2014

A Causal Model to Predict Organizational Knowledge Sharing via Information and Communication Technologies

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by

Simon Cleveland

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

Graduate School of Computer and Information Sciences
Nova Southeastern University
2014

We hereby certify that this dissertation, submitted by Simon Cleveland, 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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2014

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

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October, 2014

Knowledge management literature identifies numerous barriers that inhibit employees' knowledge seeking and knowledge contributing practices via information and communication technologies (ICTs). Presently, there is a significant gap in the literature that explains what factors promote common knowledge sharing barriers. To bridge this gap, this study examined two research questions: 1) What are the potential factors that contribute to the commonly accepted barriers to knowledge sharing?, and 2) How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing? Literature review of 103 knowledge management articles identified three major barriers to knowledge sharing practices (lack of time, poor communication skills, and lack of trust) and three underlying factors that promoted these barriers (role conflict, role ambiguity, and locus of control). A six-stage content analysis study of the 103 knowledge articles identified 199 references to the observed contributors.

To address the second research question, a causal knowledge sharing model was developed and seven hypotheses proposed. A survey consisting of 41 questions was distributed to 1,368 full-time analysts from a variety of industries, and 314 useful responses were analyzed using confirmatory factor analysis and structural equation modeling. The results confirmed that role conflict, role ambiguity, and locus of control predicted knowledge seeking and knowledge contributing behaviors via ICTs. Moreover, type of ICTs used was found to moderate the strength of these predictors.

Acknowledgements

This dissertation is a product of a long journey made possible through the personal sacrifice, support, and encouragement of a number of people. Above all, I would like to thank my wife, Marisa, who not only spent endless hours proofreading this work, but also endured through seven other idea reports, eight conference papers, five conference trips, a journal article, and hundreds of pages of homework. She is my eternal friend, my compass, and my anchor.

I would like to thank my mother, Ionka, and father, Ivan, who taught me the importance of education and instilled in me the passion for learning. They gave me their unequivocal support throughout my studies. They are my role models. For this and all that they do for me, I am forever grateful.

I would like to thank my advisor, Dr. Timothy Ellis, for whom I have tremendous respect. He graciously mentored me and taught me the importance of rigorous scholarship and the responsibility that comes with it. I will never forget how patiently he listened to my semi-coherent ideas, unstructured thoughts, and took care to steer me back to the right path. I thank him for his patience and unflagging dedication to help me excel in my work.

I would also like to thank my dissertation committee members, Drs. Maxine Cohen and Vincent Scovetta, for their thoughtful criticism, valuable suggestions, and insightful recommendations that made this study complete.

Dr. James Harvey from George Mason University and Drs. James Bailey and Elias Carayannis from the George Washington University, as well as Richard Badge and Mariusz Krolczynski deserve a special thank you. They graciously offered their time to write academic and professional recommendations so that I can gain acceptance to the Nova Southeastern University's Ph.D. program. Without their honest feedback, I would probably be still applying.

I would like to thank Drs. Greg Block, Stephen Orr IV, and Donald McKay II. They were my 'barometers' throughout the program. Their gracious sharing of lessons learned and best practices helped me optimize and accelerate my pace through the coursework and the dissertation process.

A special thanks to my peers Patrick Offor, Mohammad Moeini, Crissy Hinojosa, Jason Perretta, and Harold Madden for sharing their expert opinions and insightful comments on my work. Their continuous advice were deeply appreciated.

Thank you to the PMI Education Foundation and the International Institute for Learning for awarding me graciously with the prestigious Dr. Harold Kerzner Scholarship three years in a row. Drs. Timothy Ellis and Yair Levy, and James French, Jim VonRinteln, George Geordi, William Nemanick, and Barry Axelrod were instrumental with their recommendations in helping me secure these scholarships. A big 'Thank you' to them as well.

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Chapter 1

Introduction

Background

Avoiding repetition of mistakes by relying on the use of previously acquired knowledge has been a key knowledge management (KM) goal of organizations (Hanisch, Lindner, Mueller, & Wald, 2009). The existence of organizational procedures to share knowledge does not, however, guarantee knowledge sharing. A survey of 522 professionals indicated that while 62.4% of the organizations have formal procedures for documenting experiential knowledge, 89.3% are not sharing knowledge (Williams, 2008). This lack of adherence to procedures for knowledge documentation and the existence of a variety of other barriers to knowledge contribution inhibit knowledge management practices in organizations. As a result, novices fail to learn from experienced professionals and repeat historical mistakes.

The work force is in the process of significant change; estimates indicate that 3.6 million "baby boomers" will leave by 2020 (Toossi, 2012). With their departure, valuable knowledge accumulated over many years will disappear. This issue is especially critical in the IS area where it is common for organizations to not keep archives of accumulated experience, best practices, and valuable positive or negative work insights. For example, approximately 66% of information technology projects fail as a result of inexperienced staff (StandishGroup, 2011).

Organizations have been taking steps to combat loss of knowledge by investing in technologies that help facilitate knowledge transfer. In 2011, US based businesses invested $289.9 billion on ICTs, a 10.6% increase from 2010 (U.S.Census, 2013). ICTs (combination of email, instant messaging, micro/wiki blogging, online forums, and knowledge repositories) provide employees with the ability to capture and share knowledge in the normal flow of their work (Kankanhalli, Tan, & Wei, 2005; Rojko, Lesjak, & Vehovar, 2011). According to some reports, sales of enterprise social networking ICTs had a 259% increase in the first quarter of 2013 (Perez, 2013), yet in spite of such enterprise investments, organizations still fail to retain knowledge insights at a rate of approximately $32 billion per year in Fortune 500 companies (Yan, Davison, & Mo, 2013).

Problem Statement

Effective dissemination of knowledge is a critical component for the achievement and sustainability of competitive advantage for any firm (Buckley & Carter, 2000; Davenport & Prusak, 2000; Davenport, Prusak, & Wilson, 2003; Evermann, 2005; Foss & Pedersen, 2002; Friedman, 2002; Grant, 1996; Hackney, Burn, & Salazar, 2004; Spender & Grant, 1996; Teece, 2000). While successful knowledge transfer is associated with higher levels of productivity and prolonged organizational survival (Darr, Argote, & Epple, 1995; Dyer & Nobeoka, 2000; Galbraith, 1990), literature suggests that this success depends on the knowledge exchange between experts and novices (Cabrera & Cabrera, 2005; Damodaran & Olphert, 2000; Hinds, Patterson, & Pfeffer, 2001; Wang & Noe, 2010).

Presently, there is a gap in the understanding on how to effectively promote knowledge sharing within an organization, because barriers that inhibit knowledge

sharing behaviors and factors that promote these barriers are poorly understood (Bock, Zmud, Kim, & Lee, 2005; Connelly & Kelloway, 2003; Ruggles, 1998). Extant literature has identified a number of knowledge sharing barriers such as lack of time (Kankanhalli et al., 2005; Santos, Soares, & Carvalho, 2012; Williams, 2008), poor communications skills (Lin, Wu, & Yen, 2012; Riege, 2005; Santos et al., 2012), and lack of trust (Abrams, Cross, Lesser, & Levin, 2003; He, Qiao, & Wei, 2009; Jarvenpaa & Majchrzak, 2008; Renzl, 2008; Ridings, Gefen, & Arinze, 2002; Riege, 2005; Rosen, Furst, & Blackburn, 2007; Sun & Scott, 2005); however, information and communication technology (ICT) research has demonstrated that technology alone is not capable of increasing knowledge sharing or eliminating knowledge sharing barriers. While some studies have suggested that electronic knowledge repositories (EKRs) can facilitate the flow of knowledge (Alavi & Leidner, 2001; Ibrahim & Nissen, 2005; Newell, Swan, & Galliers, 2000; von Krogh, 1998), others have shown little evidence of such success (Kelly & Jones, 2001). For example, Gilmour (2003) found US firms spent nearly $4.5 billion on ICTs without realizable benefits to the knowledge sharing processes. In another study among European and U.S. firms, the knowledge transfer success rate was measured at only 13% from a sample of 431 organizations (Ruggles, 1998). It seems the problem is not rooted in the technology, but in the people that use it, specifically their lack of understanding of its benefits, lack of communication, lack of time to use it, its incompatibility with their current jobs, and lack of training on it (Cabrera, Collins, & Salgado, 2006).

To truly understand the problem and add value to the knowledge management literature, it is necessary to examine the organizational and individual characteristics that

influence the aspects of knowledge sharing behavior. For this purpose, knowledge sharing behaviors were deconstructed into its building blocks: knowledge seeking and knowledge contributing practices (Van den Hooff & De Ridder, 2004). Doing so allowed for an adequate exploration of the unique drivers that impact each behavior and determine potential contributors to the lack of knowledge sharing success (Carter & Scarbrough, 2001; Voelpel, Dous, & Davenport, 2005).

Dissertation Goals

The goal of this study was to develop an actionable knowledge sharing model to explain contributory factors that impact employees' use of ICTs to seek and contribute knowledge. The goal was accomplished by conducting causal modeling research. This type of research provides major advantages to assessing and predicting the effects of one set of variables on another set (Bontis & Fitz-Enz, 2002; Bontis & Serenko, 2009). In the knowledge management literature, causal modeling studies have been successfully used (Chiu, Hsu, & Wang, 2006; Ngah & Ibrahim, 2010; Staples & Webster, 2008; Wasko & Faraj, 2005; Zaim, Tatoglu, & Zaim, 2007). For example, He and Wei (2009) used a causal modeling study to demonstrate that employees contributed to knowledge management systems (KMS) as a result of the joy they perceived in helping others, the strength of social relationships, and perceived value of management support. Their model also showed that knowledge seeking was associated with the perceived seeking effort, the social relationships, and the utility of the KMS.

Similarly, Chen and Hung (2010) used causal modeling research to examine the factors associated with increased knowledge transfer and their impact on virtual communities. They studied 323 members of two communities using structural equation

modeling (SEM). The results showed that knowledge sharing in virtual communities was impacted by reciprocity, interpersonal trust, knowledge sharing self-efficacy, and perceived relative advantage, while knowledge utilization was associated with knowledge contributing behaviors.

Research Questions

For the current study, the following research questions drove the development of the causal model:

1) What are the potential factors that contribute to the commonly accepted barriers to knowledge sharing?

2) How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing?

