knowledge sharing behavior in a homeland security organization?

3. Does IT type usage effect or predict employee knowledge sharing behavior?

This chapter presents the results of the research conducted for this study. As described in Chapter 3, after reviewing past and current literature on individual attitudes and intentions, answers to questions were collected about expected rewards, contributions, associations, trust, IT types and usage, and knowledge sharing behavior in a multifaceted web-based survey (see Appendix F).

Instrument Validation and Reliability Process

Before the formal study commenced, the survey instrument was tested and validated in two phases: First, a group of five individuals participated as members of an expert panel. Panel members thoroughly examined the items' wording, readability, understandability, and content validity. Suggestions made by examiners were evaluated, and changes integrated into the survey instrument. Next, the revised survey instrument was pilot tested by 24 professional knowledge workers for readability and clarity, and as stated in Chapter 3, to determine the estimated completion time.

Expert Panel

The expert panel was recruited to evaluate the validity of the web-based survey instrument. The panel, composed of five participants, were chosen for their expertise in one or more of the following areas: statistical analysis, strategic/operational/military operations, intelligence, homeland security operations, survey design, human behavior, information management, information technology, information collections, information assurance, information systems security, cybersecurity, and knowledge management. All had experience in one or more areas, at least a master's degree, and some had doctoral degrees. All individuals invited to participate as expert panel members accepted the invitation to participate.

An informational session was conducted for the expert panel members to give the official overview of the purpose, problem, goals, and research model for this research study. The intent of the session was to be a collaborative activity to aid the expert panel in raising their understanding and support of this study so that they were able to participate to the fullest extent possible.

Panel members were provided with a validation instrument (see Appendix L) for evaluating the survey, a paper copy of the survey instrument, and a link to the draft survey instrument on the SurveyMonkey site. Each panel member assessed the instruments readability, clarity, content validity, question structure, and whether the questions as formed was answerable, based on the elements provided. The review continued until consensus was reached on the wording of the survey items or other suggestions. Survey questions were then reviewed again to determine if the survey instrument required any revisions due to concerns with readability, understandability, or answerability.

Overall, panel feedback proved to be very positive. For example, some of the comments received from the expert panel concerned word choice and order. As an added measure, given the population environment, general counsel was engaged to review the instrument for appropriateness, anonymity; to ensure that neither the agency or its employees or affiliates were compelled to take part; and, that participants would not be compensated for participation in the expert panel, pilot study, or the formal study. Counsel made blanket recommendations that the researcher did not ask participants questions that could be used to identify individual offices, divisions departments, activities, or services and asked the researcher to verify that all necessary steps be taken to allow participants to remain anonymous. Counsel's final recommendation was that a disclaimer is added to the end of the survey saying, "any survey that follows this page is not affiliated with the research of Evette Maynard-Noel." This step was to ensure that participants were fully aware that the survey had concluded and no further engagement from the participant was required. Once the panel reviews were completed, the combined

responses and comments were collected on a single rubric and presented to the researcher (see Appendix L). The researcher reviewed the recommendations provided and used the feedback to improve the survey before the pilot study was conducted.

Expert panel members were excluded from subsequent surveys.

Pilot Study

Following the expert panel review, a single-phase pilot study was conducted to evaluate the instrument and the research study procedures for anomalies. The expert panel directly solicited Twenty-four functionally diverse participants from within the target organization, and their identity was unknown to the researcher. Using the expert panel to solicit and conduct the pilot study served as a mechanism for the evaluation/re-evaluation of the survey instrument before dissemination to the study target.

Participants in the pilot study were given a link to the test instrument and instructed to complete the survey, making sure to take note of any item or items that affected readability or clarity and their overall survey experience. All 24 individuals invited to participate, accepted the invitation, and fully completed the pilot surveys (see Table 5). After the data were collected, the pilot study responses were used to confirm the operationalization of the variables of the study.

The pilot study generated an average of how long it took participants to complete the surveys. This data was used to provide formal study participants with an estimate of how long it would take to complete the formal study survey. Comments/questions from pilot study participants were captured in the comment section of the consolidated validation rubric (see Appendix L). The most consistent comment from study participants were those directed at the perceived length of the survey rather than the

length of time needed to complete the survey. No modifications to the formal survey were required or made, other than to add the estimated completion time to the consent screen, and the participation solicitation and follow-up emails.

Pilot study participants were excluded from taking part in the formal study.

Data Collection and Analysis

A formal study was conducted following the pilot study. Invitations to take part were sent to the sample population via the use of 15 pre-determined points familiar with and to employees in their agencies and components within the department, to reach the broadest possible audience. The researcher chose this method so that the potential respondents were "primed to the purpose and importance of the survey, and the value of each respondent's participation . . . . Which also aided in establishing the legitimacy of the study with the potential respondent" (Sue & Ritter, 2012, p. 131).

A total of 393 respondents accessed the survey instrument. A total of 271 respondents or 68.96% completed the survey.   Although this is not a high number of responses, there were a sufficient number of responses for this study. Data collection for the formal study was initially scheduled to take place over 30 days. The study, however, took place over 37 days from June 1, 2018, to July 7, 2018.   Since the data collection period fell between Memorial Day and Independence Day, which is a popular time for employee vacations, the data collection was extended seven days. Conducting the data collection during this time of the year may account for the low response rate.

Additionally, the FEVS, which is conducted in two waves with 6–week administration periods beginning April 30th and May 7th, was opened on May 7, 2018, and closed June 17, 2018. Because the collection of data for the FEVS also occurred at

the same time, employees may not have taken part in this study, which may also have affected the response rate. Chapter 5 of this report has a further discussion on the response rate.

Participants accessed the survey through SurveyMonkey, a third-party online data collection, and survey administration tool. Online survey tools offer a relatively easy method of survey administration, needing minimal time and effort by participants. Conducting surveys in this manner is cost-effective, eases data entry, and the analysis of the data is likely to yield more useable data than other data collection methodologies by reducing human errors in data handling. Web-based survey tools allow survey data to be collected faster, from a broader and more geographically disbursed audience (Roztocki & Lahri, 2003; Evans & Mathur, 2005; Ritter & Sue, 2007; Spriggs, 2017).

Pre-Analysis Data Cleaning

At the close of the data collection period, raw data were downloaded to Microsoft Excel, and analysis was conducted using SPS. Prior to the analyses, the data were checked for accuracy and missing responses. Accuracy was ensured by checking that all responses fell within the range of values for each variable.

Descriptive Statistics

Table 5 shows the total count of the pilot and formal study. There were 24 participants invited to take part in the pilot study, and 24 (100%) completed responses.

Table 5

Total Web-Based Survey Respondents

	Included		Excluded		Total	
	N	Percent	*N*	Percent	*N*	Percent
Pilot study	24	100.00	0	00.00	24	100
Formal study	271	68.96	122	31.04	393	100
Total	295		122		417	

Descriptive statistics of the characteristics of the formal survey sample appear in Table 6. Demographic data were collected from the survey population to decide the representativeness of the sample. The sample of 271 complete respondents had approximately equal numbers of women ($n = 123$, 45.4%) and men ($n = 128$, 47.2%). The majority of participants identified as White/Caucasian ($n = 144$, 53.1%) and were born in the United States ($n = 237$, 87.5%). The largest proportion of participants were born in the 1960s ($n = 66$, 24.4%); on average the participants had 25.73 years of work experience ($SD = 14.26$), and the more mature participants were from the years between 1920 to 1969 and accounted for a little more than half of the population ($n = 138$, *50.9%).* For the largest proportion of participants, the highest level of education attained was a master's degree ($n = 93$, 34.3%). Finally, the sample was split evenly between participants from the NCR ($n = 131$, 48.3%) and participants outside of the NCR ($n = 131$, 48.3%).

Table 6

Descriptive Statistics for Sample Characteristics

Variable	Frequency	Percent
Education		
High school graduate	16	5.9
Some college	37	13.7
Associates degree	20	7.4
Bachelor's degree	74	27.3
Master's degree	93	34.3
Doctoral degree	11	4.1
Professional degree	7	2.6
Other	4	1.5
Prefer not to answer	9	3.3
Geographical duty location		
NCR	131	48.3
Outside of the NCR	131	48.3
Prefer not to answer	9	3.3
Gender		
Female	123	45.4
Male	128	47.2
Nonbinary/third gender	2	0.7
Prefer not to answer	18	6.6
Decade of birth		
1920s	2	0.7
1930s	5	1.8
1940s	22	8.1
1950s	43	15.9
1960s	66	24.4
1970s	52	19.2
1980s	42	15.5
1990s	28	10.3
2000s	1	0.4
Prefer not to answer	10	3.7

Variable	Frequency	Percent
Ethnicity		
American Indian or Alaskan Native	4	1.5
Asian or Pacific Islander	12	4.4
Black or African American	66	24.4
Hispanic or Latino	22	8.1
White/Caucasian	144	53.1
Prefer not to answer	23	8.5
Country of birth		
United States	237	87.5
Other	25	9.2
Prefer not to answer	9	3.3

Note. NCR = National Capitol Region.

Assumption of Regression

The assumptions of regression tested in this study include normality, linearity, and reliability of measurement, homoscedasticity, and absence of multicollinearity. Normality means that the regression residuals do not strongly deviate from a normal distribution. Visual examination of normal P-P plots tested normality. Strong deviation from the normal (diagonal) line in the normal P-P plot indicates deviation from normality.

Linearity means that the relationships between the independent and dependent variables are linear. Linearity was tested by visual examination of scatterplots of residuals versus predicted values. Any curvilinear patterns observed in the scatterplots indicate possible nonlinear relationships. It also is assumed that the independent and dependent variables are measured reliably. Cronbach's alpha was calculated for each

variable to determine the reliability of measurement. Cronbach's alpha coefficients less than .70 indicates a measure may not be reliable (George & Mallery, 2010).

Homoscedasticity means that the variances of the errors are equal across values of the independent variables. Homoscedasticity was tested by visual examination of scatterplots of residuals versus predicted values. Data that are evenly distributed around zero indicate that the assumption has been met.

Multicollinearity refers to a high degree of correlation between the independent variables. In multiple linear regression, the independent variables should not be too highly correlated. Computing VIFs tested multicollinearity. Stevens (2016) suggested that VIFs greater than 10 indicates that multicollinearity is a problem.

Normality

Kolmogorov-Smirnov tests were conducted to check the normality of the composite variable (See Table 7). All Kolmogorov-Smirnov tests were significant, suggesting the variables statistically differed from normal distributions. However, as significance tests of normality are sensitive to sample size, skewness and kurtosis values were checked to determine the severity of the deviations from normality (Stevens, 2016). According to Westfall and Henning (2013), skewness exceeding 2.00 in absolute value and kurtosis exceeding 3.00 in absolute value indicates data that are markedly different from normal. No skewness or kurtosis values exceeded these criteria (see Table 7), indicating that the data were not markedly different from normal.

Table 7

Kolmogorov-Smirnov (K-S) Tests, Skewness, and Kurtosis for Composite Variables

Variable	K-S statistic	df	Sig.	Skew	Kurtosis
Expected rewards	0.12	271	< .001	0.12	-0.69
Expected contributions	0.16	271	< .001	-0.76	1.94
Expected associations	0.16	271	< .001	-0.77	2.20
Attitudes to share knowledge	0.10	271	< .001	-0.79	2.15
Trust	0.10	271	< .001	-0.69	0.73
Intentions to share knowledge	0.14	271	< .001	-0.74	1.61
IT type usage	0.08	271	.001	0.23	-0.53
Knowledge sharing	0.13	271	< .001	-0.82	2.23

Note: Sig. = significance; skew = skewness; IT = information technology.

Reliability

For each negatively worded item, reverse coding was conducted prior to use in the Cronbach's alpha analysis and subsequent variable creation. A Cronbach's alpha reliability analysis was conducted on each set of items comprising the study variables (i.e., expected rewards, expected contributions, expected associations, attitudes to share knowledge, trust, intentions to share knowledge, IT type usage, knowledge sharing), following the reverse coding process. The results of the reliability analysis are displayed in Table 8. Reliability exceeded .70 for all variables, which George and Mallery (2010) detailed as being the cutoff for acceptable internal consistency. The items

about each variable were calculated into means to create composite scores, which were used in the regression analysis (see Table 8 for descriptive statistics).

Table 8

Descriptive Statistics and Reliability Coefficients for Composite Variables

Variable	*M*	*SD*	Number of items	Cronbach's alpha
Expected rewards	2.71	1.10	3	.90
Expected contributions	4.07	0.64	5	.92
Expected associations	3.87	0.72	5	.91
Attitudes to share knowledge	4.02	0.61	5	.79
Trust	3.44	0.83	7	.94
Intentions to share knowledge	4.12	0.66	5	.90
IT type usage	3.84	1.39	5	.82
Knowledge sharing	3.82	0.73	5	.88

Note. IT = information technology.