Relevance and Significance

The alarming rate of baby boomers' departure from the workforce will increase the drain of organizational knowledge accumulated over the years (Levy, 2011). The challenge will be to capture and transfer their experiential knowledge to the employees who will inherit the vacant roles (Whyte & Classen, 2012). This challenge is even more prevalent in the IS field where the majority of software and systems projects do not keep archives of accumulated experience (Williams, 2008). While extant literature on the use of ICTs for the purpose of knowledge creation is abundant (Cabrera et al., 2006; Hsu, Ju, Yen, & Chang, 2007; Kankanhalli et al., 2005; Tseng & Kuo, 2010; Van den Hooff & De Ridder, 2004; Watson & Hewett, 2006), a review of the literature suggests a gap in research that explores the impact of contributing factors to knowledge sharing barriers on the use of ICTs for knowledge seeking and knowledge contributing. The present study

closed this gap. It contributes to the knowledge management (KM) body of knowledge by providing analysis of the existing literature on the characteristics of knowledge seeking and knowledge contributing behaviors. In doing so, current debates related to the notion of knowledge sharing via ICTs are clarified (Huysman & De Wit, 2002; Roberts, 2000; Zack, 1999). Results from the study emphasize how employees search and share knowledge in organizations, as well as provide broader understanding on the factors that guide these behaviors. Moreover, the study operationalized and validated these factors, therefore offering greater insight into their characteristics.

Another significance of this research was the use of a causal modeling approach. Presently, case-based studies dominate the KM literature (Despres & Chauvel, 1999; Wong & Aspinwall, 2004), and some researchers have proposed that KM is a soft discipline, not particularly useful beyond augmenting the corporate culture (Demarest, 1997). Quantitative-based KM study can serve as a model for future organizational initiatives in the KM discipline (O'Brien, 2013).

The research also has practical implications for organizations. For example, the study adds value to the organizational decision making process by highlighting for management the areas requiring further investments in ICTs to prevent loss of knowledge. The study also clarified the results of existing research on the use of ICTs for the purposes of knowledge seeking or contributing and assists employers with new training programs to improve knowledge sharing practices in organizations. Future research can shift focus toward specific ICT capacities that complement knowledge users' needs and contribute to the increase in knowledge seeking and knowledge contributing practices.

Barriers and Issues

The goal of this research was to determine the impacts of role conflict, role ambiguity and locus of control (LOC) on employees' knowledge seeking and knowledge contributing behaviors via ICTs, as well as the moderating effect of ICTs on the relationships of these variables. One barrier for this study was obtaining access to sufficient number of organizational ICT users. Issues that were encountered in this case included: 1) decision on the number of employees required to ensure the presence of sufficient statistical sample for the data analysis; and 2) obtaining the selected sample. To mitigate this barrier, rules of common statistical models (e.g. Structural Equation Modeling) were used to determine the appropriate sample. Additionally, the help of SurveyMonkey Audience online survey company was used to solicit the sample of organizational ICT users for the purposes of the study.

Another barrier concerned the scales used to test each of the constructs of the causal model. For example, lengthy scales were shown to lead to potential non-response issue for the participants (Biner & Kidd, 1994; Galesic & Bosnjak, 2009; Kalantar & Talley, 1999). To address this barrier, an expert panel was used to sort through and remove ambiguous or poorly worded items.

Another potential barrier was the decision on appropriate online software to conduct the survey. Potential issues included lack of accessibility for all available browsers (e.g. Mozilla, Safari, and Internet Explorer), flexible configurability of the questionnaire, and final data output format. To mitigate this barrier, the services of a proven, easily configurable, and broadly accessible online survey company (SurveyMonkey Audience) was used.

Assumptions, Limitations, and Delimitations

Assumptions

1) It was assumed that participants were honest in self-qualifying for the study;
2) It was assumed that the responses of the participants reflected their true beliefs and opinions;
3) It was assumed that the participants of the study either presently used, or have used, ICTs for knowledge sharing purposes at their place of employment;
4) It was also assumed that the participants made a conscientious effort to complete the survey in its entirety.

Limitations

One limitation that may raise potential questions on bias was the method of obtaining participants to the study. An opt-in crowd-sourcing platform was used as medium to solicit the participants - SurveyMonkey Audience, resulting in a voluntary sample that may not have been a representation of the entire population. This limitation was mitigated by the number of prior studies that have confirmed the validity of this platform (Hughes, 2009; Kavanaugh, Bessett, Littman, & Norris, 2013; McAuley, Chen, Elliott, & Shneker, 2009).

Another potential limitation was response rate and its impact on the generalizability of the study. While response rates for mailed surveys are typically higher than web-based surveys (Shih & Fan, 2008), a carefully crafted invitation, and frequent reminders were used to mitigate this limitation (Bosnjak & Tuten, 2001).

Completion rate was also a potential limitation to the study. To address it, an expert panel was used to improve on the survey's length, ordering, formatting, time-to-complete, and questionnaire clarity (Fan & Yan, 2010).

The inability to determine the beliefs and responses of those who chose not to complete the survey was a fourth limitation of the study. Similarly, the lack of knowledge whether the data was a representative of the sample drawn, let alone of the population was another limitation.

Finally, a limitation was the method used to obtain responses to the survey. The sample for the study was confined to participants selected by the SurveyMonkey Audience site. The survey participants may represent a biased survey-taking population (Ross, Irani, Silberman, Zaldivar, & Tomlinson, 2010) and as a result, the validity of the results may be limited.

Delimitations

Delimitations are intentional restrictions placed on the scope of the study in order to make it manageable. Extant literature demonstrates that employees in supervisory roles (e.g. managers or directors) experience higher levels of ambiguity and uncertainty with their job duties than non-supervisory employees (Alexander, 1979; Hannaway, 1985). As a result, a delimitation of the study was to use participants with the job function of analyst from across of variety of industries since it is consistent in terms of its non-supervisory duties across organizations.

A second delimitation of the study was the use of participants who were full-time employees in their organizations. Steffy and Jones (1990) found that part-time employees experience significantly greater role ambiguity than their full-time counter parts due to

perceived job strain as a result of reduced information training, job information, and social support. In order to control for this variable, only full-time employees were invited to take part in the study.

A third delimitation of the study was the selection of participants who used a restricted set of ICT applications in their organizations (email, instant messaging, micro/wiki blogging, online forums and knowledge repositories). Such delimitation ensured that the study covered ICTs that facilitate knowledge seeking and knowledge contributing behaviors in organizations.

Finally, a fourth delimitation of the study was the restricted sample of participants who resided in the United States. This delimitation was imposed by SurveyMonkey Audience and couldn't be avoided at the time of the survey.

Definition of Terms

Definitions of key terms used throughout this document are provided below in order to provide clarification on the constructs and methodology of the study:

Information and communication technologies are defined in this study as a combination of email, instant messaging, micro/wiki blogging, online forums, and knowledge repository systems for the purposes of communication among employees (Usman-Hamza, 2012).

Locus of control is defined as the extent to which employees believe that themselves or others have control over events in their lives. According to Spector (1988), locus of control is "a generalized expectancy that rewards, reinforcements or outcomes in life are controlled either by one's own actions (internality) or by other forces (externality)," (Spector, 1988, p. 385).

Role ambiguity is defined as "the lack of the necessary information available to a given organizational position," (Rizzo, House, & Lirtzman, 1970, p. 151).

Role conflict is defined as "the extent to which a person experiences incompatible role pressures within the work domain," (Aziz et al., 2011). It is characterized as over-demand on employees to complete specific tasks that they perceive as excessive on their time availability.

SurveyMonkey Audience is a crowd-sourcing site with access to millions of respondents in the United States (Hughes, 2009; SurveyMonkey, 2013).

Summary

Competitive advantage in organizations depends on effective knowledge exchange between experts and novices; however barriers that inhibit employees' knowledge sharing behaviors and factors that promote these behaviors via ICTs are poorly understood. To understand these factors, an actionable knowledge sharing model was developed that explained the contributory factors impacting employees' use of ICTs to seek and contribute knowledge. To validate the model, a causal-modeling research using a cross-sectional survey for the data collection was used.

The rest of the paper is structured as follows: a detailed literature review is performed to examine the most commonly recognized barriers to knowledge seeking and knowledge contributing; a shared set of potential factors are extracted and addressed; this is followed by a discussion on the study's methodology; and the paper concludes with results and conclusions.

Chapter 2

Review of the Literature

Overview

The focus of this literature review is to examine the characteristics of knowledge sharing behaviors, common knowledge sharing barriers, and a set of factors that influence these barriers. These topics represent an overall foundation for the conducted study and became part of the critical analysis for the problem statement.

The first component of the review is the act of organizational knowledge sharing, which is deconstructed into knowledge seeking and knowledge contributing behaviors. Results of existing studies associated with each behavior are evaluated, and potential gaps requiring further studies are proposed. Next, barriers to knowledge sharing are addressed in order to explore potential contributors that enhance or inhibit knowledge sharing behaviors. Finally, extant literature on proposed contributors is analyzed to determine their impact on employees' knowledge sharing behaviors via ICTs.

Knowledge Sharing

McDermott (1999) regarded knowledge sharing as an act where one individual guides another through one's own thinking, to make another aware of his/her own situation using personal insights. According to Lin (2006) knowledge sharing is the act of capturing, organizing, transferring, and reusing an organization's experiential knowledge. The sharing process consists of continuous dissemination, absorption, and utilization of information among employees for the purposes of integrated learning (Tiwana, 2002).

Van den Hooff and De Ridder (2004) argued that knowledge sharing is a form of knowledge donation that includes the element of joint explicit and tacit knowledge creation (Fernie, Green, Weller, & Newcombe, 2003; Lee, 2001). The process also involves two or more parties who partake in the roles of knowledge supply (source or carrier) and knowledge demand (seeker or requestor) (Ardichvili, Page, & Wentling, 2003). Wu and Haasis (2013) considered knowledge sharing as not only the contribution of one's own knowledge but also the seeking and receiving of knowledge from others within the system. As a result, the following portion of the literature review examines the characteristics of knowledge seeking and knowledge contributing behaviors.

Knowledge Seeking Behavior

Knowledge acquisition, or knowledge seeking, involves behavior associated with active searching of information for the purposes of fulfilling specific information needs (Xu, Tan, & Yang, 2006). Such needs typically stem from the existence of ambiguous problems in need of knowledge on potential courses of action (Pirolli & Card, 1999).

One theory that explains this behavior is the information foraging theory proposed by Pirolli and Card (1999). Pirolli and Card suggested that valuable information is viewed as prey that is often hidden in the environment (e.g. online documentation, books, media, people, etc). Since it may take longer to locate a piece of information from a file drawer than from an online database, information foragers, similar to predators, are forced to make decisions whether to hunt for hard-to-locate prey, or focus on accessing prey that "maximize the rate of gain of information relevant to their task," (Pirolli & Card, 1999, p. 646). As a result, the foragers consider certain information more valuable when the amount of time and effort taken to locate it is minimal and will not seek additional

information if efficiency has been achieved. “The optimal information forager is one that best solves the problem of maximizing the rate of valuable information gained per unit cost, given the constraints of the task environment,” (Pirolli & Card, 1999, p. 645). The theory also explains that in order to locate the more ‘profitable’ information, foragers “will modify their strategies or the structure of the environment to maximize their rate of gaining valuable information,” (Pirolli & Card, 1999, p. 643).

A number of different knowledge seeking behaviors have been proposed by researchers. Vandenbosch and Huff (1997) argued that these are divided into four categories: 1) undirected– exposure to information without purpose in mind; 2) conditioned – exposure without active search; 3) informal– effort to acquire information without structure; and 4) formal– purposeful effort to uncover specific information. Huber (1991) proposed that knowledge acquisition behavior consists of scanning, focused search, and performance monitoring. Furthermore, Huber argued that focused search “occurs when organizational members or units actively search in a narrow segment of the organization's internal or external environment, often in response to actual or suspected problems or opportunities,”(Huber, 1991, p. 97) and when the benefits and costs for the search have been justified.

Belkin (1980) argued that knowledge seeking behavior consists of: 1) the seeker’s awareness of knowledge disparity; 2) a quest for gathering relevant information, and 3) an awareness of reduced knowledge disparity. Savolainen (2006) proposed a model to explain the knowledge seeking behavior (Figure 1). Savolainen reasoned that information-seeking is initiated by a trigger, such as an ambiguous task or an unclear problem. This is followed by a consideration of useful sources and channels of

information on behalf of the seeker. Next, retrieval of the information and weighing of its relevance occurs. The conclusion includes interpretation of the acquired information and a ruling on the derived benefit whether: a) the information sufficiently satisfies the need, or b) additional information is required. Depending on the conclusion, the behavior may be terminated or repeated.

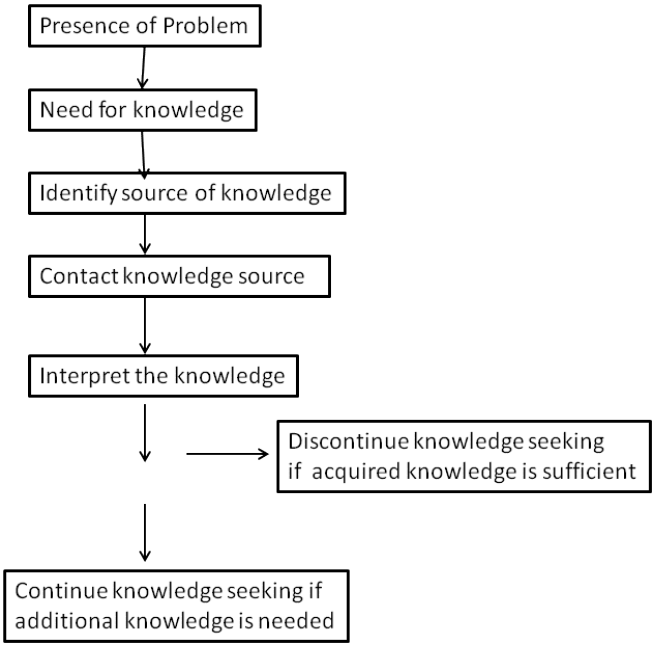

Figure 1. Knowledge Seeking Process Model adapted from Savolainen (2006).

Research into the type of information sought by employees identifies several categories of knowledge. For example, Miller and Jablin (1991) developed a theoretical model and series of propositions to explain factors that impacted information-seeking behaviors of newcomers in organizations. They argued for three categories: 1) referent - related to functions of the job, 2) appraisal - related to job performance, and 3) relational - related to acceptability of social behavior at work. Madzar (2001) extended Miller and Jablin's categories to include a technical type, which addressed information related to: "defining a problem/task; learning techniques applicable to dealing with the

problem/task; finding solutions; or identifying a piece of missing data," (Madzar, 2001, p. 222).

From their qualitative interview study, among 40 consulting managers from a Big Five accounting firm, Cross and Sproull (2004) distinguished five categories of wanted knowledge: 1) solutions, 2) meta-knowledge, 3) problem reformulation, 4) validation of plans or solutions, and 5) legitimation from contact with a respected person. Xu, Kim, and Kankanhalli (2010) categorized the sought information into task information (associated with specific technical skills, feedback associated with performance, role expectations, goals, and organizational values) and social information (knowledge related to political and social feedback, history, and knowledge of people).

Extant literature identifies a number of factors that impact knowledge seeking behaviors. For example, trust has been found to affect knowledge seeking behaviors. Al-Ani, Wilensky, Redmiles, and Simmons (2011) conducted a study at a large Fortune 500 company in order to determine whether trust impacts knowledge seeking practices in distributed teams. The researchers interviewed 43 participants from nine different countries who were members of distributed teams within the year before the data collection. The results indicated that trust in the knowledge owner and the validity of knowledge impacted knowledge seeking behaviors. He, Fang, and Wei (2009) surveyed 201 knowledge workers at a leading IT corporation in China in order to determine whether trust impacts knowledge seeking behaviors in the context of KMS. They found that trust positively affected employees' perceived usefulness of knowledge seeking in KMS.

The quality of knowledge and relationship (both personal and supervisory) between seeker and source were also found to impact knowledge seeking frequency in organizations. Xu, Zhang, and Zhang (2010) conducted a study to examine whether formal structures impacted the formation of informal networks and perception of information quality. They surveyed 35 IS/IT professionals from a major Chinese university and found that perceived information quality of the source and the relationship between seeker and source significantly affected knowledge seeking frequency.

A survey, conducted among 154 university professionals from a major university in Southeast Asia, aimed to determine the effect of source quality, understandability, proximity, and social risk on source preference for task-information seekers. The results indicated that source quality was a key driver for seekers of knowledge related to important tasks (Xu et al., 2006).

Another factor that impacts employees' frequency and intent to seek knowledge is leadership. For example, in a survey among 73 software development employees from various companies in China, Humayun and Gang (2013) examined the relationship between leadership support and KMS success. The results indicated that the support of leaders is related to employees' knowledge seeking intentions. Similarly, Madzar (2001) conducted a survey among 75 engineers from a US medical technology company. The goal of the study was to determine the impact of leadership style of subordinates' information seeking behaviors. The results revealed that employees increased the frequency of their information seeking when their leaders were perceived as transformational.

Extant literature provides a number of job-related factors that influence employees' knowledge seeking behaviors. For example, task interdependence, task-relevant expertise and task complexity positively impact knowledge seeking. Cross, Rice, and Parker (2001) conducted a study to determine if the organizational and social structures impact the benefits (e.g. knowledge, legitimacy, and validation) of information seeking. The data collected from 34 information scientists at a global pharmaceutical organization revealed that while social relations impact the receipt of knowledge, the key predictor to information seeking is task interdependence.

In another study, Rice, Collins-Jarvis, and Zydney-Walker (1999) studied the impact of role (expert or novice), ease of use, gender, organizational, spatial and relational proximity, task interdependency, and socialization on information seeking behaviors. The researchers conducted two surveys (before and after the implementation of new information systems) at a multi-state customer service organization. The first survey included 180 respondents, while the second one included 112. The results revealed that task interdependence impacted employees' knowledge seeking behaviors.

Cross and Sproull (2004) used a mix of qualitative and quantitative methodology to examine how contribution of knowledge is donated by information sources. The researchers conducted a survey among 118 consultants, senior consultants and managers from three offices of a Big Five business consulting practice. The results of the quantitative study showed that knowledge seekers' task-relevant expertise is positively related to the receipt of referrals, problem reformulation, and validation; seekers receive knowledge from sources outside of their units; superiors were considered important

sources of referrals, validation and legitimation knowledge, while seekers relied on peers for problem reformulation.

Xu, Kim, et al. (2010) sought to understand the motivations behind interpersonal information seeking and to compare the effects of these motivations in the task and social information seeking. The researchers surveyed 425 employees from a large IT company in order to examine the employees' information seeking behaviors for the purposes of task or social information. Respondents to the survey worked within 14 different departments and occupied six different rank levels (from frontline employees to directors). The authors found that the relevance of perceived information is an antecedent to source preference while perceived relational benefit is significant for seeking task information. Moreover, their study suggested that organizational ICTs should support not only information delivery, but also provide seekers with the ability to build and manage relationships with their sources.

Byström and Järvelin (1995) found that task complexity influenced information seeking behaviors. In their qualitative study of 25 task descriptions collected from the Finnish public administration domain, higher task complexity was associated with an increased need for problem solving information and general-purpose sources. Task complexity also led to an increase in the number of sought information sources.

Specific job characteristics have also been demonstrated to positively impact knowledge seeking behaviors. For example, Gray and Meister (2004) studied the impact of knowledge sourcing on employees' learning outcomes. They hypothesized that employees with greater job demands will engage in greater knowledge seeking behaviors. Through the use of cross-sectional survey, responses from 313 employees from variety of

job roles (e.g. front line employees, project leaders, managers and supervisors) at a technology company were collected and analyzed. The results demonstrated that high demanding work led individuals to engage in greater knowledge seeking behaviors.

Ashford and Cummings (1983) proposed a model to explain individuals' feedback seeking behaviors and argued that in environments characterized by higher role ambiguity, individuals will engage in greater feedback seeking behaviors. Haas and Witte (2001) investigated the transfer of tacit knowledge via a mix of words, gestures and documents among city government employees and an engineering agency. They found that coherence depends on reduction of ambiguity between documented and verbal knowledge. Vandenbosch and Huff (1997) conducted a field study among 36 Canadian executives from the largest financial institutions. The main goal of the study was to determine the antecedents to the use of executive information systems (EIS) both scanning (general browsing for information) and focused searches (specific knowledge seeking). The results indicated that three quarters of the executives used the EIS to seek for specific knowledge. Furthermore, the researchers found a link between scanning behavior, tolerance for ambiguity and divergent jobs. Executives engaged in scanning for information (rather than focused search) if they had increased tolerance for ambiguity as well as divergent jobs.

Work-related conflict also impacts knowledge seeking behaviors. For example, Marineau and Labianca (2010) conducted a survey among 75 respondents at a mid-size manufacturing company in the US in order to determine whether individuals who perceived work-related conflict with colleagues would seek out work-related advice and knowledge from them. The results revealed that "work conflict was significantly

positively related to advice relationships suggesting that individuals who perceive work conflict with another person will seek that person for advice and knowledge," (Marineau & Labianca, 2010, p. 6).

In addition to work-related factors, time pressure, perceived time cost, looming deadlines, and ease of knowledge accessibility have also been found to drive knowledge seeking behaviors. For example, Lee and Thomas (2008) investigated knowledge seeking practices of consultants at a global IT services firm. Through a series of observations and semi-structured interviews, the researchers collected data from 16 participants. The results showed that consultants sought information quickly (between 30 minutes and one hour) and in pieces (e.g. paragraphs and bullets) after weighing the time cost to create deliverables from scratch versus finding useful information.