Validity Tests

Several procedures were used during data analysis for this study. Factor analysis was used to test for construct validity, convergent validity, and discriminant validity. To test convergent validity, exploratory factor analyses were conducted for the items corresponding to each construct with a principal component analysis method of extraction and a varimax rotation. To test discriminant validity, an exploratory factor

analysis, with all items corresponding to the constructs, was conducted with a principal

component analysis method of extraction and a varimax rotation.

Convergent Validity

Exploratory factor analyses were conducted to determine the convergent validity

of the scale items. Item loadings for each construct are presented in Tables 9 to 17. All

items, except for AS2, loaded strongly (i.e., 0.5 or greater; see Fornell & Larcker (1981)

on their corresponding factors, supporting convergent validity. The loading of AS2 was

.49, which approached the standard (0.5) for a high loading.

Table 9

Component Matrix Expected Rewards

Items	Loading
ER1	.89
ER2	.92
ER3	.92

Table 10

Component Matrix Expected Contributions

Items	Loading
EC1	.86
EC2	.85
EC3	.91
EC4	.89
EC5	.87

Table 11

Component Matrix Expected Associations

Items	Loading
EA1	.86
EA2	.89
EA3	.89
EA4	.81
EA5	.81

Table 12

Component Matrix Attitudes to Share Knowledge

Items	Loading
AS1	.76
AS2	.49
AS3	.84
AS4	.84
AS5	.81

Table 13

Component Matrix Trust

Items	Loading
TR1	.84
TR2	.84
TR3	.88
TR4	.86
TR5	.86
TR6	.93
TR7	.79

Table 14

Component Matrix Intentions to Share Knowledge

Items	Loading
IS1	.85
IS2	.86
IS3	.79
IS4	.89
IS5	.87

Table 15

Component Matrix IT Type Usage

Items	Loading
TT1	.75
TT2	.77
TT3	.81
TT4	.80
TT5	.69

Table 16

Component Matrix Knowledge Sharing

Items	Loading
KS1	.76
KS2	.82
KS3	.86
KS4	.87
KS5	.85

Convergent validity was further tested by examining the correlations between the items corresponding to each construct. The expected rewards items had correlations ranging from .72 to .78, and the expected contributions items had correlations ranging from .65 to .79. The expected associations' items had correlations ranging from .56 to .80; the trust items had correlations ranging from .59 to .86. The intentions to share knowledge items had correlations ranging from .54 to .77, and the knowledge sharing

items had correlations ranging from .49 to .72. All correlations were significant ($p <$ .001).

Discriminant Validity

An exploratory factor analysis was conducted to determine the convergent validity of the scale items. Rotated factor loadings are displayed in Table 17. The expected rewards items all loaded most strongly on Factor 7, and the expected contributions items all loaded most strongly on Factor 2. The expected associations' items all loaded most strongly on Factor 3, the attitudes to share knowledge items all loaded most strongly on Factor 8, and the trust items all loaded most strongly on Factor 1. The intentions to share knowledge items all loaded most strongly on Factor 4, and the IT type usage items all loaded most strongly on Factor 6. The knowledge sharing items all loaded most strongly on Factor 5. As all items loaded most strongly on their own factor compared to other factors, discriminant validity is supported.

Table 17

Rotated Factor Analysis Matrix (Discriminant)

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
ER1	-.07	.02	-.04	-.05	.08	-.02	**.89**	-.04
ER2	-.04	.05	.03	.05	-.04	.02	**.91**	-.05
ER3	-.04	.05	.01	.03	.05	.06	**.90**	.04
EC1	.07	**.80**	.25	.16	.17	.01	.03	.17
EC2	.05	**.78**	.19	.18	.15	.15	.05	.01
EC3	.06	**.81**	.27	.21	.14	.11	.05	.10
EC4	.00	**.81**	.21	.20	.16	.10	.01	.08
EC5	.04	**.76**	.28	.20	.13	.13	.03	.11
EA1	.16	.21	**.79**	.13	.14	.00	-.02	.17

(continued)

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
EA2	.13	.25	**.80**	.15	.21	.04	-.05	.07
EA3	.11	.34	**.78**	.18	.10	.06	.01	.05
EA4	.12	.19	**.75**	.12	.18	.14	.02	.05
EA5	.15	.27	**.68**	.15	.18	.11	.03	.13
AS1	.22	.32	.20	.20	.13	.21	.04	**.55**
AS2	.05	.06	-.06	.15	.08	-.13	-.11	**.70**
AS3	.25	.12	.31	.13	.30	.18	.02	**.61**
AS4	.18	.15	.30	.24	.35	.17	.03	**.57**
AS5	.24	.09	.41	.34	.17	.06	.04	**.54**
TR1	**.82**	.08	.11	.03	.04	.14	-.10	.06
TR2	**.82**	.08	.12	.13	.01	-.02	-.08	.08
TR3	**.87**	.03	.13	.05	.09	.00	.00	.03
TR4	**.85**	-.04	.03	.08	.19	-.04	.03	.05
TR5	**.84**	.01	.10	.08	.08	.05	.01	.14
TR6	**.92**	.00	.05	.10	.09	-.01	.01	.04
TR7	**.78**	.09	.11	.03	-.09	.04	-.07	.11
IS1	.14	.24	.12	**.71**	.27	.16	.00	.15
IS2	.09	.25	.13	**.80**	.17	.02	-.01	.08
IS3	.09	.12	.25	**.64**	.22	.22	.11	.17
IS4	.10	.22	.15	**.80**	.21	.08	-.01	.16
IS5	.13	.19	.16	**.79**	.22	.02	-.04	.17
TT1	-.07	.17	.04	.25	.06	**.70**	-.01	.03
TT2	-.05	.06	.04	.14	.17	**.72**	.12	.13
TT3	.10	.14	.04	-.05	.18	**.79**	-.05	-.04
TT4	.02	.12	.00	.06	.00	**.80**	-.05	.09
TT5	.13	-.07	.18	-.02	.14	**.68**	.06	-.07
KS1	.02	.10	.08	.20	**.71**	.18	-.04	.11
KS2	.14	.20	.10	.20	**.75**	.18	-.10	.11
KS3	.05	.24	.20	.27	**.74**	.13	.12	.02
KS4	.10	.16	.22	.15	**.78**	.06	.08	.21
KS5	.09	.09	.26	.19	**.74**	.12	.11	.14

Data Analysis

Three multiple linear regressions were conducted to test the research hypotheses. All variables were mean-centered prior to conducting the analysis. The first multiple linear regression was conducted to test Hypotheses 1-3. In this regression, the independent variables were expected rewards, expected contributions, and expected associations. The dependent variable was attitude toward knowledge sharing. All variables were entered into this regression model in the same step. Prior to interpreting the results of this regression, the assumptions of normality, homoscedasticity, and absence of multicollinearity were tested. Normality was tested by visual examination of a normal P-P plot (see Figure 4). The data did not strongly deviate from the normal line, so the assumption was met (see Field, 2013).

The assumption of homoscedasticity was tested by visual examination of a scatterplot of residuals versus predicted values (see Figure 5). The data were approximately evenly distributed around zero, so the assumption was met (see Field, 2013). Computing VIFs tested multicollinearity. Stevens (2016) suggested that VIFs greater than 10 indicate that multicollinearity is a problem. All VIFs were less than 10, indicating no problems with multicollinearity.
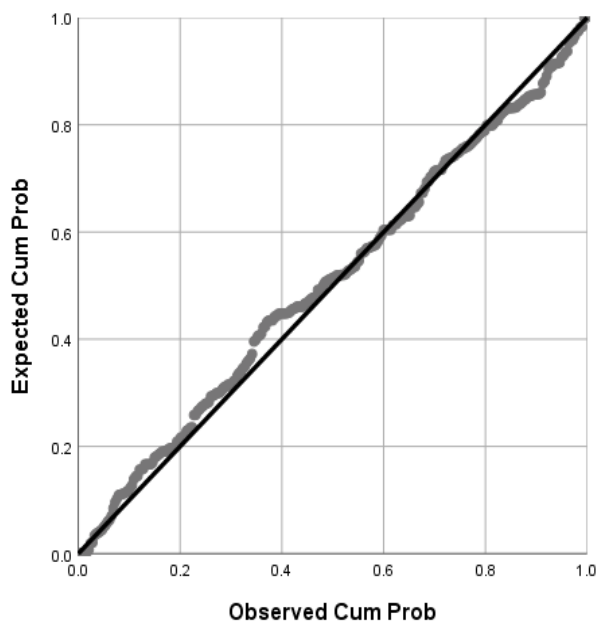
Figure 4. *Normal P-P plot for regression predicting attitudes to share knowledge. Cum prob = cumulative probability.*
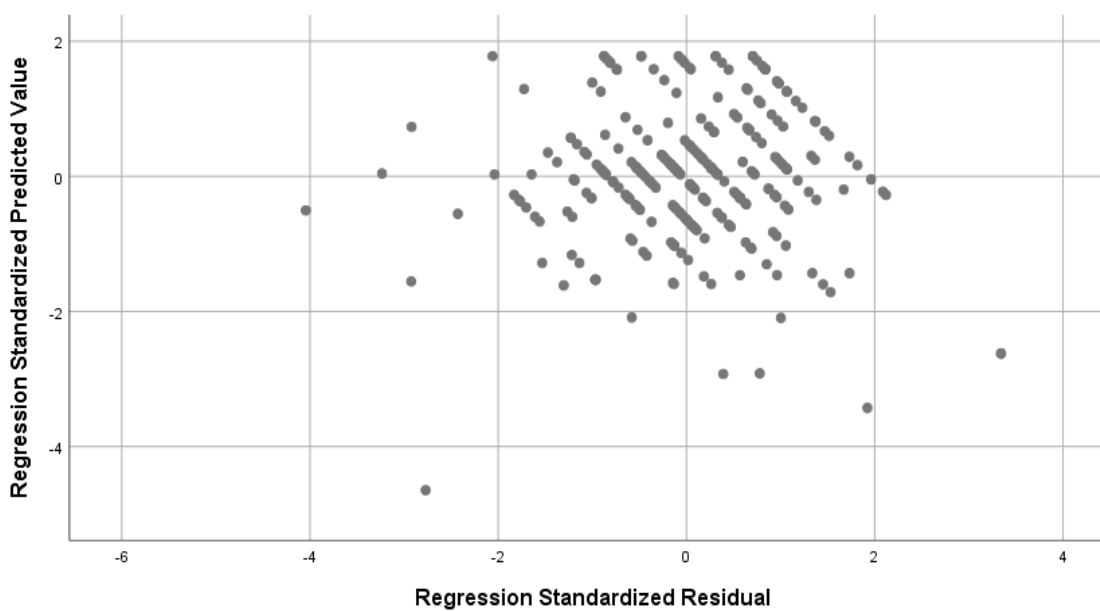

Figure 5. Residuals versus predicted values for regression predicting attitudes to share knowledge.

The second multiple linear regression was conducted to test Hypotheses 4 and 5. In this regression, the independent variables were attitude towards knowledge sharing and trust. The dependent variable was intention to share knowledge. Variables were entered into this regression model in steps. The independent variables were entered into this regression model in the first step. In the second step, the interaction term (i.e., attitude towards knowledge sharing x trust) was entered into the model. Prior to interpreting the results of this regression, the assumptions of normality, homoscedasticity, and absence of multicollinearity were tested in the same manner as the previous analysis. The normal P-P plot showed that the data did not strongly deviate from the normal line (see Figure 6), so the assumption was met. The scatterplot showed that the data were approximately evenly distributed around zero (see Figure 7), so the assumption was met as well (see Field, 2013). All VIFs were less than 10, indicating no problems with multicollinearity (see Stevens, 2016).
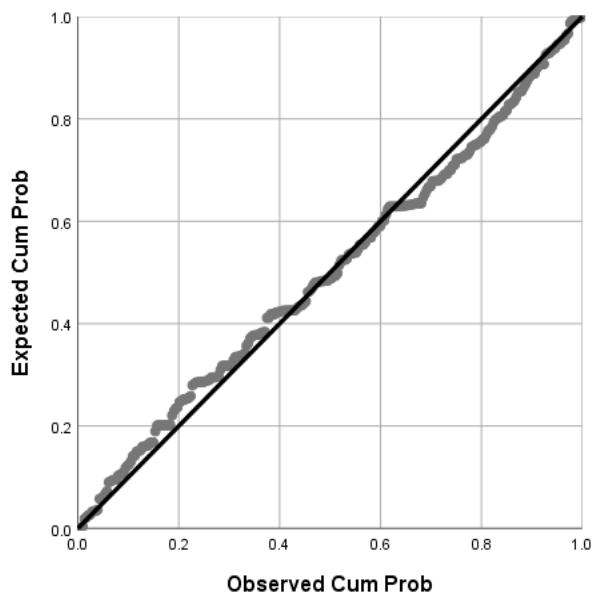
Figure 6. Normal P-P plot for regression predicting intentions to share knowledge.
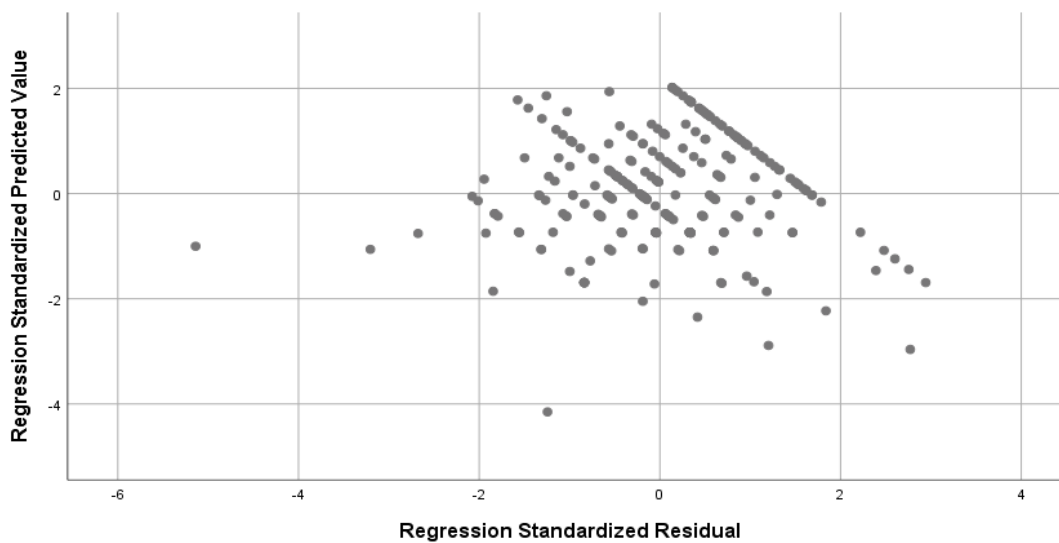

Figure 7. Residuals versus predicted values for regression predicting intentions to share knowledge.