Anderson, Glassman, McAfee, and Pinelli (2001) studied variables that impacted the information seeking behaviors of aerospace scientists and engineers. They surveyed 872 private sector employees and discovered that higher task uncertainty led knowledge seekers to widen the search for knowledge sources (from oral contacts to literature searches and finally to communication with library sources). Seekers preferred sources that were easily accessible due to time constraints.

Similarly, Hertzum and Pejtersen (2000) investigated barriers to knowledge seeking and approaches to knowledge source discovery among engineers. They conducted two case studies among engineers at two product-development organizations. The final results revealed that employees engaged in mixed knowledge seeking methods. They sought documents in order to determine their authors and sought information from people in order to discover documents for the purposes of knowledge acquisition. Furthermore,

they found that the main impediment to both oral and written information seeking was cost/time involved in obtaining the information.

O'Reilly (1982) examined the frequency and variations of information sources. They hypothesized that easily accessible information sources will be used more frequently by knowledge seekers. The researcher surveyed 163 employees of a welfare agency. The results showed that source accessibility was a determinant of knowledge seeking frequency. The researcher concluded that time pressure to complete large workloads caused severe time constraints leading employees to seek knowledge from easily accessible sources. Correspondingly, Yitzhaki and Hammershlag (2004) studied workplace impacts on information seeking behaviors. The main goal of their study was to determine which information source was sought for specific knowledge. The researchers surveyed 233 computer scientists and software engineers employed by both companies and universities in Israel. The results showed that industry professionals preferred oral discussions with colleagues and experts for knowledge seeking purposes due to easier accessibility. The academy respondents preferred textbooks as their immediate knowledge source due to the convenience of their location (office, laboratory or near-by library).

Yuan, Rickard, Xia, and Scherer (2011) investigated the factors that influenced both knowledge seeking behaviors and preferences for electronic versus interpersonal knowledge sources. They used interviews, surveys, and social network analysis to examine knowledge seeking practices of 24 educators and 25 dairy farmers. The results demonstrated that knowledge accessibility and availability were key determinant of knowledge seeking behavior. Moreover, time played an important role in the selection of

knowledge source since “To accomplish a task, participants showed great agency and resourcefulness to bypass social or geographic constraints,”(Yuan et al., 2011, p. 542).

Fidel and Green (2004) also studied factors that influenced preferences for information sources. In particular, they were interested in the role accessibility played in information seeking behaviors. The researchers interviewed 32 engineers from a large manufacturing company. The results demonstrated that highly accessible sources were the ones that provided quick information. Time saving was the highest motivator for choosing documentary sources of information.

Bock, Kankanhalli, and Sharma (2006) examined the impact of norms, costs and benefits, and perceived behavioral controls on knowledge seeking via EKRs. They surveyed 134 working professionals who pursued part time graduate degrees at a large university. The researchers found that time to complete work significantly impacted knowledge seeking via EKRs.

Su and Contractor (2011) conducted a study among 110 consultants from nine project team in two multinational consulting firms. Their goal was to determine if there were any differences between employees’ information seeking from human versus digital knowledge repositories and if there were, to examine specific characteristics of the knowledge domain. The data was collected using a web survey. The results demonstrated that consultants sought knowledge from others based on expertise and accessibility level of team members and from digital knowledge repositories based on the amount of information stored and whether colleagues with strong social ties also sought information from the same digital source.

Knowledge Contributing Behavior

Knowledge contributing is a behavior that involves knowledge, information, and assistance exchange between individuals and groups (Connelly & Kelloway, 2003; Davenport & Prusak, 2000; Yang, 2004). Bock et al. (2005) argued that personal beliefs play a key role in enabling this behavior since individuals who share expertise with others risk losing the competitive advantage, or damage to their reputation (in the cases of providing the wrong information). Social exchange theory has been used to explain knowledge contributing behaviors (Blau, 1964). The theory suggests that individuals constantly weigh the costs and benefits to them before making a determination whether to engage in knowledge contribution (Cyr & Choo, 2010).

The majority of extant knowledge management literature explores extrinsic factors (organizational rewards, promotions, raises, and incentives) and intrinsic factors (e.g. reciprocity, enjoyment in helping others, altruism, and personal achievement) that motivate knowledge contributing behaviors. For example, Hsu et al. (2007) studied antecedents that facilitated or impeded knowledge sharing behaviors. They conducted a survey among 274 participants in virtual communities from Taiwan, Hong Kong and China on the topics of engineering, computers, science, humanities, entertainment, business, politics, health, and others. The results showed that extrinsic motivators such as status change, promotions, and raises had positive effects on knowledge sharing behavior.

Similarly, Kankanhalli et al. (2005) investigated the impact of cost and benefit, and contextual factors on knowledge contributing behaviors via EKRs. They surveyed 150 employees among ten organizations in Singapore. The researchers found significant positive relationships between organizational rewards and knowledge contribution via

electronic repositories. Enjoyment in helping others and reciprocity were found to be key intrinsic motivators to knowledge contributing behaviors. In their study on the motivating factors that impacted Wikipedians' knowledge contributing behaviors, Wagner and Prasarnphanich (2007) surveyed 35 contributors and found that altruism and the feeling of personal achievement were key knowledge sharing motivators.

Watson and Hewett (2006) examined employees' frequency of access, reuse and willingness to contribute knowledge to KMS at a multinational services firm. They surveyed 430 non-clerical employees. The researchers found ease of knowledge access and value of knowledge to be positively related to the frequency of knowledge reuse. Moreover, advancement within organizations was positively related to frequency of knowledge contribution to knowledge systems.

Extant literature indicates that a blend of individual and organizational factors also impact knowledge contributing behaviors. For example, a host of studies report that individual's characteristics such as agreeableness, openness to experience, self-efficacy, sense of belonging, ideology, values, and sense of self-worth have been found to impact knowledge sharing. The same studies also find that organizational characteristics such as ethical culture, social ties, community identity, social awareness, organizational climate, and perceived management support affect knowledge contributing behaviors.

In a study of 372 employees from a large multinational IT company, Cabrera et al. (2006) investigated the psychological and organizational factors that impacted individual knowledge contributing behaviors. In their study, they found that agreeableness, conscientiousness, openness to experience, and role breadth self-efficacy were the primary factors that impacted employees' knowledge contributing practices.

Chai and Kim (2012) studied social and technical factors that impacted knowledge contributing practices of social network site users. The researchers surveyed 212 social networking site users at a large US university. The results demonstrated that ethical culture, sense of belonging, and social ties were positively related to knowledge contributing behaviors.

Tseng and Kuo (2010) examined the impact of social capital and social cognitive factors on knowledge contributing behaviors. The researchers surveyed 161 teachers enrolled in an online K-12 community. The results indicated that knowledge contributing behaviors were impacted by community identity, social awareness, and knowledge sharing self-efficacy.

Bock et al. (2005) aimed to determine facilitating and impeding factors to employees' knowledge contributing intentions. They surveyed 154 managers from 27 Korean organizations. The results revealed that anticipated reciprocal relationships and sense of self worth impacted attitudes toward knowledge contribution while subjective norms (e.g. normative beliefs and motivation to abide by them) and organizational climate (fairness, innovativeness, and affiliation) impacted individual intentions to share knowledge.

Radaelli, Mura, Spiller, and Lettieri (2011) hypothesized that organizational knowledge contributing behaviors were affected by intellectual capital and knowledge sharing climate. They conducted a survey among 226 doctors, psychologists, physiotherapists, nurses and other healthcare professional from three healthcare companies. The results showed the employees' perceptions of organizational and social capital, and knowledge sharing climate positively impacted their knowledge contributing behaviors.

Masrek and Edang (2012) examined factors that influenced knowledge contributing behaviors of Internet users. They surveyed 265 undergraduate and post-graduate IS students at a large university in Malaysia. The findings showed that fairness, identification, openness, and usefulness affected knowledge contribution behaviors. Nov (2007) surveyed 151 Wikipedians and discovered that enjoyment, ideology, and values drove the contributors to share knowledge.

Paroutis and Saleh (2009) investigated determinants of knowledge contributing behaviors at a large multinational technology and services firm. They conducted a case study and interviewed 11 employees. The results revealed that trust, history, outcome expectations, and perceived management/organizational support were key determinants to knowledge sharing.

Yeh, Lai, and Ho (2006) studied the roles that leadership, culture and people played in enabling knowledge contributing behaviors in organizations. They conducted case studies at two engineering companies. The findings revealed that knowledge contributing behaviors were impacted by support from senior management, existence of sharing culture, speedy KMS access, and employee incentive programs.

Research provides evidence that work-related characteristics, such as in-role behavior, work and task conflict, decentralization, and work engagement also impact knowledge contributing behaviors. For example, Flowers, Xia, Burnett, and Shapiro (2010) conducted a study to determine what extrinsic, contextual, and intrinsic factors affected employees' contribution of knowledge to KMS. They surveyed 173 employees at large US university and found that affective commitment (individual's emotional attachment to

the organization) and perceived in-role behavior (requirement of the job) were positively related to the extent of knowledge contribution.

Lu, Zhou, and Leung (2011) examined the effects of task and personal conflict on supervisors and subordinates' knowledge contributing behaviors. The researchers surveyed 166 part-time MBA students from China. The results showed that task conflict (conflict in understanding expectations) was positively related to knowledge contributing behaviors.

Willem and Buelens (2009) studied the impact of decentralization (horizontal-coordination among teams) on knowledge contributing behaviors. They surveyed a total of 408 employees from two mid-size companies (in the energy and financial sectors) in Europe. The results indicated that under certain conditions, decentralization led to increase in knowledge contributing behaviors.

Chen, Zhang, and Vogel (2011) investigated the impact of task and relationship conflict, and work-engagement factors (meaningfulness, safety, availability) on knowledge contributing behaviors. They surveyed 139 software engineers and developers within two Chinese companies. The results demonstrated that work engagement significantly and positively impacted knowledge contributing in organizations. Likewise, Teh and Sun (2012) investigated the impacts of work attitude on employees' knowledge contributing behaviors. They surveyed 116 IS employees in three multinational companies. The results demonstrated that organizational citizenship behavior (OCB), job involvement and job satisfaction factors had a significant positive relationship with knowledge contributing behaviors.

Barriers to Knowledge Sharing

Knowledge sharing in organizations frequently fails as a result of numerous critical factors, also known as sharing barriers (Riege, 2005; Yeh et al., 2006). The existence of these barriers can impact organizational decision making processes on the acquisition and use of ICTs to facilitate knowledge sharing behaviors (Sedighi & Zand, 2012). The following section examines extant literature on the most common knowledge sharing barriers. It also assumes that these barriers are mere symptoms of problems caused by specific contributors. Potential contributors are also investigated.