The third multiple linear regression was conducted to test Hypotheses 6 and 7. In this regression, the independent variables were intention to share knowledge, and IT type usage. The dependent variable was knowledge sharing. Variables were entered into this regression model in steps. The independent variables were entered into this regression model in the first step. In the second step, the interaction term (i.e., intention to share knowledge x IT type usage) was entered into the model. Prior to interpreting the results of this regression, the assumptions of normality, homoscedasticity, and absence of multicollinearity were tested in the same manner as the previous analysis. The normal P-P plot showed that the data did not strongly deviate from the normal line (see Figure 8), so the assumption was met. The scatterplot showed that the data were approximately evenly distributed around zero (see Figure 9), so the assumption was also met (see Field, 2013). All VIFs were less than 10, indicating no problems with multicollinearity (Stevens, 2016).
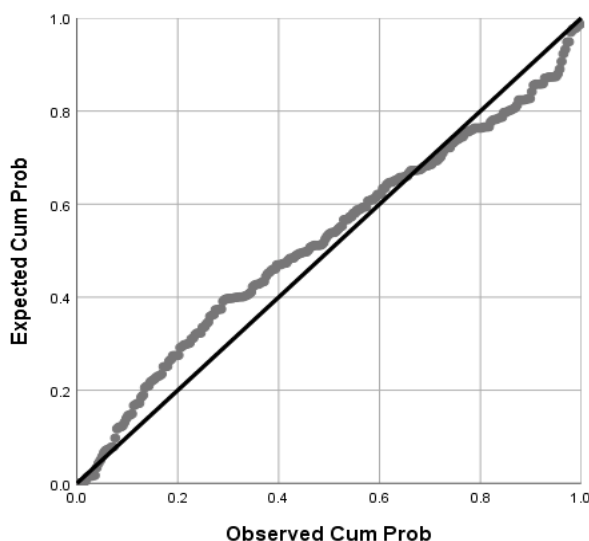

Figure 8. *Normal P-P plot for regression predicting knowledge sharing.*
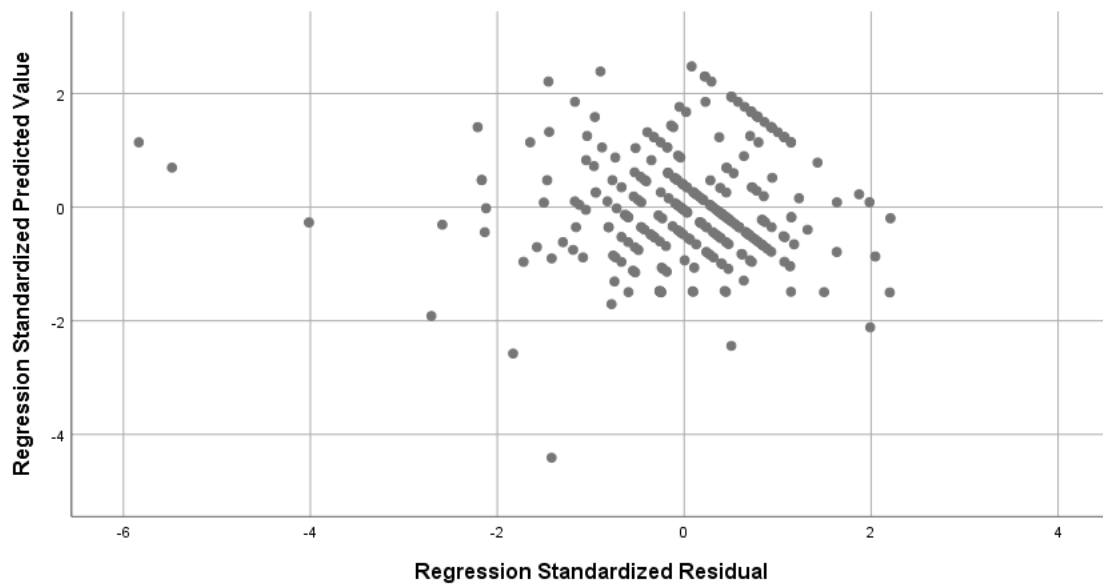
Figure 9. Residuals versus predicted values for regression predicting knowledge sharing.

Findings

The results of the regression predicting attitudes to share knowledge are presented in Table 18. The overall regression model was significant, $F(3, 267) = 42.72$, $p < .001$, $R^2 = .32$, indicating that the independent variables explained approximately 32% of the variance in attitudes to share knowledge. Expected contributions ($B = 0.21$, $p < .001$) and expected associations ($B = 0.35$, $p < .001$) were significant positive predictors, indicating that participants with higher expected contributions and associations tended to have higher attitudes to share knowledge. Expected rewards was not a significant predictor. Hypothesis 1 was not supported, but Hypotheses 2 and 3 were supported.

Table 18

Multiple Linear Regression Predicting Attitudes to Share Knowledge

Variable	B	SE	β	t	p	VIF
Expected rewards	-0.02	0.03	-0.03	-0.60	.550	1.01
Expected contributions	0.21	0.06	0.22	3.55	< .001	1.56
Expected associations	0.35	0.05	0.41	6.51	< .001	1.55

Note. VIF = variance inflation factors.

The results of the regression predicting intentions to share knowledge are presented in Table 19. The overall regression model was significant at Step 1, $F(2, 268)$ = 75.58, $p < .001$, $R^2 = 0.36$, indicating that the independent variables explained approximately 36% of the variance in intentions to share knowledge. The interaction term was added at Step 2 to determine if the addition of the interaction to the model resulted in a significant change in the R^2. Attitudes to share knowledge ($B = 0.67$, $p <$ .001) was a significant positive predictor, indicating that participants with higher attitudes to share knowledge tended to have higher intentions to share knowledge. No other predictors were significant. Hypothesis 4 was supported, but Hypothesis 5 was not supported.

Table 19

Multiple Linear Regression Predicting Intentions to Share Knowledge

Variable	*B*	*SE*	β	*t*	*p*	VIF
Step 1						
Attitudes to share knowledge	0.63	0.06	0.58	11.03	< .001	1.18
Trust	0.03	0.04	0.04	0.74	.459	1.18
Step 2						
Attitudes to share knowledge	0.67	0.06	0.62	10.91	< .001	1.35
Trust	0.04	0.04	0.05	0.86	.393	1.18
Attitudes x trust	0.08	0.05	0.09	1.60	.110	1.20

Note. VIF = variance inflation factors.

Table 20

Multiple Linear Regression Predicting Knowledge Sharing

Variable	*B*	*SE*	β	*t*	*p*	VIF
Step 1						
Intentions to share knowledge	0.58	0.06	0.52	10.34	< .001	1.09
IT type usage	0.11	0.03	0.21	4.08	< .001	1.09
Step 2						
Intentions to share knowledge	0.59	0.06	0.53	10.62	< .001	1.09
IT type usage	0.11	0.03	0.21	4.28	< .001	1.09
Intentions x IT type usage	0.10	0.04	0.13	2.73	.007	1.01

Note. VIF = variance inflation factors.

The results of the regression predicting knowledge sharing are presented in Table 20. The overall regression model was significant at Step 1, $F(2, 268) = 79.82$, $p < .001$, $R^2 = .37$, indicating that the independent variables explained approximately 37% of the variance in knowledge sharing. The addition of the interaction term at Step 2 resulted in a significant change in the R^2 (R^2 change $= .02$, $p = .007$), indicating that the addition of the interaction term increased the amount of variance explained by 2%. Intentions to share knowledge ($B = 0.59$, $p < .001$) and IT type usage ($B = 0.11$, $p < .001$) were significant positive predictors, indicating that participants with higher intentions to share knowledge and IT type usage tended to have higher knowledge sharing. The interaction term was significant ($B = 0.10$, $p = .007$), indicating that, as IT type usage increases, intentions to share knowledge has a greater positive effect on knowledge sharing. Hypotheses 6 and 7 were supported. Table 21 is a consolidated table listing each of the hypotheses and whether each hypothesis was supported or not supported. Conclusions from the results of the hypotheses testing will be discussed in Chapter 5.

Table 21

Consolidated Hypotheses Testing Results

Hypotheses	Results
$H_0$1: Expected rewards will have a positive effect on the employee's attitude toward knowledge sharing.	$B = 0.02, p$ .550 Not Supported
$H_0$2: Expected associations will have a positive effect on the employee's attitude toward knowledge sharing.	$B = 0.35, p < .001$ Supported
$H_0$3: Expected contributions will have a positive effect on the employee's attitude toward knowledge sharing.	$B = 0.21, p < .001$ Supported
$H_0$4: Attitude toward knowledge sharing will have a positive effect on the employee's intention to share knowledge.	$B = 0.67, p < .001$ Supported
$H_0$5: Employee trust will positively moderate the relationship between employee attitudes toward knowledge sharing and employee intentions to share knowledge, such that when employee trust is high, the relationship between employee attitudes to share, and intentions to share knowledge will be stronger.	$B = 0.08, p$ .110 Not Supported
$H_0$6: Employee's positive intentions to share knowledge positively affects knowledge sharing behavior.	$B = 0.59, p < .001$ Supported
$H_0$7: Employee IT usage will positively moderate the relationship between employee intention to share knowledge and actual knowledge sharing behavior is such that when technology usage is high; it will strengthen the relationship between intention to share knowledge and knowledge sharing behavior will be strengthened and result in increased knowledge sharing behavior.	$B = 0.10, p$ .007 Supported

Summary

The research hypotheses were tested using three multiple linear regressions. The results of the first regression revealed that expected contributions and expected associations were positively related to attitudes to share knowledge, but expected rewards were not significantly related to attitudes to share knowledge. Therefore, Hypothesis 1 was not supported, but Hypotheses 2 and 3 were supported. The results of the second regression revealed that attitudes to share knowledge was positively related to intentions to share knowledge, but trust did not significantly moderate this relationship. Therefore, Hypothesis 4 was supported, but Hypothesis 5 was not supported. Finally, the results of the third regression revealed that intentions to share knowledge was positively related to knowledge sharing, and IT type usage positively moderated this relationship. Therefore, Hypotheses 6 and 7 were supported.

Chapter 5 presents a discussion of these findings, limitations of the study, implications for practice and research, contributions to the literature, and recommendations for further research.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Introduction

This chapter consists of four main sections. The first section of this chapter is a

discussion of the findings and conclusions drawn from the data analysis. The second

section discusses the limitations; the third section presents implications for the practice

and research and contributions. The fourth section presents the contributions that this

research makes to research and the body of knowledge in the human behavior aspects of

knowledge sharing and the use of technology in sharing knowledge, which leads into the

fourth section, which presents the directions for further research into attitudes and

intentions to share knowledge. Chapter five concludes with a summary.

Discussions

Summary of Findings: Research Question 1

Research Question 1 (RQ1) asked: Does the expectation of rewards, associations,

or contributions affect employee attitudes towards knowledge sharing in a homeland

security organization?

The first hypothesis, $H_0 1$, stated that expected rewards would have a positive

effect on the employee's attitude toward knowledge sharing. This relationship was tested

as detailed in Chapter 4 to determine if expected rewards had a positive effect on employee knowledge sharing behavior. Prior to analysis, a significance level would be required to test the hypotheses. The results of the test did not establish that expected rewards were a significant predictor of employee attitudes to share knowledge (B = 0.02, p .550, not supported).