Lack of Time

One of the biggest barriers for both contributors and seekers of knowledge in organizations is lack of time (Lin, Tan, & Chang, 2008). According to Lin et al. (2012), the lack of time barrier is one that never changes regardless of the knowledge management maturity level of an organization. It is characterized as the employees' unwillingness to devote time and resources for knowledge sharing (Lin et al., 2008), lack of contact time and interaction between knowledge sources and recipients, lack of time to share knowledge and time to identify colleagues in need of specific knowledge (Riege, 2005), tools available to share knowledge are very time consuming (Santos et al., 2012), and due to time pressure (defined as "a severe form of a time constraint that invokes stress and fears of retribution for missing a deadline," (Fugate, Thomas, & Golicic, 2012, p. 700)). For example, in a survey among 522 experienced project managers from the UK, US, and China, 67% attributed lack of employee time as the leading inhibitor to knowledge sharing in their organizations (Williams, 2008). Similarly, in a study among 53 top UK civil engineering and construction companies, 68% of the respondents

indicated that lack of time, attributed to tight schedules and lean organizational structure, was a significant barrier to engaging in knowledge sharing (Carrillo, Robinson, Al-Ghassani, & Anumba, 2004). Keegan and Turner (2001) analyzed the knowledge management practices of 19 project-based companies from a variety of industries and interviewed 44 of their members. They found that the key barrier to learning among all organizations operating in "turbulent product market domains" was time pressure. Employees cited lack of time to engage in knowledge sharing meetings and lessons learned reviews since they were often reassigned to new engagements immediately after the completion of their current projects.

Dai, Wertenbroch, and Brendl (2008) introduced the term *value heuristic* and argued that "people judge the frequency of class of objects on the basis of the subjective value of the objects," (Dai et al., 2008, p. 18). Time "is fixed in its amount – there are only 24 h in a day,"(Pfeffer & DeVoe, 2012, p. 49), as such it is considered limited and individuals tend to perceive it as valuable and scarce (DeVoe & Pfeffer, 2011). As a result, individuals alter their behavioral patterns to accommodate this perception (e.g. decreased patient behavior in response to time scarcity) (Darley & Batson, 1973).

In his exploratory study on time as contextual factor for information seeking, Savolainen (2006) noted that time is a qualifier for information seeking and is typically influenced by situations (e.g. people, places, and events). Furthermore, the researcher argued that "Temporal factors are significant contextual qualifiers of information seeking in that they usually posit a major constraint to accessing information sources; in most cases, time is a scarce resource for information seekers," (Savolainen, 2006, p. 116).

Markus (2001) found that time constraints inhibit quality knowledge contributions. In her exploratory study on factors impacting knowledge reuse in organizations, she cited the studies of Orlikowski (1995) at Zeta company and Leonard-Barton and Sensiper (1997) at American Management Systems in support of her argument that high quality repositories have high production costs (in terms of time). Problems centered around "the amount of time available to produce high quality and sanitized knowledge for dissemination," (p.80) and "If you ask people, they will tell you that they really want to learn and they really want to contribute, but they are out working on a project for 15, 16, 17 hours a day, five to six days a week, and knowledge management is not their first priority," (p.81).

Pentland (1992) investigated factors that affected knowledge seeking and knowledge transferring in organizations. He conducted a six-month observation of specialists at two software support hot lines. The results showed that time impacted the type of knowledge sought and contributed. Quick questions posted by knowledge seekers were interpreted by knowledge contributors as inquiries that demanded "the interaction be short and unobtrusive," and "that the degree of responsibility for finding an answer would be minimal," (p.537). The researcher argued that the likelihood that a knowledge contributor will respond to a knowledge seeker increased when the contributor perceived that the request required a limited time to respond.

Wasko and Faraj (2000) examined factors that impacted individuals' knowledge contributing behaviors to public online communities. Specifically, they were interested in determining whether self-interest or altruism guided knowledge contributors. The researchers surveyed 342 users of three electronic communities who voluntarily

contributed knowledge to other peers. They found that one of the barriers to knowledge contribution was lack of time as a result of increased work duties.

In the field of decision making, research demonstrates that under increased time pressure, individuals filter information more and spend less time processing each new piece of information. For example, Ben Zur and Breznitz (1981) investigated risk behaviors under the conditions of time pressure. They conducted a lab experiment with 36 subjects who were monitored during a gambling game. The results indicated that participants subjected to high time pressure exhibited less risky behavior by spending more time observing the negative consequences of their choices (e.g. amount and probability of loss). Furthermore, subjects exhibited accelerated information processing information filtration behaviors under the conditions of higher time pressures.

In another study, Payne, Bettman, and Johnson (1988) conducted two experiments among sixteen and 28 students respectively. In both experiments, the subjects were asked to seek knowledge and make decisions both under conditions of time pressure and without time pressure. The researchers observed that the subjects acquired less information. Furthermore, time pressure significantly increased the subjects' information processing, selectivity and filtration of information. Subjects also shifted information acquisition and processing from depth (alternative-based) to breath (attribute-based) (Payne et al., 1988). Effort/accuracy framework has been used to explain decision-making based on multiple task demands (where effort concerns operations associated with cognitive information acquisition and processing) (Bockenholt, Albert, Aschenbrenner, & Schmalhofer, 1991; Payne, Bettman, & Johnson, 1993). For example, Creyer, Bettman, and Payne (1990) studied the accuracy and effort feedback on

individual decision-making processes. The study involved an experiment with 81 undergraduate students at a large northwestern university. The results of the experiment showed that when the objective to pick an alternative was focused on accuracy, individuals took more time, acquired more information, and focused on alternative-based processing strategy.

Additional studies reported that when the variable of time constraint was present, individuals increased information search efficiency, accelerated decision-making, decreased decision quality, and experienced stress, distraction, excessive work progress monitoring and remaining time monitoring (Arnold, Sutton, Hayne, & Smith, 2000; Karau & Kelly, 1992; Keinan, Friedland, Kahneman, & Roth, 1999; Kelly, Jackson, & Hutson-Comeaux, 1997).

Adaptive cost theory (Cohen, 1978) has been used to explain knowledge sharing under time pressure (Connelly, Ford, Turel, Gallupe, & Zweig, 2013). The theory proposes that individuals are forced to prioritize their cognitive resources in response to changing environmental stressors. The result of such stressors may lead to a decreased response and sensitivity to the needs of others, lower task motivation, and diminished socialization behavior (Boman & Hygge, 2000; Cohen, 1980; Hui, Organ, & Crocker, 1994).

Connelly et al. (2013) applied the adaptive cost theory in their study of 403 second-year undergraduate students in a communication course. The students were allowed, but not required, to contribute knowledge to their peers while working on a specific problem-solving exercise. The results showed that “perceptions of time pressure affected people’s likelihood of engaging in knowledge sharing behaviors,” (Connelly et al., 2013, p. 6).

Students' perceptions of the environmental stressors resulted in individual feelings of time pressure and preoccupation that prevented them from sharing knowledge.

Time pressure has also been shown to have a negative effect on knowledge management system use. For example, Durcikova, Fadel, Butler, and Galletta (2011) studied how climate of innovation and autonomy, and KMS access impacted employees' knowledge seeking practices. The researchers surveyed 110 technical support analysts from 26 companies. The researchers found a negative correlation between time pressure and KMS access and reuse. When faced with increased time pressure, the analysts opted to create new solutions rather than searching for existing ones in the KMS.

In a study on group information-seeking behavior in emergency response scenarios, which involved 11 groups (7 from Federal Emergency Management Agency and 4 from undergraduate programs of a medium-sized northeastern university), Gu and Mendonça (2009) found that time pressure negatively impacted the search for information in both novice and expert groups. Higher time pressure was also found to decrease knowledge exchange between individuals. For example, Thomas, Esper, and Stank (2010) investigated the time pressure effects on supplier-retailer relationships. The researchers surveyed 204 professionals enrolled in a weekend Executive MBA program at a large southeastern university. The findings demonstrated that under time pressure, participants decreased information exchange, limited collaborative behaviors, and reduced relationship loyalty (affective and emotional connections between parties).

Gray and Durcikova (2006) studied factors that impacted the knowledge seeking behaviors of technology support analysts at a software development company. They hypothesized that increased levels of work-related time pressure will lead individuals to

seek knowledge from colleagues, electronic repositories, and written documents. To validate their hypotheses, the researchers surveyed 110 participants. The results showed that perceived time pressure had a negative impact on knowledge seeking from repositories (but not from documents, or colleagues). The researchers reasoned that colleagues and documents provided faster access to knowledge than repositories because "the process of finding and accessing knowledge in the repositories we studied remains too time-consuming," (Gray & Durcikova, 2006, p. 181).

Van der Kleij, Lijkwan, Rasker, and De Dreu (2009) examined team performance under time pressure settings and specific communication conditions. They conducted an experiment with 72 students from a university in the Netherlands. The students were assigned to 36 teams and asked to create a written plan. Teams were split into high and low time pressure groups. The results indicated that time pressure had significant negative effect on the perceived information exchange between members. Moreover, time pressure impacted the quality of the solutions, quality of planning and satisfaction with the team's performance.

Even exhibiting time pressure coping mechanisms by some (e.g. hastiness, rash decision-making, being less available) have been found to negatively influence the willingness of others to share knowledge in return. Fugate et al. (2012) examined the way time pressure impacted the collaboration process between buyers and suppliers. The researchers conducted an experiment with 126 working professionals enrolled in an Executive MBA program at a major northeastern university. Each participant was assigned to one of six treatment conditions and was asked to read unique buyer-supplier cases and answer a set of questions. The results of the experiment indicated that time

pressure had a negative influence on participants' information exchange, solidarity and stewardship.

Thomas, Fugate, and Koukova (2011) investigated how knowledge sharing behaviors between suppliers and buyers were impacted by time pressure. The researchers conducted an experiment with 126 full-time managers enrolled in a part-time graduate program at a private northeastern university. The results showed that time pressure negatively impacted information exchange, operational knowledge transfer activities and shared interpretation. In another study, Huber and Kunz (2007) experimented with 40 subjects in order to determine the impact of time pressure on risk defusing behaviors. The results of the study revealed that under time pressure, individuals searched for less information, considered a limited amount of information, and stopped information seeking sooner.

Borgatti and Cross (2003) studied factors that impacted information seeking among employees. They hypothesized that information seeking is affected by perceived timely access to the information source and that accessibility is "a question of timeliness," (Borgatti & Cross, 2003, p. 435). To validate their hypotheses, the researchers conducted surveys between two organizations with 37 information scientists and 35 researchers. The results confirmed that individuals will engage in knowledge seeking behaviors if they perceive they have timely access to the knowledge source.