The literature revealed inconsistent findings concerning factors that motivate employees to share their knowledge in other types of organizational environments. H.-F. Lin (2007) found that motivational factors, such as rewards, significantly affect employees' attitudes and intentions. M. H. Hsu et al. (2007) and Wang and Noe (2010) found that rewards often encouraged knowledge sharing. However, research by Bock and Kim (2001) revealed that an individuals' attitude toward knowledge sharing was not positively affected by expected rewards, and the present study supports this finding. Casimir et al. (2012) and Ozlati (2012) found that performance-based pay or rewards have no relationship, or even a negative relationship, between rewards and performance. In fact, these studies demonstrated that monetary rewards, promotions, or punitive measures will not encourage any type of knowledge sharing and may be construed as coercion. (Ozlati, 2012)

Other studies by Amayah Ntala (2011, 2013), Bock et al. (2005), H. F. Lin (2011), and Welschen et al. (2012) also revealed that rewards (Expected Rewards) are not related to knowledge sharing. Bock et al. (2005), and Welschen et al. (2012) indicated that rewards might hinder rather than encourage positive attitudes toward knowledge sharing. Findings on the relationship between expected rewards and knowledge sharing remain inconclusive. Based on the results presented in the previous chapter, the

researcher concluded that the expectation of rewards (Expected Rewards) did not influence employees' attitudes toward knowledge sharing. This implies that monetary influences such as raises and bonuses have no influence on an employees' attitude about the decision to share their knowledge and thus not supported by this research.

The second hypothesis, $H_0 2$, stated that expected associations would have a positive effect on the employee's attitude toward knowledge sharing. This relationship was tested as detailed in Chapter 4 to determine if expected associations had a positive effect on employee knowledge sharing behavior. The results of this study show that expected associations were significant positive predictors of employee attitudes to share knowledge in homeland security. The researchers' hypothesis that expected associations would have a positive effect on the employee's attitude toward knowledge sharing was supported (B = 0.35, p < .001, supported). These findings indicate that participants with higher expected associations tended to have higher attitudes to share knowledge.

Expected associations assume that if employees believe they could improve relationships through social interactions and mentoring with other employees by offering their knowledge, with the expectation of reciprocal favors, they will develop a more positive attitude toward knowledge sharing.   If a person assumes that they may develop lasting reciprocal relationships with other employees, they are likely to share their knowledge due to the expected association (Bock & Kim, 2001; Ozlati, 2012; Tohidinia & Mosakhani, 2010). Additionally, employees may be more willing to share knowledge if they have reason to expect valuable information and knowledge from peers in return (Abdelwhab Ali, Panneer Selvam, Paris, & Gunasekaran, 2019; Seba, Rowley, Lambert, 2012a). Prior studies by Amayah Ntala (2011, 2013), Bock et al. (2005), H. F. Lin

(2011), and Welschen et al. (2012) also revealed a positive relationship between expected associations and attitudes toward knowledge sharing.

The third hypothesis, H_03, stated that expected contributions would have a positive effect on the employee's attitude toward knowledge sharing. This relationship was tested as detailed in Chapter 4 to determine if expected contributions had a positive effect on employee knowledge sharing behavior. The results show that expected contributions were significant positive predictors of employee attitudes toward knowledge sharing and indicated that participants with higher expected contributions and associations tended to .05have higher attitudes to share knowledge. The researchers' hypothesis that expected contributions would have a positive effect on the employee's attitude toward knowledge sharing was supported (B = 0.21, p < .001, supported).

These results are consistent with previous studies such as those conducted by Bock and Kim (2001), Bock, et al. (2005), Chiu et al. (2006), H.-F. Lin (2007a; 2007b), and H. T. Tsai and Bagozzi (2014), and indicate that individuals believe through their knowledge sharing contributions, they could improve relationships with other employees, developing stronger attitudes and intentions toward knowledge sharing, resulting in positive knowledge sharing behaviors. Additionally, if employees have greater confidence in their abilities, they have a more positive attitude toward knowledge sharing (Jolaee, Md Nor, Khani, & Md Yusoff, 2014).

Summary of Findings: Research Question 2

Research Question 2 (RQ2) asked: Does trust change the relationship between employee attitudes to share knowledge and employee intentions to share knowledge in a homeland security organization?

The fourth hypothesis, H_04, in support of RQ2, stated that an employee's attitude toward knowledge sharing would have a positive effect on the employee's intention to share knowledge. This relationship was tested as detailed in Chapter 4 to determine if an employee's attitude toward knowledge had a positive effect on the employee's intention to share knowledge.

According to the TRA (Ajzen & Fishbein, 1980), intention is determined by attitudes, and the more favorable the attitudes, the greater favorable intention toward the behavior (Ajzen & Fishbein, 2005; Arpaci & Baloğlu, 2016). If individuals do not believe that their participation matters or has worth, then there is no incentive to participate and share (Marshall et al., 1996). According to Pardo et al. (2006), knowledge sharing allows individuals to "achieve greater benefit" from working collaboratively, allowing for increased "effectiveness, efficiency, and responsiveness" (p. 296).

The researchers' hypotheses that employee's attitude toward knowledge would positively affect the employee's intention to share knowledge was supported ($B = 0.67$, $p < .001$, supported). The results of this study indicated that individuals' attitudes toward knowledge sharing were significant positive predictors of knowledge sharing behaviors. These results support the findings of previous studies that examined attitudes toward knowledge sharing and revealed that attitudes influence intentions to share knowledge (Bock & Kim, 2001; Bock et al., 2005; H.-F. Lin & Lee, 2004; Sabbir Rahman & Hussain, 2014).

The fifth hypothesis, H_05, stated that employee trust would positively moderate the relationship between employee attitudes toward knowledge sharing and employee

intentions to share knowledge, such that when employee trust is high, the relationship between employee attitudes to share, and intentions to share knowledge will be stronger. This relationship was tested as detailed in Chapter 4 to determine if trust would positively moderate the relationship between employee attitudes toward knowledge sharing and intentions to share knowledge.

In organizations such as the DHS where national security, including the protection of life and infrastructure, are paramount, employees assume that other employees will do as expected, as conditions of their employment, for the mission of the organization, and the greater good. According to Dawes et al. (2009), the lack of trust, particularly in public sector organizations, can be an inhibitor to knowledge sharing. However, in studies where trust is considered a key influencer of sharing behavior, if the knowledge shared is not seen as essential, trust might not necessarily be considered a prerequisite for inspiring willingness to share knowledge (Luna-Reyes, Black, Cresswell, & Pardo, 2008).

Although trust is considered a key influencer of sharing behavior (Dawes et al., 2009; Seba, Rowley, & Lambert, 2012b), inconsistencies exist in previous studies concerning the importance and requirement for trust in knowledge sharing (Davenport & Prusak, 1998; Jolaee, Md Nor, Khani, & Md Yusoff, 2014). C.-L. Hsu and Lin (2008) considered trust a requirement for knowledge sharing, while Lee and Hong (2014) determined that trust did not influence behavior, and Ozlati (2012) argued that trust is not a requirement for sharing knowledge but facilitates the knowledge sharing process and is, thus, a moderator.

The results of this study indicated that trust was not a significant predictor of employees' intention to share knowledge. Based on these results, the existence of trust between employees did not influence the relationship between employee attitudes or intentions to share knowledge. It thus did not have a moderating effect on the relationship between attitudes and intentions to share knowledge ($B = 0.08$, p .110, not supported).

The sixth hypothesis, $H_0 6$, supporting RQ2, stated that an employee's positive intentions to share knowledge would positively affect knowledge sharing behavior. This relationship was tested as detailed in Chapter 4 to determine if positive intentions would positively affect knowledge sharing behavior. According to Fishbein and Ajzen (1970, 1981), behavior is determined by attitudes toward sharing. The best predictor of behavior is intention, and intention is the indication of an individual's willingness to perform an action—in this case, to share knowledge (Ajzen, 1991).

The results of this study indicated that an individual's positive intention toward knowledge sharing influences knowledge sharing behavior, indicating that intentions to share knowledge were significant positive predictors, indicating that participants with higher attitudes to share knowledge tended to have higher intentions to share knowledge, resulting in higher knowledge sharing behavior (B = 0.59, p < .001, supported). These results reinforce findings from earlier studies by Bock et al. (2005), Ryu et al. (2003), Tohidinia and Mosakhani (2010), and Jolaee, Md Nor, Khani, and Md Yusoff (2014), which support the positive effect of intention on knowledge sharing behavior.

Summary of Findings: Research Question 3

Research Question 3 (RQ3) asked: Does IT type usage affect or predict employee knowledge sharing behavior?

Hypothesis seven H_07 in support of RQ3 stated that employee IT type usage would positively moderate the relationship between employee intention to share knowledge and actual knowledge sharing behavior, such that when technology usage is high, it will strengthen the relationship between intention to share knowledge and knowledge sharing behavior will be strengthened and result in increased knowledge sharing behavior.

This relationship was tested as detailed in Chapter 4 to determine if IT type usage would positively moderate the relationship between employee intention toward knowledge sharing behavior and actual knowledge sharing behavior. The researcher hypothesized that individuals' intention to share their knowledge and who used IT frequently would share their knowledge more frequently through available technology such as email, teleconferencing, web conferencing, content management or knowledge repositories, instant messaging, and other electronic means; and that the availability and usage of such technology would influence the relationship between employees' intentions to share and their actual knowledge sharing behavior.

The results of this study showed that participants with significant IT type usage tended to have increased knowledge sharing intentions. Where IT type usage increases, intentions to share knowledge had a greater positive effect on knowledge sharing. Based on these results, IT type usage was a significant positive predictor on the relationship

between intention to share knowledge and actual knowledge sharing behavior (B = 0.10, p .007, supported).

Casimir et al. (2012) concluded that IT was important and necessary for knowledge sharing; however, they found IT was not enough for knowledge sharing to occur. Bock and Kim (2001) concluded that an individual's level of IT usage did not show a significant moderating effect on the relationship between intentions to share knowledge and knowledge sharing behavior. However, Ozlati (2012) revealed a positive link between the use of technology and knowledge sharing behavior. The results of the present study indicated that IT Type Usage affected the relationship between the intention to share knowledge and actual knowledge sharing behavior. Thus, a moderating effect by IT Type Usage was supported in this study and the literature.

Limitations of the Study

According to Ellis and Levy (2009), a study limitation is defined as an "uncontrollable threat to the internal validity of the study" (p. 332). Prior to discussing the implications of this work, it is necessary to recognize some inherent limitations of this study. This research provides valuable information about employee attitudes and intentions toward knowledge sharing behavior. Where possible, several measures were taken to diminish limitations. However, some limitations remain and are discussed in this section.

Web-Based Surveys

First, an important limitation of this study is its use of a web-based survey to collect data. According to Spriggs (2017), "biases arise either from a lack of response from intended participants or in the nature and truthfulness of the responses that are

received" (p. 55). A respondent may misreport a question by answering it incorrectly by mistake or on purpose. Sekaran (2003) indicated that respondents might not answer truthfully or respond in a way that they considered the researcher expects. For instance, in the table Descriptive Statistics for Sample Characteristics for this study (see Table 6), the data shows that two respondents answered that their date of birth was in the 1920s, and five answered that their decade of birth was 1930's. In the present, these respondents would be between 89-99 years of age. With web-based surveys, the results are dependent upon the respondent's direct response, which cannot be verified. A respondent is free to answer as they choose. With a survey conducted in-person, however, the researcher may rely on some visual facial or ID verification of the respondent's age. Additionally, web-based surveys are subject to self-selection bias.

Participant Access

The second limitation was that survey participants were restricted to employees in a single United States federal government agency with a primary mission of homeland security. According to Spriggs (2017),

> limitations can arise either from a lack of response from intended participants or in the nature and truthfulness of the responses that are received. Moreover, misreporting may occur for several reasons, such as fear of retaliation, privacy concerns, or simply answering incorrectly. (p. 55)

This may result in the findings not being immediately generalizable or relevant for other government agencies. Even within the federal government, according to S. Kim and H. Lee (2005), the results could be expected to differ according to agency and conducting similar studies in other agencies in the federal government, or different types of

organizations and sectors may result in improved generalizability, and further support this study (Spriggs, 2017; Wah, Menkhoff, Loh, & Evers, 2007). Therefore, future studies into the potential differences of the knowledge sharing intention between other federal agencies, and other types of governments such as state, local, tribal and territorial, governments, would be of interest and may generate thought-provoking results. (Fullwood & Rowley, 2017).

Organizational Climate and Fear of Retaliation

The third limitation of the study involved potential respondents' concern with the organizational climate. Because of the challenging political climate, individuals appeared to suspect ulterior motives behind the questionnaire, and some were reluctant to take part in the study at all. Additionally, organizational missions—preventing terrorism and enhancing security, managing national borders, securing cyberspace, ensuring disaster resilience, and administering immigration laws—may have influenced respondents' actual knowledge sharing behavior. Respondent concerns can arise despite assurances and measures taken to guarantee the anonymity and privacy of the data.

Low Survey Response Rate

A fourth limitation of the study was the low survey response rate. Data collection for the survey occurred over five weeks, from June 1, 2018, to July 7, 2018. Data collection began following Memorial Day and closed just after Independence Day. Additionally, the FEVS second wave of the data collection was also open from May 7, 2018, to June 17, 2018. The number of respondents may well have increased, had the data collection for this study not occurred at the same time. However, given the power analysis indicated that a total sample size of 77 was satisfactory to detect an adequate and

significant sample size for this study, and by surpassing that by more than 190

respondents, reaching 271 responses was suitable for this investigation. The researcher

concluded that the response rate did not create a non-response bias.

Span of Generations in the Workforce

Further, the span of generations in the workforce may have created a limitation

involving employees who were not likely to rely on technology in sharing knowledge

because of their lack of competency in the use of the existing technology.

Implications

Both a comprehensive literature review and an analysis of the findings completed

during this study revealed many contradictory factors for the sharing of knowledge.

Several implications for current and future research exist in knowledge management,

employee behavior, information systems, information technology, and organizational

practice exist. This section addresses the implications that are reflected in the findings of

the current study.

Implications for Practice

The findings of the study imply that trust did not affect the relationship between

attitudes and intentions to share knowledge within the context of the current study. Prior

research suggests that individuals are willing to share their knowledge, because a high

degree of trust is assumed or exists, given the mission of the organization (Yui & Law,

2012). However, in this study, trust did not have a moderating effect on intentions to

share and knowledge sharing behavior. The findings of the study do not imply that trust

does not exist. In an organization such as DHS, trust within the community of employees

and affiliated organizations is assumed to be a crucial part of managing and carrying out

the homeland security mission. Pre-9/11, "bonds of trust in an infrastructure of relationships" did not exist (Hambly, 2016, p. 1). In this post 9/11 environment, the need-to-know, and right-to-know must be carefully balanced with the need-to-share the right knowledge, at the right time, with the right people, using the right or best available technological methods, for timely decision making (Best, 2011; Dawes et al., 2009).

Government agencies are aware of the importance of information and knowledge sharing for addressing policy issues such as anti-terrorism, cybersecurity, infrastructure security, emergency management, and disaster recovery, immigration, border protection, and customs enforcement. Much of this evolution of action can be attributed to the events of 9/11/2001, which, according to Yang and Maxwell (2011), "underscored the failure of prior governmental information and knowledge sharing practices." (p.164). The Federal government's ability to effectively manage and leverage knowledge is critical, and statutory and regulatory changes have resulted in the need for new policies, procedures, and technologies to link people and systems to share information and knowledge (Best, 2011).

The context of this study was focused on a single U.S. federal government environment. Despite the investigations small sample population, its results, though not universally applicable, may aid organizations by providing empirical data for development or modifying knowledge sharing activities in their organizations. The survey instrument from the current study may be used as a stand-alone instrument as a benchmark for evaluating employee attitudes and intentions in public sector organizations such as the U.S. federal government, specifically, and private sector organizations in general.

All or portions of this instrument should be incorporated into future versions of the FEVS, by expanding the "My Satisfaction" area of the FEVS.   As the FEVS is used to "capture Federal employees' perceptions of policy, practices, and procedures, and interactions and behaviors that support organizational performance" (p. 1). According to OPM (2018),

> the results from the survey can be used by agency leaders to aid in identifying areas in need of improvement as well as highlighting important agency successes. FEVS findings allow agencies and sub-agencies to assess trends by comparing earlier results with the 2016 results, to compare agency results with the government-wide results, to identify current strengths and challenges, and to focus on short-term and long-term action targets that will help agencies reach their strategic human resource management goals. The recommended approach to assessing and driving change in agencies utilizes FEVS results in conjunction with other resources such as results from other internal surveys, administrative data, focus groups, exit interviews, and so on (p. 1).

The findings of the present study also indicated there is a positive relationship between IT type and usage and knowledge sharing behavior. While the availability of technology or its use does not automatically guarantee successful knowledge sharing behavior, the findings in this study confirm individuals' use of various technology in sharing knowledge and lends support to informed decision-making toward adopting useful types of technology to facilitate collaboration and knowledge sharing. The technology used for knowledge sharing can enable an organization, and its individuals access to share and to shared knowledge to facilitate effective problem solving and

decision-making. Decision-makers can find and use diverse information and knowledge embedded in the organization by searching repositories, or using other sharing technologies, thus enhancing the organization's efficiency and effectiveness. Depending on the technology tools used, knowledge in its most effective state can be reused and leveraged in other applications and decisions in the organization and beyond (He & Wei, 2009).

Finally, results from this study could be used to inform employees of what knowledge sharing is, its importance, and the benefits of sharing. From there, employees can be informed or trained on how to share knowledge, with a focus on the use of various types of technology that can be used for knowledge sharing effectiveness and efficiency.

Given the distributed nature of the subject organization, employee isolation can occur. Consequently, for employees who telework or who work in closed-off environments, virtual training could be conducted to share information and share about the importance and benefits of knowledge sharing. This type of training may increase group cohesiveness, which in turn could improve attitudes, intentions, and actual knowledge sharing.

Implications for Research

While this study was conducted in a public-sector organization that differs from most studies on knowledge management and knowledge sharing, much of the research in this area is more often conducted in private sector settings. This study is significant in that it contributes to the body of knowledge on information systems, knowledge sharing, human behavior, public sector, and federal government agencies, which is often overlooked and under-investigated.

Regarding public sector government organizations, this study demonstrated that expected rewards such as monetary rewards, promotions, as well as trust, do not encourage or discourage knowledge sharing. However, one's expected contribution, their confidence in their ability to share; expected associations with others or ability to improve relationships; and the use and type of technology available for knowledge sharing affect individuals' attitudes and intentions toward knowledge sharing.

Contribution to the Literature

This study makes valuable contributions in information systems theory, research, and practice. The results presented in this study expands the TAM and TRA, and previously limited research on the use of available technology, coupled with human attitudes and behavior in knowledge sharing. The results of this study contribute to the literature and provide a basis for future research on knowledge sharing and IT, providing researchers and decision-makers with source literature to address and expand this research.

One of the strengths of this study was the diligence in ensuring a valid and reliable instrument used to capture the data collected to conduct this study. The expert panel served in a critical advisory role in the preparation of the survey instrument, by recommended engaging the general counsel to reinforce security and privacy, and in facilitating the pilot study, where the participants were unknown to the researcher before, during, and after the study. The support of the expert panel and the pilot study participants contributed to the refinement and quality of the survey instrument.

From a theoretical perspective, this study gives some theoretical clarity on the individual's use of technology and their knowledge sharing by how often specific technologies are used to share knowledge, in addition to the prediction of individual attitudes, intentions, and knowledge sharing behaviors. Lacking in the literature was the added aspect of trust as a moderator, which was significant to the context of this research, as trust contributes to a positive working environment characterized by honest, supportive relationships (Moye & Henkin, 2006). Lack of trust can influence employees' perspectives on knowledge sharing, particularly in a government organizational setting (Pardo et al., 2006). Others can apply the lessons learned from the study to future research in similar and dissimilar contexts.

Additionally, the study was designed to examine the relationships between employees' expected associations and knowledge sharing. The results of this research revealed that expected associations motivated employee attitudes toward knowledge sharing. While an attitude may be different from an intention or a behavior (Ajzen & Fishbein, 1980), according to the present study, a favorable attitude toward the sharing of knowledge influenced employees to share knowledge to strengthen expected associations, which could lead to favorable knowledge sharing behaviors (Ajzen & Fishbein, 1980; Bock et al., 2005).

Finally, from a practical perspective, the results of this study provide insight that can be used by organizational management for actionable decision making in all areas and at levels. The result can be used for developing improved manual and automated processes and policies to advance organizational missions and objectives. For example, as a method of advancing organizational missions and objectives, implementing and

endorsing technologies that facilitate improved knowledge sharing, along with a communication strategy to socialize the efforts across the organization,

This study opens the door for further research, and further research should be conducted in other public and private-sector organizations and should focus on different motivating factors, which are explored more fully in the next section.

Directions for Further Research

This study focused on employees' attitudes and intentions to share knowledge; however, the actual reasons for not sharing knowledge were not investigated. Therefore, research into reasons for the lack of sharing knowledge should be examined, as these factors may have had an impact on the motivators, enablers, or barriers in knowledge sharing.

There are several interesting and significant research directions that can stem from this study. They include extensions of the research involving the inclusion of different subjects, disciplines, and organizational types. Therefore, researchers should examine these contexts, as they may be connected to knowledge sharing motivators. Other areas of future study might include the investigation of specific intrinsic and extrinsic rewards to discover whether other specific types of rewards impact employees' attitudes about knowledge sharing.

Future studies on the effect of trust in knowledge sharing behaviors should also be investigated. Ozlati (2012) observed that there are three types of trust: benevolence-based trust, which implies that an individual will not be adversely affected in the trusting relationship; institution-based trust, which relies on an organization's structure to ensure trustworthy behavior in employees; and competence-based trust, which refers to the

confidence one has in the expertise of other parties in the trusting relationship. Potential research in this area could explore the impact of these three types of trust, in the same or similar environments. Such research would create further empirical data for comparisons of employee attitudes and intentions to share knowledge in this and other organizational settings.

Given the results of this study, future researchers may expand knowledge sharing and technology by measuring future technology usage with more diverse types of technology as they become available. The study of sharing via more diverse types of technology may give added insight into IT type and usage for knowledge sharing in organizations. Additionally, researchers could further investigate specific types of technology in organizations as a facilitator of knowledge sharing.

According to Mitchell (2003):

> Whether it is the expertise of employees or operational processes, organizations are repositories of information and knowledge. Technology is not only a conduit for knowledge to flow to and from the organization, but it provides organizations with the means to improve and increase their business opportunities or mission operations. Without technology, organizations would find it very difficult to access the vast amount of information that is available . . . . would not be able to link people both internally and externally for the sharing of knowledge. (p. 66)

It may also be important to consider exploring the degree to which training in relevant technologies could enhance user ability, potentially increasing the use of technology to share knowledge. Additionally, a comparison of training methods, instructor-led versus computer-based, could be studied for its influence on employee

technology acceptance from a generational standpoint. Attention could be directed toward determining if the age of the user or the length of time that computers have been available to or used by a person in their life affects the acceptance and usage of technology.   Other follow-up studies could then be conducted to measure whether there has been an increase in competency or an impact on motivation to share knowledge.

Since there are several types of public sector organizations, factors that have a significant effect on knowledge sharing at this agency may not have the same influence in other organizations. Therefore, the factors investigated in this study should be examined in different organizational settings. Future research in other federal government organizations in state, local, tribal, or territorial governments, as well as in private sector organizations, would make available additional empirical data for comparison, and provide further insight into employee knowledge sharing behaviors. Additionally, this study should be replicated with a larger sample size to validate further the model presented in Figure 1.

Federal employees, such as those working for the DHS, may have a public service motivation, which is described as "an individual's predisposition to respond to motives grounded primarily or uniquely in public institutions and organizations" (Perry & Wise, 1990, p. 368). According to Wright (2007),

> considerable empirical support exists for the assertion that employee reward preferences coincide with the function served by the sector in which they are employed. Public sector employees have repeatedly been found to place a lower value on financial rewards and a higher value on helping others than their private sector counterparts.   (p. 54)

In other words, the individual values public service and the mission over rewards. Future research should be conducted to determine if public sector motivation has a moderating effect on expected rewards in this context.

Conclusion

Chapters 1 through 4 identified the research questions, defined the scope of the variables, and justified the hypotheses to be tested. The purpose of this chapter was to offer an overview of the study, interpretations of the findings, and a discussion of how this study contributes to the body of knowledge. Factors that influence individual attitudes and intentions to share knowledge in homeland security were not clearly understood; therefore, the purpose of this study was to investigate the extent that certain factors motivated employee attitudes and intentions to share knowledge, whether trust had an impact on individuals' intention to share knowledge, and whether IT type usage affected the relationship between intention to share knowledge and actual knowledge sharing behavior.

Most studies on knowledge sharing have been conducted in the private sector or on foreign governments. This study was conducted in an often-overlooked organization type—an agency within the U.S. federal government, a large, diverse, and previously unstudied context. Therefore, the study expands on existing literature by investigating employee attitudes, intentions, and knowledge sharing behaviors, trust, or the lack of trust between potential sharers of knowledge and the use of technology to facilitate knowledge sharing. The benefits of sharing knowledge include enhanced proficiency and efficiency in problem-solving, decision making, information quality, and shared information technology infrastructure (White, 2013). For practitioners, these findings may create a

starting point to develop and align knowledge sharing and technology initiatives, which can improve mission support and readiness, especially in our current threat environment, while conducting the daily business of protecting the homeland.