Braganza, Hackney, and Tanudjojo (2009) examined factors that facilitated successful knowledge transfer strategies in organizations. The researchers conducted a case study at an organization that underwent the implementation of a knowledge management system. Based on the findings, the researchers developed several theoretical propositions and outlined 30 key attributes that impacted creation and transfer of knowledge. Real-time

access to knowledge source was considered the second most important attribute. Senior management at the organization noted: “Our people need to have the ability to interact with the knowledge system real time. This will facilitate them to ask question and get the necessary knowledge at real time. Question is one of the basis for knowledge creation,” (Braganza et al., 2009, p. 516).

Extant literature suggests that perceived time pressures occur as a result of changes (such as adding new tasks) or interruptions to the employee’s work role. For example, Bailey and Konstan (2006) experimented with 50 participants to determine the impact of interruption on the participants’ task completion time, error rate, annoyance, and anxiety. The results of the study indicated that interrupted users required up to 27% more time to complete a task, committed double the errors, experienced up to 106% more annoyance and double the anxiety rates. In a similar experiment, Eyrolle and Cellier (2000) found that interruptions led to an increase in processing time for primary tasks and increase in error rates for secondary tasks.

Consequences of changes or interruptions to tasks typically result in additional work to be completed (including new knowledge to be acquired) within the original allotted timeframe accompanied by an increase in the perceived time pressure. For example, Baethge and Rigotti (2013) studied the impact of external interruptions on participants’ ability to complete primary tasks. The researchers collected data via diaries from 133 nurses from German hospitals. The results showed that time pressure had a significant negative effect on performance satisfaction. Time pressures resulted in higher mental demands and increased irritation.

In a related study, Mark, Gudith, and Klocke (2008) investigated the disruption cost of interruptions. They conducted an experiment with 48 German university students. The results revealed that in order to compensate for interruptions, participants worked faster, but experienced higher stress levels, increased frustration, higher perceptions of time pressure and increased workload and effort.

Poor Communication Skills

Improvements in communication have been linked to knowledge transfer activities. For example, Modi and Mabert (2007) examined the role of communication and the use of organizational knowledge transfer activities on performance improvement of supplier companies. They conducted a survey among 114 respondents representing 228 development programs. The results revealed that increased operational knowledge transfer activities positively affected performance improvements. Furthermore, knowledge transfer was positively related to collaborative communication practices and collaborative communication had a positive impact on performance improvements.

Poor communication skills (such as verbal, written, and interpersonal) have been proposed as a major barrier to knowledge sharing. Riege (2005) conducted an extensive literature review of over 70 knowledge management articles in order to determine "a wide range of knowledge sharing barriers that are central to effective KM," (Riege, 2005, p. 20). He classified KM barriers into three categories: individuals, organizational and technology-based. Among the individual knowledge sharing barriers, he indicated poor verbal/written communication and interpersonal skills and noted that "the ability of employees to share knowledge depends first and foremost on their communication skills. Effective communication, both verbal (the most common vehicle of sharing tacit

knowledge), and written, is fundamental to effective knowledge sharing," (Riege, 2005, p. 24).

Riege (2005) also found that among the organizational knowledge sharing barriers, restriction of communication and knowledge flow into specific direction (e.g. top down) was another major knowledge sharing barrier. He noted that adequate resource allocation to support collaboration and knowledge was necessary to prevent this barrier. Finally, from the technology barriers, Riege noted that a major technology barrier to knowledge sharing is the lack of communication on the advantages of new systems over current ones.

Sandhu, Jain, and Ahmad (2011) investigated knowledge sharing barriers, knowledge contributing and knowledge seeking behaviors of public sector employees in Malaysia. They surveyed 170 public sector executives from the technical arm of Malaysian civil service. The results showed that employees regarded poor communication and interpersonal skills barrier as one of the top three. Similarly, Syed-Ikhsan and Rowland (2004) conducted a case study at the Ministry of Entrepreneur Development of Malaysia in order to examine public sector employees' knowledge transfer barriers. A questionnaire was distributed to employees, and the results of 154 directors, engineers, system and administrative officers, accounts and auditors were analyzed. The results indicated that 53% of respondents considered poor communication channels between officers as major knowledge sharing barrier.

Al-Alawi, Al-Marzooqi, and Mohammed (2007) examined specific organizational culture factors that facilitate knowledge sharing success among employees in public and

private organizations. They conducted a survey among 231 public and private sector employees and found that communication, "human interaction through oral conversations and the use of body language while communicating,"(Al-Alawi et al., 2007, p. 25), impacted knowledge sharing and was critical in facilitating team collaboration, face-to-face interaction and common language among employees.

In a four-month field study at a blown-molded glass factory, Nakano, Muniz Jr, and Batista Jr (2013) investigated factors that aided tacit knowledge sharing in unstructured work environments. Fourteen semi-structured interviews were conducted with operators, production supervisors, tool shop workers and leaders. The respondents reported that communication between teams was essential in creating information relationships that facilitated the development of trust, shared language, collegiality, openness, and knowledge sharing practices.

Sun and Scott (2005) studied unique knowledge transfer barriers in organizations with a Delphi group comprised of 17 members. The participants, ranging from junior to senior management from seven different organizations, went through two review stages with a total of three rounds of analysis and identified a total of 90 knowledge sharing barriers. Sun and Scott classified the barriers into four categories: individual, team, organizational and inter-organizational. From the individual category, the results indicated that skills of communication and persuasion, "the skills in expressing effectively any thoughts or information on your mind," (Sun & Scott, 2005, p. 81), were identified as the top two barriers to transfer knowledge from an individual to a team by 94% of the participants.

Santos et al. (2012) conducted a similar study among professionals from six different countries working in the areas of mechanical engineering, IS, multimedia, power

systems, industrial management, and construction, who were employed at institutes, universities, IT corporations, and industrial associations. The researchers conducted 24 interviews in order to determine knowledge sharing barriers within complex research and development projects. The results showed that the second most widely noted KS barrier was inadequate IT, which concerned the lack of "easy communication with other tools and assurance that people really understand the meaning (ambiguity)," (Santos et al., 2012, p. 31). Furthermore, the second highest issue listed among collaboration in research and development activities in large multinational projects was the communication barrier. This barrier referred to "difficulties in establishing a common technical language understandable by all participants; personal backgrounds, time zones, national cultures, and technical contexts (leading to misunderstandings and conflicts); difficulties in communicating with and managing expectations and requirements of the clients; and use of miscellaneous technologies (e-mail, videoconference, and portals) to try to deal with challenges (however to solve problems, according to the participants, it is better to have personal interactions such as meetings or conversations)," (Santos et al., 2012, p. 33). Participants indicated that creating a common communication language represents a major challenge in establishing sound knowledge exchange. Moreover, communication was indicated as one of the highest requirements for knowledge sharing as participants indicated that personal interactions and conversations were preferred for problem solving tasks.

Lin et al. (2008) studied determinants and barriers to knowledge flow in healthcare organizations. Through a comprehensive literature review, they categorized five barriers that included knowledge characteristics, knowledge source barriers, knowledge receiver

barriers, contextual barriers and insufficient mechanisms. Using interviews, surveys, and a Delphi method to collect data among 174 physicians, experts and middle medical managers, they found that poor communication skills between the knowledge source and receiver were critical factor for knowledge sharing. Moreover, the researchers also found that communication was an essential barrier to knowledge transfer between physicians and patients.

In a case-based study among three organizations, a law firm, an educational institution and local council, Southon, Todd, and Seneque (2002) investigated factors that impacted knowledge use and integration within these environments. The researchers interviewed 21 senior, middle managers and professionals to determine individual factors to knowledge management adoption practices. The final results revealed that knowledge sharing among members was accomplished primarily through meetings and forums that relied heavily on formal and informal communication. Moreover, communication was indicated as a critical barrier among all participants. Informal communication and coaching among teams were considered problematic and indicative of poor communication culture within the organization.

Tokar, Aloysius, Waller, and Williams (2011) examined the effect of information sharing about promotions on cost efficiency among supply chain partners. They conducted two controlled lab experiments, the first one with 30 undergraduate students at a large US university, and the second one with 76 senior members of multiple departments from a large consumer products manufacturer in the US. The results indicated that communication was essential for reduction of coordination risk, planning problems, uncertainty about promotion's timing and magnitude. Furthermore, the

researchers concluded that communication was intertwined with coordination risk and both needed to be managed into order to improve decision making about promotional timing and magnitude.

Kumar and Ganesh (2009) developed a morphological framework in order to investigate the dimensions of knowledge transfer in KM literature. To develop the framework, the researchers systematically browsed through the KM literature published within EBSCO, Proquest, Emerald and Sciencedirect online databases. They classified five contextual factors that impacted knowledge sharing within organizations: cognitive, social-psychological, social, infrastructural, and administrative. The social-psychological option, consisting of social-psychological factors (SPFs) responsible for influencing individual's behavior in social settings, was influenced by the frequency and quality of personal communication.

Cramton (2001) investigated to what extent the geographic dispersion of team members and use of ICTs impacted the sharing of mutual knowledge. Her goal was to determine the factors that led to the development of collaboration and knowledge sharing difficulties. The researcher studied thirteen geographically dispersed teams. The results showed five major types of issues that affected knowledge sharing. Two of them included failure to communicate and difficulty communicating and understanding the importance of information.

Song and Teng (2008) examined the effects of work unit environment on voluntary and solicited knowledge sharing behaviors in organizations. Specifically, they hypothesized that open communication will be positively related to knowledge sharing. The data for the study was collected via a survey of 149 working professionals enrolled

in an MBA program at a large southern university in the United States. The final results demonstrated that open communication led to "higher intensity of solicited sharing behaviors,"(Song & Teng, 2008, p. 7). Further, the authors found that internalization (the process of face-to-face communication and learning by doing for the purposes of knowledge acquisition) had a significant influence on solicited knowledge sharing behaviors.

Ko, Kirsch, and King (2005) investigated antecedents to the transfer of knowledge between stakeholders engaged in ERP implementations. They hypothesized that knowledge transfer was impacted by specific communication, knowledge, and motivational factors. To test their model, they surveyed 118 organizations within variety of industries and collected data from 96 projects. The results indicated that communication factors had both direct and indirect impact on knowledge transfer. Specifically, source credibility and receiver's communication decoding competence influenced knowledge transfer. The researchers concluded that knowledge transfer was affected negatively when poor communication skills (e.g. inability to listen or pay attention) were present.