This research concluded that the research model showed significant results to support 5 of the seven hypotheses and revealed key findings on factors that influence employee attitudes and intentions to share knowledge in homeland security. This research presents several theoretical and practical implications, advancing prior findings and overall the literature regarding knowledge sharing, individual behaviors, attitudes and intentions to share knowledge, IT use and acceptance, and information systems, providing researchers, policy-makers and decision-makers, with foundations to improve knowledge sharing in organizations, such as the federal government. As such, results can be used to support Presidential and Congressional mandates to foster more collaboration and sharing to support a more secure United States, ultimately contributing to the collective body knowledge in the field.

This study is a step towards a greater understanding of the factors, such as technology, which affects employee attitudes and intention to share knowledge in homeland security. While technology has been identified as an enabler (Al-Ammary, Fung, & Goulding, 2005; Ajzen, 1991; Davenport, 1997; O'Dell & Grayson, 1998), it also adds considerable value to the management and operation of organizations. The use of technology makes it possible to share massive amounts of knowledge in many ways, with multitudes of people. It is through the sharing of knowledge that problems are solved, ideas are formed, and new innovations emerge.

Summary

The main goal of this study was to empirically assess factors that motivate employee attitudes and intentions to share knowledge using a theoretical model (see Figure 1) formed by constructs in previously validated survey instruments as a foundation to develop the research model for this study: Expected rewards, expected associations, expected contributions, attitudes to share, intention to share by Bock and Kim (2001); trust and knowledge sharing by Usoro et al. (2007), and IT usage by Ozlati (2012),

Where the Bock and Kim (2001) study leaves off, the model in the current study advances the model and literature with the inclusion of trust as a moderator of the relationship between attitudes and intentions to share knowledge and IT type usage as a moderator between intentions to share and knowledge sharing behavior.

This research concluded that the research model showed significant results to support 5 of the seven hypotheses and revealed key findings on factors that influence employee attitudes and intentions to share knowledge in homeland security. This research presents several theoretical and practical implications, advancing prior findings in the literature about knowledge sharing, individual behaviors, attitudes, and intentions to share knowledge, IT use and acceptance, and information systems. The findings in this research deepen our understanding of knowledge sharing behavior and contribute to the collective knowledge in the field. The study results in added knowledge in an area not often studied in the current literature and is a step towards a greater understanding of the factors that affect employee attitudes and intentions to share knowledge in homeland security.

Appendix A

Site Participation Approval

Office of the Chief Information Officer
National Protection and Programs Directorate
U.S. Department of Homeland Security
Washington, DC 20528

Homeland Security

November 21, 2017

Nova Southeastern University
3301 College Avenue
Fort Lauderdale, FL 33314-7796

Subject: Site Approval Letter

To whom it may concern:

This letter acknowledges that I have received and reviewed a request by Evette Maynard-Noel to conduct a research project entitled "An Investigation of Factors Motivating Employee Attitudes and Intentions to Share Knowledge in Homeland Security" at DHS, and I approve of this research to be conducted at our facility.

When the researcher receives approval for his/her research project from the Nova Southeastern University's Institutional Review Board/NSU IRB, I agree to provide access for the approved research project. If we have any concerns or need additional information, we will contact the Nova Southeastern University's IRB at (954) 262-5369 or irb@nova.edu.

Sincerely,

David B. Epperson
Chief Information Officer
David.Epperson@hq.dhs.gov

Appendix B

G*Power 3.1.9.2 Analysis
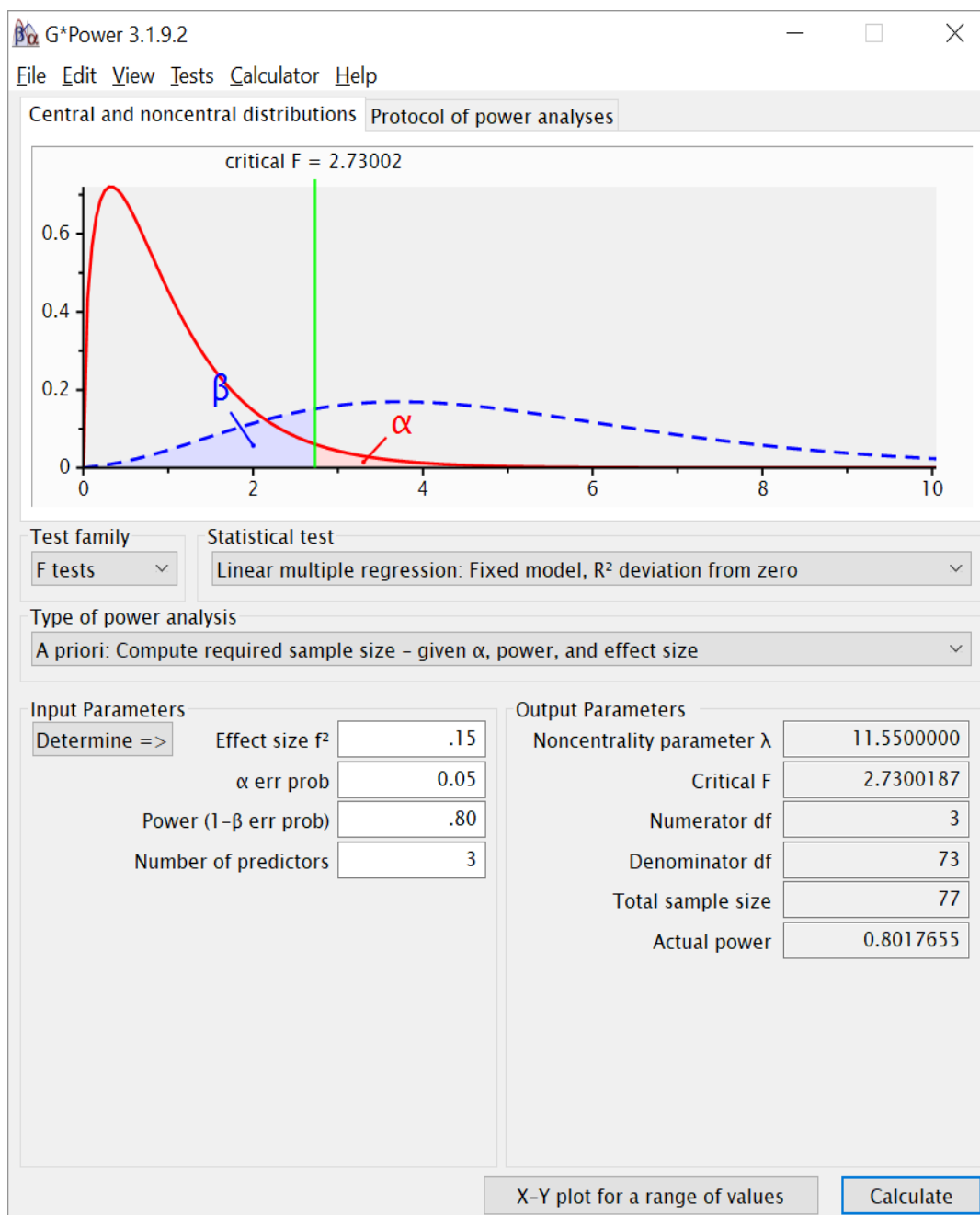
Appendix C

Participant Solicitation Email

Dear Colleague,

One of our members, Evette Maynard-Noel, is currently working on completing her Ph.D. at Nova Southeastern University, which includes her research and Dissertation on factors that motivate employee attitudes and intentions to share knowledge in Homeland Security.

She has created an external survey instrument to collect data on individual knowledge sharing beliefs and would appreciate your participation, which is entirely voluntary and completely anonymous. No information is being asked or collected about you or your device. This questionnaire style SurveyMonkey® instrument, may be completed on any computer, laptop, tablet, and/or smartphone device.

Please share with members of your team, encourage sharing with the wider DHS audience, as well as individuals and affiliates in the homeland security industry.

If you have any questions about the survey or the research, please direct them to the principal researcher:

Evette Maynard-Noel, M.S., CISSP, CISM
maynardn@mynsu.nova.edu
301-899-7263

The survey will take 10-15 minutes to complete and will remain open until July 7, 2018.

Thank you for your participation.

Click Here to Begin or Resume Survey or Scan OR Code Below

Appendix D

Direct Participant Solicitation Email

EVETTE MAYNARD-NOEL
DOCTORAL CANDIDATE
NOVA SOUTHEASTERN UNIVERSITY

I am currently conducting research toward completing my dissertation to fulfill the requirements for the degree of Doctor of Philosophy in Information Systems at Nova Southeastern University.

I am researching factors that motivate employee attitudes and intentions to share knowledge in Homeland Security, by studying the opinions of DHS employees, as well as individuals and affiliates outside of DHS that serve to protect the homeland in varying capacities.

I have created an external survey instrument to collect specific data and would appreciate your voluntary and anonymous participation. No identifying information is being asked or collected about you or your device. This questionnaire style SurveyMonkey® instrument, may be completed on any computer, laptop, tablet, and/or smartphone device. All questions and responses are entirely unclassified.

If you have any questions about the survey, the research, or future results, please direct them to me, the principle researcher:

Evette Maynard-Noel, M.S., CISSP, CISM
maynardn@mynsu.nova.edu
301-899-7263

The survey will take 10-15 minutes to complete. Data collection will end on 07/07/2018. Please take a moment to complete the survey today. Thank you again for your support!

Click to Begin Survey or Use QR Code Below

Appendix E

Participant Follow Up Letter

Reminder Solicitation Message (emailed to participants from select points of contact)

Dear Homeland Security Community Members,

The knowledge sharing survey will close in 4 days, on 07/07/2018. The survey will take about 10-15 minutes to complete. If you have not completed the survey and wish to assist me with my research by participating, please click on the survey link and complete the survey at your earliest convenience.

**Click Here to Begin or Resume Survey
or scan QR Code Below**

Your participation is entirely voluntary. Your responses will remain confidential. No personally identifiable information will be collected or associated with your responses in any manner.

Please address any questions or comments directly to me at maynardn@nova.edu

Your participation is appreciated.

Sincerest thanks,

Evette Maynard-Noel, MS, CISSP, CISM
Doctoral Candidate
College of Engineering and Computing
Nova Southeastern University
Academic email: maynardn@mynsu.nova.edu

Appendix F

Survey Instrument

Welcome!

NSU Consent to be in a Research Study Entitled: "An Investigation of Factors Motivating Attitudes and Intentions to Share Knowledge."

Who is doing this research study? The person doing this study is Evette Maynard-Noel, with Nova Southeastern University College of Engineering and Computing. She will be helped by Souren Paul, Ph.D.

Why is this research being done? This is a research study, it is designed to specifically look at what motivates individuals to share knowledge and how the use of and perceived usefulness of various technologies may influence their decision to share knowledge within homeland security. The purpose of this research study is to evaluate individual attitudes and intentions to share knowledge, in addition to the usage of technology and its influence on an individual's intention to share knowledge in a homeland security organization.

You will be presented questions regarding sharing your work related knowledge with members of your organization. The primary topic include:

• Whether topics such as bonuses, promotion, training, etc., influence your attitudes and/or intentions to share your knowledge in your organization.
• Your rating of the level of trust and its impact on sharing knowledge in your organization
• Your intention to use technology to share knowledge, and subsequent usage behavior.

What will I be doing if I agree to be in this research study? You will be taking a one-time, anonymous survey. The survey will take approximately 10 -15 minutes to complete.

Are there possible risks and discomforts to me? This research study involves minimal risk to you. To the best of our knowledge, the things you will be doing have no more risk of harm than you would have in everyday life.
What happens if I do not want to be in this research study? You can decide not to participate in this research and it will not be held against you. You can exit the survey at any time.

Will it cost me anything? Will I get paid for being in the study? There is no cost for participation in this study. Participation is voluntary and no payment will be provided.

How will you keep my information private? Your responses are anonymous. Information we learn about you in this research study will be handled in a confidential manner. Participants may choose to participate in the study by clicking the survey link or typing the survey link information into their web browser on their computer, tablet, or phone. The survey does not ask for, nor does it record any name, email, IP address, or other personally identifiable or location information.

Survey data will be available to the researcher, the Institutional Review Board and other representatives of this academic institution, and any granting agencies (if applicable). No confidential data will be collected.

All survey data will be kept securely, and stored on encrypted servers and password-protected computers. In accordance with NSU IRB Policy, the data will be kept for a minimum of 36-months, then securely erased/destroyed using NIST Special Publication 800-88 Guidelines for Media Sanitation or other appropriate guidance.

Who can I talk to about the study? If you have questions, you can contact Evette Maynard-Noel at (301) 899-7263 maynardn@mynsu.nova.edu or Souren Paul, Ph.D. at (954) 262-2047 spaul@nova.edu . If you have questions about the study but want to talk to someone else who is not a part of the study, you can call the Nova Southeastern University Institutional Review Board (IRB) at (954) 262-5369 or toll free at 1-866-499-0790 or email at IRB@nova.edu.

* 1. I am 18 years of age or older and understand the purpose of this survey. I grant consent for my responses to be included in the research data. Completing the survey indicates your voluntary participation in the study.

◯ Yes -- to confirm you are 18 or older, to acknowledge understanding the purpose of this survey, and to grant your consent for your responses to be included in the research data (if you elect to participate and quit prior to completing the survey, your responses cannot be used).

◯ No -- If you do not grant consent.

Attitudes and Intentions to Share Knowledge

Expectations

* 2. In this survey, knowledge refers to what you know, such as the individual's know-how, skills, or important factual information. Knowledge sharing refers to the behavior of an individual who willingly shares or transfers her/his knowledge to others.

The following questions are about your belief in the possibility of receiving rewards in return for your knowledge sharing. Please make the most appropriate selection for each question.

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
I expect to receive monetary rewards in return for my knowledge sharing.	○	○	○	○	○
I expect to receive additional credit toward promotion in return for my knowledge sharing.	○	○	○	○	○
I expect to receive an honor or educational opportunity in return for my knowledge sharing.	○	○	○	○	○

Attitudes and Intentions to Share Knowledge

Expectations

* 2. In this survey, knowledge refers to what you know, such as the individual's know-how, skills, or important factual information. Knowledge sharing refers to the behavior of an individual who willingly shares or transfers her/his knowledge to others.

The following questions are about your belief in the possibility of receiving rewards in return for your knowledge sharing. Please make the most appropriate selection for each question.

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
I expect to receive monetary rewards in return for my knowledge sharing.	○	○	○	○	○
I expect to receive additional credit toward promotion in return for my knowledge sharing.	○	○	○	○	○
I expect to receive an honor or educational opportunity in return for my knowledge sharing.	○	○	○	○	○

* 3. The following questions are about your belief in the possibility of your organization's improvement in its performance after sharing your knowledge. Please make the most appropriate selection for each question.

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
My knowledge sharing would help other members in the organization to solve problems.	○	○	○	○	○
My knowledge sharing would create new opportunities for the organization.	○	○	○	○	○
My knowledge sharing would improve work processes in the organization.	○	○	○	○	○
My knowledge sharing would increase the productivity in the organization.	○	○	○	○	○
My knowledge sharing would help the organization to achieve its performance objectives.	○	○	○	○	○

* 4. The following questions are about your belief in the possibility of changes in relationship between you and other organizational members after sharing your knowledge. Please make the most appropriate selection for each question.

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
My knowledge sharing would strengthen the tie between me and existing members in the organization.	○	○	○	○	○
My knowledge sharing would get me well acquainted with new members in the organization.	○	○	○	○	○
My knowledge sharing would expand the scope of my associations with other members in the organization.	○	○	○	○	○
My knowledge sharing would draw smooth cooperation from able members in the future.	○	○	○	○	○
My knowledge sharing would make strong relationships with members who have common interests in the organization.	○	○	○	○	○

Attitudes and Intentions to Share Knowledge

Attitudes Toward Knowledge Sharing

There are many reasons why people share their knowledge with members of their organization. Knowledge sharing refers to the behavior of an individual who willingly shares or transfers her/his knowledge to others

* 5. The following questions are about your general attitude toward your knowledge sharing with other members in the organization. Please make the most appropriate selection for each question.

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
My knowledge sharing with other organizational members is good.	○	○	○	○	○
My knowledge sharing with other organizational members is harmful.	○	○	○	○	○
My knowledge sharing with other organizational members is an enjoyable experience.	○	○	○	○	○
My knowledge sharing with other organizational members is valuable to me.	○	○	○	○	○
My knowledge sharing with other organizational members is a wise move.	○	○	○	○	○

Attitudes and Intentions to Share Knowledge

Trust

* 6. Please indicate the extent to which you disagree or agree with each statement on trust:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I believe that members of my organization would act in my best interest.	○	○	○	○	○
If I required help, members of my organization would do their best to help me.	○	○	○	○	○
Members of my organization are truthful in their dealings with me.	○	○	○	○	○
I would characterize members of my organization as honest.	○	○	○	○	○
Members of my organization would keep their commitments.	○	○	○	○	○
Members of my organization are genuine and sincere.	○	○	○	○	○
I trust members of my organization when I ask them not to forward or share any sensitive material.	○	○	○	○	○

Attitudes and Intentions to Share Knowledge

Intentions to Share Knowledge

The following questions are about your general intention to share your knowledge with other members in the organization. Please make the most appropriate selection for each question.

* 7. Please indicate how often you share or intend to share your work-related knowledge with members of your organization in general. Please indicate the likelihood of your knowledge sharing intentions:

	Extremely Unlikely	Unlikely	Neutral	Likely	Extremely LIkely
I will share my knowledge with more organizational members.	◯	◯	◯	◯	◯
I will always provide my knowledge at the request of other organizational members.	◯	◯	◯	◯	◯
I intend to share my knowledge with other organizational members more frequently in the future.	◯	◯	◯	◯	◯
I try to share my knowledge with other organizational members in an effective way.	◯	◯	◯	◯	◯
I will share my knowledge to anyone in the organization if it is helpful to the organization.	◯	◯	◯	◯	◯

Attitudes and Intentions to Share Knowledge

**IT Type
Usage**

The questions below will focus on your experiences with the types of technology used for sharing knowledge at your workplace, and how often you use them.

* 8. Please indicate how often you use each tool or technology to share your knowledge with your colleagues

	Never	Rarely (<10% of the time)	Occasionally (about 30% of the time)	Sometimes (about 50% of the time)	Frequently (about 70% of the time)	Usually (about 90% of the time)	All of the time
Electronic Mail (EMail)	◯	◯	◯	◯	◯	◯	◯
Phone or teleconferencing	◯	◯	◯	◯	◯	◯	◯
Web Conferencing (Adobe Connect, etc.)	◯	◯	◯	◯	◯	◯	◯
Content Management. knowledge repository (Databases, Sharepoint, etc.)	◯	◯	◯	◯	◯	◯	◯
Instant Messaging (Skype, etc.)	◯	◯	◯	◯	◯	◯	◯

Attitudes and Intentions to Share Knowledge

Knowledge Sharing Behavior

* 9. In this survey, knowledge refers to what you know, such as the individual's know-how, skills, or important factual information. Knowledge sharing refers to the behavior of an individual who willingly shares or transfers her/his knowledge to others. Please indicate the extent to which you disagree or agree with each statement:

	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
I frequently share my knowledge with others in the community.	○	○	○	○	○
I make a conscious effort to spend time engaged in activities that contribute knowledge to my organization.	○	○	○	○	○
My contributions to the organization enable others to develop new knowledge.	○	○	○	○	○
The knowledge I share with the community, and my colleagues, has a positive impact on the organization.	○	○	○	○	○
Overall, I feel the frequency and quality of my knowledge sharing efforts are of great value to the organization.	○	○	○	○	○

Attitudes and Intentions to Share Knowledge

Participant Demographics

Thank you so much for your time and participation in this research.

The next few questions will help us make sure that all types of people are represented in this study

* 10. Number Years work experience (ex. 36 to represent the period of time between the first job to current job)

[   ]

* 11. Please indicate your highest level of education

( ) High school graduate

( ) Some college

( ) Associate's degree

( ) Bachelor's degree

( ) Master's degree

( ) Doctoral degree

( ) Professional degree

( ) Prefer not to answer

( ) Other (please specify)

[   ]

* 12. Please indicate your Geographical Duty Location

( ) NCR - National Capitol Region (DC, MD, VA)

( ) Outside of the NCR

( ) Prefer not to answer

* 13. Please indicate your gender

( ) Female

( ) Male

( ) Non-Binary/Third gender

( ) Prefer not to answer

* 14. In what year were you born? (enter 4-digit birth year; for example, 1976)

[   ]

* 15. What is your ethnicity?

☐ American Indian or Alaskan Native

☐ Asian or Pacific Islander

☐ Black or African American

☐ Hispanic or Latino

☐ White / Caucasian

☐ Prefer not to answer

☐ Other (please specify)

[   ]

* 16. What is your country of birth?

○ United States

○ Prefer not to answer

○ Other (please specify)

[   ]

Attitudes and Intentions to Share Knowledge
Closing Page

Thank you very much for your participation. You have completed the research survey. Any survey that appears after this page is not affiliated with Evette Maynard-Noel's research study, and you may stop at this point. If you have any questions about the study or would like to receive a copy of the results please contact the researcher, Evette Maynard-Noel Nova Southeastern University (maynardn@mynsu.nova.edu).

Appendix G

Construct and Question Matrix

Construct/Variable	#	Selection
Expected Rewards	ER1-1	I expect to receive monetary rewards in return for my knowledge sharing.
	ER2-1	I expect to receive additional points for promotion in return for my knowledge sharing.
	ER3-1	I expect to receive an honor or educational opportunity in return for my knowledge sharing
Expected Contributions	EC1-2	My knowledge sharing would help other members in the organization to solve problems.
	EC2-2	My knowledge sharing would create new business opportunities for the organization.
	EC3-2	My knowledge sharing would improve work processes in the organization.
	EC4-2	My knowledge sharing would increase productivity in the organization.
	EC5-2	My knowledge sharing would help the organization to achieve its performance objectives.
Expected Associations	EA1-3	My knowledge sharing would strengthen the tie between me and existing members in the organization.
	EA2-3	My knowledge sharing would get me well acquainted with new members of the organization.
	EA3-3	My knowledge sharing would expand the scope of my associations with other members of the organization.
	EA4-3	My knowledge sharing would draw smooth cooperation from able members in the future.

	EA5-3	My knowledge sharing would make strong relationships with members who have common interests in the organization.
Attitudes to Share Knowledge	AS1-4	My knowledge sharing with other organizational members is good.
	AS2-4	My knowledge sharing with other organizational members is harmful.
	AS3-4	My knowledge sharing with other organizational members is an enjoyable experience.
	AS4-4	My knowledge sharing with other organizational members is valuable to me.
	AS5-4	My knowledge sharing with other organizational members is a wise move.
Trust	TR1-5	I believe that members of my organization would act in my best interest.
	TR2-5	If I required help, members of my organization would do their best to help me.
	TR3-5	Members of my organization are truthful in their dealings with me.
	TR4-5	I would characterize members of my organization as honest.
	TR5-5	Members of my organization would keep their commitments.
	TR6-5	Members of my organization are genuine and sincere.
	TR7-5	I trust members of my organization when I ask them not to forward or share any component sensitive material.
Intentions to Share	IS1-6	I will share my knowledge with more organizational members.
	IS2-6	I will always provide my knowledge at the request of other organizational members.
	IS3-6	I intend to share my knowledge with other organizational members more frequently in the future
	IS4-6	I try to share my knowledge with other organizational members in an effective way.
	IS5-6	I will share my knowledge with anyone in the organization if it is helpful to the organization.

IT Type Usage	TT1-7	Electronic Mail (Email)
	TT2-7	Phone or teleconferencing
	TT3-7	Web conferencing (Adobe Connect, etc.)
	TT4-7	Content Management, Knowledge repositories, (Databases, SharePoint, etc.)
	TT5-7	Instant Messaging/Skype, etc.
Knowledge Sharing	KS1-8	I frequently share my knowledge with others in the community.
	KS2-8	I make a conscious effort to spend time engaged in activities that contribute knowledge to my organization.
	KS3-8	My contributions to the organization enable others to develop new knowledge.
	KS4-8	The knowledge I share with the community of my coworkers has a positive impact on the organization.
	KS5-8	Overall, I feel the frequency and quality of my knowledge sharing efforts are of great value to the organization.

Appendix H

Permission to use research: Expected Rewards, Expected Contributions, Expected Associations, Attitudes to Share, Intentions to Share, (Bock, & Kim 2001; Bock et al., 2005)

From: Gee-Woo Bock <gwbock@gmail.com>
Date: April 13, 2017 at 1:18:59 AM EDT
To: Evette Maynard-Noel <maynardn@nova.edu>
Subject: Re: PERMISSION TO USE EXISTING SURVEY'S OR RESEARCH IN MY RESEARCH STUDY

Thanks for your interest in my research. Please refer to the attached file and feel free to use the instruments.

Regards,
Gilbert

Bock, Gee-Woo (Gilbert) Ph.D., Professor
Room 321, School of Business Building
Sungkyunkwan University (www.skku.edu)
25-2, Sungkyunkwan-ro, Jongno-gu
Seoul 03063, Korea
Tel: 82-2-760-1051 Fax: 82-2-744-8609
Mobile: 82-10-9479-7852
E-mail: gwbock@skku.edu; gwbock@gmail.com
CV: https://sites.google.com/site/gwbock/home

Appendix I

Permission to use research: IT Usage & Technology Acceptance Model (TAM) (Davis, 1989)

From: "Davis, Fred" <fred.davis@ttu.edu>
Date: April 10, 2017 at 9:45:23 PM EDT
To: Evette Maynard-Noel <maynardn@mynsu.nova.edu>
Subject: RE: PERMISSION TO USE EXISTING SURVEY'S OR RESEARCH IN MY RESEARCH STUDY

Dear Evette,

You have my permission to USE EXISTING SURVEY'S OR RESEARCH IN MY RESEARCH STUDY
Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, *13*(3), 319–339.
best wishes
Sincerely, F Davis

 Dear Dr. Davis.