Lack of Trust

Extant literature suggests that trust is a vital component of knowledge seeking and knowledge contributing behaviors. Rotter (1971) defined trust as a general disposition toward others. Frost, Stimpson, and Maughan (1978) conceptualized trust as "an expectancy held by an individual that the behavior (verbal or nonverbal) of another individual or group of individuals would be altruistic and personally beneficial to himself," (Frost et al., 1978, p. 104). Rousseau, Sitkin, Burt, and Camerer (1998) argued

that trust is a "psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another," (Rousseau et al., 1998, p. 395). Hosmer (1995) characterized trust as the "expectation by one person, group, or firm of ethical behavior—that is, morally correct decisions and actions based upon ethical principles of analysis—on the part of the other person, group, or firm in a joint endeavor or economic exchange," (Hosmer, 1995, p. 399).

In the domain of knowledge management, trust has been shown to impact knowledge sharing. For example, Nelson and Cooprider (1996) investigated factors that influenced knowledge sharing within 132 IS groups from seven organizations with the pharmaceuticals, insurance, gas and oil, consumer goods, computer manufacturing, and automotive industries. The researchers found that mutual trust and mutual influence between IS and line groups led to increased level of knowledge sharing. Further, the researchers noted that mutual trust resulted in increased information seeking about the other groups and knowledge sharing among participants.

Andrews and Delahaye (2000) investigated individual factors that impacted knowledge processes and organizational learning of employees. In their study, they gathered data through 15 semi-structured interviews of senior scientists, managers, technicians and assistants at a bio-medical consortium. They found that individuals shared knowledge with those they perceived as trustworthy. As a result, perceived trustworthiness was regarded as a central psychosocial factor that influenced knowledge-sharing decisions.

Holste and Fields (2010) examined the role of affect-based and cognition-based trust on employees' willingness to seek and contribute tacit knowledge. The researchers

hypothesized that affect-based trust influenced tacit knowledge sharing, while cognition-based trust influenced use of tacit knowledge. The data for the study was collected via survey among 202 employees of an international non-profit organization. The results supported their hypotheses. Moreover, both affect-based and cognitive-based trusts were positively related to employees' willingness to share knowledge. Holste and Fields concluded that "warm personal relationships most likely developed through face-to face interactions and solid respect for another worker's professional capability is required for the sharing of tacit knowledge," (p. 135).

Chowdhury (2005) also investigated affect-based and cognition-based trusts, but the focus of his study was on the sharing of tacit (complex) knowledge between dyads. To confirm his hypotheses, the researcher surveyed 164 MBA students who produced 229 dyads with 31 teams. The results confirmed that affect-based trust and cognition-based trust levels were related to the level of shared tacit knowledge among the dyads. The researcher showed that either of the two forms of trust (but not both) can produce tacit knowledge sharing.

Lack of trust was reported as a key barrier to knowledge sharing. For example, Seba, Rowley, and Delbridge (2012) investigated knowledge sharing barriers and challenges at the Dubai police force. They conducted fifteen semi-structured interviews with officers from various ranks and positions and discovered that lack of trust was one of the key factors that inhibited knowledge exchange between the officers.

Liao (2006) investigated the relationship between learning organization, knowledge sharing, and innovation in firms. She posited that trust had positive impact on both knowledge sharing and innovation and surveyed 254 employees from eight computer

manufacturing companies to validate her hypotheses. The final results revealed that trust had direct and positive relationship with both knowledge sharing and firm innovation. The researcher noted that trust is prerequisite for knowledge sharing since it builds social relationships and is a necessity for the development of cooperation and interdependence.

Ardichvili et al. (2003) explored barriers to employees' knowledge contributions in virtual communities of practice. Semi-structured interviews were held with managers of three communities including members and experts. The researchers concluded that in order to limit employees' apprehension to share knowledge, organizations need to build knowledge-based and institution-based trust as these instill confidence in the company's integrity.

Pardo, Cresswell, Thompson, and Zhang (2006) researched the knowledge sharing processes that occurred with the development of an IS system in two public sector organizations. In their analysis of the cases, the researchers found that interpersonal and identity-based trust established a foundation for knowledge sharing practices. Further, they noted that higher levels of trust and the lower levels of mistrust among employees result in greater knowledge sharing, consensus building, and learning.

Staples and Webster (2008) explored the impacts of trust, task interdependence and virtualness on knowledge sharing practices in organizations. The researchers hypothesized that trust among team members is related to knowledge sharing within the team. They conducted a survey among 824 members from a high tech company and an online panel. Trust was found to have a strong relationship with knowledge sharing among local, hybrid, and distributed teams.

Muthusamy and White (2005) investigated the effects of commitment, trust, and power sharing on knowledge transfer in strategic alliances. They hypothesized that ability-based, benevolence-based, and integrity-based trusts were all positively related to knowledge sharing. To test their model, they surveyed 144 alliance managers from a variety of companies and industries within the US. The final results revealed that only ability-based trust and integrity-based trust had positive relationship with knowledge transfer. The researchers concluded that partner trustworthiness was essential to the "meaningful and productive exchange of information, knowledge and skills," (Muthusamy & White, 2005, p. 434).

Trust that others will not misuse the shared knowledge to their advantage has been found to significantly influence knowledge sharing behavior. Renzl (2008) found that fear of losing one's unique value has a negative impact on knowledge sharing. She collected 201 survey responses from two companies and discovered that an employee's fear of losing his or her unique value had a negative impact on knowledge sharing within and between teams, since trust in people reduced fear in cooperating behavior.

Fear of loss of control over ownership of knowledge has been shown as a high barrier to knowledge sharing between individual and the team (Sun & Scott, 2005). Jarvenpaa and Majchrzak (2008) conducted a study to determine the impact of network motives on individual's perceived level of distrust in transaction memory systems (TMS) when receiving knowledge from others. They surveyed 104 members of FBI's InfraGuard program. The results indicated that competition in virtual communities resulted in increased concern among employees that their ownership of expertise was lost after knowledge transfer. The researchers concluded that "In mixed-motive situations, TMS

achieves its coordination benefits by indicating not only what should be shared (because others do not know what you might know) and what need not be shared (because others already know it), but also what should not be shared (since others may act in a harmful way with that knowledge)," (Jarvenpaa & Majchrzak, 2008, p. 270).

Rosen et al. (2007) examined barriers and strategies to facilitate knowledge sharing in virtual teams. They conducted a mixed method study involving multiple interviews with virtual team leaders and members in several organizations and three surveys with 200 responses. The researchers identified lack of trust among team members as the first barrier to knowledge sharing. The results showed that minimal communication among team members limited opportunities for useful conversations, identification of common interests, and the sharing of personal information. As a result, trust was not built among the members and knowledge was never shared.

Ridings et al. (2002) investigated antecedents and the impact of trust on knowledge seeking and knowledge contributing in virtual communities. They surveyed 663 online forum members from 36 different communities. The results showed that sharing personal information with others in a virtual community led to increase of trust among the team. Further, trust was found to have two dimensions: ability and integrity/benevolence. Trust was also found to increase in individuals by the presence of disposition to trust. Finally, sharing personal information increased trust in others, while perceived responsiveness to shared information also increased trust in knowledge contributors.

Abrams et al. (2003) examined how interpersonal trust developed in knowledge sharing context. They proposed two dimensions of trust that impact knowledge sharing behaviors: benevolence (perceived trust that others care about my well-being) and

competence (perceived trust in the competence of others). Benevolence-based trust allows individuals to seek knowledge without fear that the knowledge contributors will inflict harm on their reputation, or self-esteem. Competence-based trust allows knowledge seekers to feel confident in the expertise of the knowledge contributors. The researchers interviewed 40 employees across 20 different organizations. The results showed that knowledge contributors promoted different dimensions of trust. For example, both benevolence-based and competence-based trusts were promoted by contributors who engaged in frequent, rich, and collaborative communication with the seekers. Only benevolence-based trust was promoted when contributors created personal connections with the seekers, while only competence-based trust was promoted when disclosure of expertise and personal limitations was performed.

Levin and Cross (2004) investigated the impacts of strong and weak ties, and competence-based and benevolence-based trust on receipt of useful knowledge in a network. They surveyed 127 employees from three separate companies (pharmaceutical, bank, and oil and gas). The results demonstrated that benevolence-based and competence-based trusts mediated the relationship between strong ties and the receipt of useful knowledge. The researchers concluded that benevolence-based trust was a necessity for the knowledge exchange process, because it "shapes the extent to which knowledge seekers will be forthcoming about their lack of knowledge, even after seeking out the knowledge source," (Levin & Cross, 2004, p. 1480). Moreover, they argued that competence-based trust impacted the perceived usefulness of the received knowledge, because it allowed knowledge seekers to rely on the contributor's competence when accepting the knowledge.

Contributors to Knowledge Sharing Barriers

The following section is based on the results of the content analysis that was conducted on the articles from the literature review. It draws on the identified common knowledge sharing barriers as well as several theories in order to explain potential contributors to these barriers. First, the constructs of role conflict and role ambiguity are examined in conjunction with the organizational role theory. These are followed by analysis of the construct of locus of control and its reference to the social learning theory.

Role Conflict

Role conflict, one aspect of role stress (Peterson et al., 1995), is characterized as over-demand on employees to complete specific tasks that they perceive as excessive on their time availability (Sales, 1970). Organizational role theory (ORT) is used to explain the behavior of individuals in the workplace based on a set of rules and norms (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964). Its origins are rooted in the role theory, which holds that people behave in predictable ways depending on their social identities and situation (i.e. assume roles just as actors in a play). Depending on circumstances, individual behavior will be the result of a role determined by social position, social interaction, and expectations. "Most versions of role theory presume that expectations are the major generators of roles, that expectations are learned through experience, and that persons are aware of the expectations they hold." (Biddle, 1986, p. 69).

In the workplace, ORT proposes that employee roles are associated with specific social positions guided by normative expectations and organizational demands. As a result of the plurality of expectations, employees often experience role conflicts that require behavioral adjustments. Furthermore, the proliferation of new technology into the

enterprise is frequently associated with divergence in job responsibilities as a result of change in the organizational culture (Hosono & Shimomura, 2012). The following examples illustrate this statement:

- New configuration technology, coupled with the adoption of agile development methodologies, result in the emergence of DevOps, a new role in the information technology group, which combines responsibility for both development and operations to fulfill deployment and automated testing of software (Spinellis, 2012);
- The traditional roles of project management and business analysts are integrated into a new role as a result of the combination of virtual server technology with the Infrastructure-as-a-Service (IaaS) model. The new hybrid role, known as a solution architect, encompasses the responsibilities for capturing customers' needs, translating them into technical specifications, and managing the project from conception to closure (Cleveland & Ellis, 2013; Konstantinou et al., 2009);
- Cloud computing, a new model to deliver applications and infrastructure using a shared pool of resources, has been associated with a shift in the responsibilities of the traditional CIO role toward strategic business activities (Malladi & Krishnan, 2013).