I am a doctoral student from Nova Southeastern University.   I am currently writing my dissertation, tentatively titled "An Investigation of Factors Motivating Employee Attitudes and Intentions to Share Knowledge in Homeland Security," under the direction of my dissertation committee, chaired by Dr. Souren Paul.

I would like permission to use a portion of your research/survey instrument referenced above, in my research study under the following conditions:

- I will use this survey only for my research study and will not sell or use it wit any compensated or curriculum developed activities.
- I will use a standard APA style citation in referencing your work.

If these are acceptable terms and conditions, please indicate so by replying to this email with a short statement, granting your permission.

 Sincerely,

Evette Maynard-Noel, Doctoral Candidate
Nova Southeastern University
Email: maynardn@mynsu.nova.edu

Appendix J

Permission to use research: IT Type Usage (Ozlati, 2012)

From: Evette Maynard-Noel <maynardn@nova.edu>
Date: April 9, 2017 at 8:14:52 PM EDT
To: <shabnam@hfcsi.com>, <shabnam.ozlati@alumni.cgu.edu>
Cc: Evette Maynard-Noel <maynardn@nova.edu>
Subject: PERMISSION TO USE EXISTING SURVEY OR RESEARCH IN MY RESEARCH STUDY
PERMISSION TO USE EXISTING SURVEY OR RESEARCH IN MY RESEARCH STUDY

Ozlati, S. (2012). Motivation, Trust, Leadership, and Technology: Predictors of Knowledge Sharing Behavior in the Workplace.

Dear Dr. Ozlati.

I am a doctoral student from Nova Southeastern University. I am currently writing my dissertation, tentatively titled "An Investigation of Factors Motivating Employee Attitudes and Intentions to Share Knowledge in Homeland Security," under the direction of my dissertation committee, chaired by Dr. Souren Paul.

I would like your permission to use a portion of your research/survey instrument referenced above, in my research study under the following conditions:

- I will use this survey only for my research study and will not sell or use it wit any compensated or curriculum developed activities.
- I will use a standard APA style citation in referencing your work.

If these are acceptable terms and conditions, please indicate so by replying to this email with a short statement, granting me your permission.

Sincerely,

Evette Maynard-Noel, Doctoral Candidate
Nova Southeastern University
Email: maynardn@nova.edu

Appendix K

Permission to use research: Trust & Knowledge Sharing Behavior
(Usoro et al., 2007)

From: Abel Usoro <Abel.Usoro@uws.ac.uk>
Date: April 10, 2017 at 5:16:27 AM EDT
To: Evette Maynard-Noel <maynardn@nova.edu>
Subject: RE: PERMISSION TO USE EXISTING SURVEY OR RESEARCH IN MY RESEARCH STUDY

Dear Evette
Yes, you can use it, and I wish you the best in your research.
Best regards.
Abel

Please consider the environment and think before you print.

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Appendix L

Consolidated Response: Survey/Interview Validation Rubric for Expert Panel – VREP©
By Marilyn K. Simon with input from Jacquelyn White
2014 Version

Reviewers Name: _____Consolidated Responses from Expert Panel_____

Expertise in Related area (please note courses taught, professional experience, publications, or degrees in related areas);
Combined expertise: statistical analysis, strategic/operational/military operations, intelligence, homeland security operations, survey design, human behavior, information management, information technology, information collections, information assurance, information systems security, cybersecurity, and knowledge management. Combined Degrees: B.S., M.S., Ph.D. (2). J.D.

http://dissertationrecipes.com/

Criteria	Operational Definitions	Score 1=Not Acceptable (major modifications needed) 2=Below Expectations (some modifications needed) 3=Meets Expectations (no modifications needed but could be improved with minor changes) 4=Exceeds Expectations (no modifications needed)				Questions NOT meeting standard (List page and question number) and need to be revised. *Please use the comments and suggestions section to recommend revisions.*
		1	2	3	4	
Clarity	• The questions are direct and specific. • Only one question is asked at a time. • The participants can understand what is being asked. • There are no *double-barreled* questions (two questions in one).			X		**See below 6 + 8**
Wordiness	• Questions are concise. • There are no unnecessary words			X		
Negative Wording	• Questions are asked using the affirmative (e.g., Instead of asking, "Which methods are not used?", the researcher asks, "Which methods *are* used?")				X	

Overlapping Responses	• No response covers more than one choice. • All possibilities are considered. • There are no ambiguous questions.				X	
Balance	• The questions are unbiased and do not lead the participants to a response. The questions are asked using a neutral tone.				X	
Use of Jargon	• The terms used are understandable by the target population. • There are no clichés or hyperbole in the wording of the questions.				X	**. . . . of note, terms and acronyms were defined.**
Appropriateness of Responses Listed	• The choices listed allow participants to respond appropriately. • The responses apply to all situations or offer a way for those to respond with unique situations.				X	
Use of Technical Language	• The use of technical language is minimal and appropriate. • All acronyms are defined.				X	
Application to Praxis	• The questions asked to relate to the daily practices or expertise of the potential participants.				X	

Relationship to Problem	• The questions are sufficient to resolve the problem in the study • The questions are sufficient to answer the research questions. • The questions are sufficient to obtain the purpose of the study.				**X**	
Measure of Construct: SURVEY QUESTION #2: EXPECTED REWARDS	The survey adequately measures this construct. * **Definition:** Expected Rewards assume that employees believe they will receive such as monetary rewards, promotion, or educational opportunity from their knowledge sharing, they would develop a more positive attitude toward knowledge sharing (Bock & Kim, 2001).				**X**	

Measure of Construct: SURVEY QUESTION #3: EXPECTED CONTRIBUTIONS	The survey adequately measures this construct. * **Definition:** Expected contribution refers to the idea that if employees believe they could make contributions to the organization's performance, they will develop a more positive attitude toward knowledge sharing (Bock & Kim, 2001).				X	
Measure of Construct: SURVEY QUESTION #4: EXPECTED ASSOCIATIONS	The survey adequately measures this construct. * **Definition:** Expected associations assume that if employees believe they could improve relationships with other employees by offering their knowledge, they will develop a more positive attitude toward knowledge sharing (Bock & Kim, 2001).				X	

Measure of Construct: SURVEY QUESTION #5: ATTITUDES TO SHARE KNOWLEDGE	The survey adequately measures this construct. * **Definition:** The degree of positive/negative feelings an individual has towards the intention to share knowledge. Higher attitudinal disposition towards knowledge sharing should increase knowledge sharing intention (Arpaci & Baloğlu 2016).				X	
Measure of Construct: SURVEY QUESTION #6: TRUST	The survey adequately measures this construct. * **Definition:** The expectation of honest and cooperative behavior (Usoro et al., 2007).				X	**Note: Given the environment, the panel agreed that trust is a major significant factor, and the construct was defined and applied appropriately.**
Measure of Construct: SURVEY QUESTION #7: INTENTIONS TO SHARE KNOWLEDGE	The survey adequately measures this construct. * **Definition:** The degree to which one believes that one will engage in a knowledge sharing act (Bock & Kim, 2001).				X	
Measure of Construct: SURVEY QUESTION #8: IT USAGE	The survey adequately measures this construct. * **Definition:** IT usage measures the specific type of technology (email,				X	

					X	
	phone, social media, repositories, etc.) used, and the frequency of its use (Ozlati, 2012).					
Measure of Construct: SURVEY QUESTION #9: KNOWLEDGE SHARING BEHAVIOR	The survey adequately measures this construct. * **Definition:** The degree to which one actually shares one's own knowledge (Bock & Kim, 2001).			X		

* The operational definition should include the domains and constructs that are being investigated. You need to assign meaning to a variable by specifying the activities and operations necessary to measure, categorize, or manipulate the variable.   For example, to successfully measure the construct, the following domains could be included: the degree of physical disability (low number), the prevalence of physical performance (high number), and degree of cognitive impairment (low number). If you were to measure creativity, this construct is generally recognized to consist of flexibility, originality, elaboration, and other concepts. Prior studies can help establish the domains of a construct.

Comments and Suggestions

Expert Panel Comments

All reviewers initially considered the survey instrument a bit long on paper. However, once panel members stepped through each, it was pretty clear that it did not take that long to compete, maybe 10 minutes or so. Overall, the questions and response choices made in this survey would capture appropriate data from the population.

Additional Expert Panel Questions/Comments

- Add "Other" as an option to demographics questions so that the user can write out what the option is instead of just selecting the dot.
- Panel members discussed the question of whether to use an age range or year of birth. Additional questions followed: (1) will you give the user the option to type in the year, or will they be able to scroll and select a year? (2) How are you going to look at the responses generationally (based on the age/age range)? The panel decided to vote among themselves for an outcome. Results were 4 to 1 in favor of using the year.

Additional Recommendations

- Add the following to the Thank You page: "Any survey requests or questions following this page are NOT associated with Evette Maynard-Noel's study. This is recommended because it seems that SurveyMonkey is soliciting for other surveys immediately following your study. This may help respondents to understand that they are completely DONE assisting you with your study and do not have to proceed.

- Add other to every option in your instrument. This will give the participant an option, especially if they feel that there was not a selection that matched their opinion, belief, or other.

Pilot Study Questions/Comments

Q5-5: "There are many reasons why people share their knowledge with members of their organization. Knowledge sharing refers to the behavior of an individual who willingly shares or transfers his/her knowledge to others." The directions for the question states the following questions are about your general attitude toward your knowledge sharing with other members in the organization. Please make the most appropriate selection for each question. Where the option Pilot Study Participant asked: "How will I know if my knowledge sharing with other organization members is a wise move? The question is asking for the level of agreement with the statement.

Panel Observation or Comment: The panel agreed that the researcher is soliciting opinions and beliefs as to the level of agreement with the statement, or frequency, or likelihood of occurrence, and the population of respondents may know or understand how to interpret and answer.

Overall comment: "the survey seemed to be somewhat lengthy, but really did not take that long to complete."

Types of Validity

VREP is designed to measure face validity, construct validity, and content validity. To establish criterion validity would require further research.

Face validity is concerned with how a measure or procedure appears. Does it seem like a reasonable way to gain the information the researchers are attempting to obtain? Does it seem well designed? Does it seem as though it will work reliably? Face validity is independent of established theories for support (Fink, 1995).

Construct validity seeks agreement between a theoretical concept and a specific measuring device or procedure. This requires operational definitions of all constructs being measured.

Content Validity is based on the extent to which a measurement reflects the specific intended domain of content (Carmines & Zeller, 1991, p.20). Experts in the field can determine if an instrument satisfies this requirement. Content validity requires the researcher to define the domains they are attempting to study. Construct, and content validity should be demonstrated from a variety of perspectives.

Criterion-related validity, also referred to as instrumental validity, is used to demonstrate the accuracy of a measure or procedure by comparing it with another measure or procedure which has been demonstrated to be valid. If, after an extensive search of the literature, such an instrument is *not* found, then the instrument that meets the other measures of validity are used to provide criterion related validity for future instruments.

Operationalization is the process of defining a concept or constructs that could have a variety of meanings to make the term measurable and distinguishable from similar concepts. Operationalizing enables the concept or constructs to be expressed in terms of empirical observations. Operationalizing includes describing what is and what is not, part of that concept or construct.

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Appendix M

NSU Institutional Review Board (IRB) Approval Letter

NOVA SOUTHEASTERN UNIVERSITY
Institutional Review Board

MEMORANDUM

To: **Evette Maynard-Noel**

From: **Ling Wang, Ph.D.,**
Center Representative, Institutional Review Board

Date: **February 16, 2018**

Re: **IRB #: 2018-85; Title, "An Investigation of Factors Motivating Employee Attitudes and Intentions to Share Knowledge in Homeland Security"**

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review under **45 CFR 46.101(b) (Exempt Category 2)**. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1)   CONSENT: If recruitment procedures include consent forms, they must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2)   ADVERSE EVENTS/UNANTICIPATED PROBLEMS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and Ling Wang, Ph.D., respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3)   AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Souren Paul
Ling Wang, Ph.D.

Appendix N

Permission to Use Survey: Interview Validation Rubric for Expert Panel—VREP©

Nov 18, 2019

To: Evette Maynard-Noel

Thank you for your request for permission to use VREP in your research study. I am willing to allow you to reproduce the instrument as outlined in your letter at no charge with the following understanding:
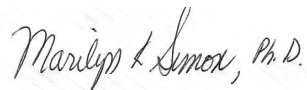
- You will use this survey only for your research study and will not sell or use it with any compensated management/curriculum development activities.

- You will include the copyright statement on all copies of the instrument.

- You will send your research study and one copy of reports, articles, and the like that make use of this survey data promptly to our attention.

If these are acceptable terms and conditions, please indicate so by signing one copy of this letter and returning it to me.

Best wishes with your study.

Sincerely,

Marilyn K. Simon, Ph.D.

Marilyn K. Simon, Ph.D.

_____

Signature

More information can be found in Simon and Goes' Dissertation and Scholarly Research: Recipes for Success, 2018 edition. http://www.dissertationrecipes.com/

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