In a nationwide study on the effects of psychological and physical role demands on employee job satisfaction, Kahn et al. (1964) discovered that increased levels of role conflict resulted in greater work-related tensions and lower levels of job satisfaction.

Wickham and Parker (2007) argued that employees faced with new roles and without sufficient training to transition into their new responsibilities were destined to experience role conflict as a result of the varying, and in some cases conflicting, expectations. Noor (2004) noted that conditions leading to role conflict included lack of sufficient time to

perform the new role and stress caused by the inability to meet expected requirements and behaviors.

Boshoff and Mels (1995) investigated the effects of role stress on organizational commitment and internal service quality. The researchers hypothesized that role conflict had a negative impact on organizational commitment. To validate their model, they surveyed 140 insurance salesmen from a national insurance company. The results confirmed that role conflict had an inverse relationship with organizational commitment so that an increase in role conflict led to decrease in organizational commitment.

In a similar study, Judeh (2011) investigated the relationship between employee socialization practices and organizational commitment, and mediating effects of role stress (role conflict and role ambiguity) on the relationship between the two. She defined socialization as the process that companies use to educate new employees on their roles and behaviors. The researcher surveyed 256 employees at a large telecommunications company in Jordan. The results showed that socialization was significantly related to role conflict and role ambiguity. Moreover, lower levels of socialization resulted in higher levels of role conflict and role ambiguity as well as reduced organizational commitment.

IS research suggests that the lack of time barrier stems from the introduction of new technology, conflicting expectations and norms of employees' roles in the enterprise. For example, Tarafdar, Tu, Ragu-Nathan, and Ragu-Nathan (2007) conducted a study to investigate the impact of ICT-created stress (technostress) on employees' role stress and productivity. The researchers theorized that technostress has a positive effect on role stress. To validate this hypothesis, they surveyed 223 ICT users from two public-sector companies in the US. The final results showed direct relationship between technostress

and role stress. The researchers noted that "users are often overloaded by vast amounts of information, disturbed by the blurring of work time and family time," and "the introduction of new technology often means completing the same amount of work with fewer people and through leaner organization structures," (Tarafdar et al., 2007, p. 320). Moreover, their study showed that increase in role stress resulted in time pressure and a need for multitasking.

Role Ambiguity

Role ambiguity, a second aspect of role stress (Peterson et al., 1995), is defined as "the lack of the necessary information available to a given organizational position," (Rizzo et al., 1970, p. 151) and is related to conflicting supervisory expectations, ambiguous definitions of tasks, and lack of clarification of duties. Role theory suggests that individuals experiencing role ambiguity will engage in attempts to resolve the issues associated with the vagueness of their positions since new or changing roles have the potential to increase ambiguity in conditions of novel technologies, rapid organizational growth, reorganizations, and shifts in managerial philosophies (Kahn et al., 1964).

Miller and Jablin (1991) developed a theoretical model and series of propositions to explain newly-hired employees' information seeking practices. They argued that newcomers will engage in knowledge seeking tactics from their supervisors and colleagues in order to reduce uncertainty about their new roles. The researchers argued that new hires who engage in greater knowledge seeking will experience reduced levels or role ambiguity/role conflict. Conversely, those who do not engage in knowledge seeking will experience higher levels of role ambiguity/role conflict. The researchers noted: "Experiences of role ambiguity/role conflict, may in turn, simulate more

information information-seeking activity. Thus, it is expected that the levels of role ambiguity/role conflict experienced by new comers during the organizational encounter period may depend upon their information-seeking behaviors," (Miller & Jablin, 1991, p. 102). Further, the researchers proposed that new comers who rely on third-parties as information-seeking sources while excluding their supervisors will encounter higher levels of ambiguity and role conflict than the ones relying on both third-party and supervisors for information sources. New comers who relied on indirect questions and disguised conversation for information sources were also expected to experience higher role ambiguity and role conflict than the ones who less frequently used such tactics.

Holder (1996) aimed to confirm Miller and Jablin's propositions. In her study, she investigated the type of information-seeking strategies that proved most effective in order to reduce role ambiguity for new employees. The data for the study was collected through focus group interview and survey. A total of 111 participants responded to the survey. The results indicated that a higher level of uncertainty with a work role was positively related to information-seeking via the use of observation, third-party inquiries and indirect knowledge-seeking tactics. Indirect information-seeking tactics (indirect, 'face-saving' questions) were also positively related to role ambiguity, while overt tactics (direct interaction and solicitation of information) were negatively related to role ambiguity.

In the same nationwide study cited earlier, Kahn et al. (1964) discovered that increased levels of role ambiguity translated into lower levels of job satisfaction, lower levels of self-confidence, and increased level of work related tensions. Job dissatisfaction led to perceived lack of time to provide information to patients about their conditions

(Sales & House, 1971), while perceived lack of competence inhibited knowledge seeking as "by seeking help, one publicly acknowledges incompetence, inferiority, and dependence in front of another person," (Lee, 2002, p. 19). As a result, role ambiguity is considered as another factor that contributes to the lack of time barrier.

Knight, Kim, and Crutsinger (2007) examined the impact of role ambiguity on customer and sales orientation among retailers. They posited that role ambiguity has a negative impact on customer orientation (focus on meeting customer needs), sales orientation (focus on sales with short term results), and job performance. The researchers surveyed 259 employees in the clothing, accessories, shoe, and home furnishings areas of a national department store retailer. The results showed that role ambiguity had a negative effect on the two sales approaches as well as a negative effect on job performance. The researchers noted that "employees who are unsure of job requirements and expectations might be unable to meet performance standards," (p. 389). To mitigate this, researchers recommended retail managers contribute sufficient knowledge and feedback to the sales force in order to clarify any ambiguous role areas.

Spreitzer (1996) investigated the effects of role ambiguity, access to information and sociopolitical support on employees' perceived empowerment. They surveyed 393 middle level managers from a variety of units at a Fortune 50 company. The results indicated that role ambiguity had a strong impact on empowerment. The researchers argued that ambiguous tasks or goals introduced a great level of uncertainty into employees' work which resulted in increased expectations from multiple stakeholders and decreased perception of empowerment. Correspondingly, access to information

helped to reduce such uncertainty, increased understanding of work roles and increased employee empowerment.

Tang and Chang (2010) examined the effects of roles stress on employee creativity. They hypothesized that role ambiguity will have a negative effect on creativity and surveyed 202 employees of Taiwanese companies to validate their model. The results showed that role ambiguity had a significant negative effect on employee creativity and job satisfaction. The findings suggested that consistent feedback on clarifying employee's role improved creativity and increased job satisfaction.

In their study on the antecedents of executive information system use among 36 executives, Vandenbosch and Huff (1997) found that executives were predisposed toward scanning for information behaviors (rather than focused search) if they had increased tolerance for ambiguity. Moreover, executives with divergent jobs engaged in scanning for knowledge more than those with convergent jobs.

Jackson and Schuler (1985) conducted a meta-analysis to determine the strength and consistency of relationship between role conflict, role ambiguity, and 29 respective correlates. They used 96 journal articles from a variety of indexes and derived 58 pairs of variables including role conflict, role ambiguity, ten context, five individual, ten affective, and four behavioral variables. Analysis of the results demonstrated that role ambiguity was negatively correlated with feedback from others (knowledge contribution). The researchers argued that feedback from others was associated with low role ambiguity, because individuals learned their roles primarily through such feedback.

Ayyagari, Grover, and Purvis (2011) investigated the impact of ICTs' technology characteristics in inducing work-related stress on employees. They hypothesized that

demands created by ICTs can lead to increased workload, work interruptions, and ambiguity on what tasks need to be completed first. The researchers surveyed 661 ICT users from a variety of companies and industries. The final results indicated that consistent connectivity to an ICT "increases the workload by enhancing the speed of work flow," and "the dynamic nature of ICTs also increased perceived work overload when technologies change beyond an individual's ability to cope," (p.848). The consistent connectivity to an ICT (e.g. email) resulted in frequent interruptions to employees' work practices, while changes to the ICT resulted in role ambiguity due to new learning demands. Workload and role ambiguity were found to the dominant stressors that led to exhaustion and turnover intentions.

Locus of Control

Locus of control (LOC) is the extent to which employees believe that others have control over events in their lives (Rotter, 1966). According to the social learning theory (SLT), people's motivations to engage in a specific behavior are impacted by the results of previous behaviors (Rotter, 1954). Rotter (1966) proposed that since individuals strive to minimize negative consequences while maximizing positive results, they will engage in behaviors that are expected to have a high probability of resulting in positive outcomes. Positive results will either reinforce or weaken repetitions of that behavior, depending on whether an individual believes that the reinforcement resulted from his or her personal behavior or from an outside entity. This personal locus (location) of control is characterized as internal or external.

Individuals with high external locus of control believe that factors such as luck, fate, or powerful others determine what happens to them (Rotter, 1966). They tend to be more

withdrawn, less likely to take risks and rely more on information from their inner circle since this makes them feel safe, while individuals with high internal locus of control believe that their behaviors determine what occurs to them. For example, Lam and Mizerski (2005) investigated the impact of locus of control on word-of-mouth communications. They proposed that internals will tend to engage in word-of-mouth communication (seeking advice, promote a product) with members of out-groups (weaker tie relationship such as colleagues) rather than members of in-groups (stronger tie relationships such as friends and family). To validate their hypothesis, the researchers surveyed 197 undergraduate students at an Australian university. The results showed that individuals with internal LOC tended to engage in word-of-mouth communication with out-group members, while externals preferred communicating with the in-group (friends and family). The researchers reasoned that the preferences of the externals were influenced by "uncertainty associated with being in a less familiar environment… promoted or encouraged more in-group communication and sharing," (Lam & Mizerski, 2005, p. 223).

Extant literature demonstrates that individuals with internal LOC tend to engage in increased level of information seeking in order to remain in control of their environment. For example, Srinivasan and Tikoo (1992) investigated the impact of locus of control on consumer's information searching behavior. They hypothesized that individuals with internal locus of control will engage in greater information search and rate themselves as more knowledgeable than externals. A mail survey collected 1401 responses from residents in a Northeast metropolitan area. The results of the study indicated that internals

engaged in a higher level of information seeking than external. As a result, internal scored themselves as more knowledgeable of the product class than externals.

Flaherty, Pearce, and Rubin (1998) examined motives for using ICTs for communication purposes versus face-to-face interactions as well as the impact of locus of control on communication apprehension. They surveyed 132 ICT users at a Midwestern university. The final results showed that compared to internals, who found greater enjoyment in face-to-face and computer mediated communication with others, externals communicated for the purpose of inclusion.

Darley and Johnson (1993) also examined the effects of locus of control on information search as it related to fashion. In their survey, they discovered that individuals with external locus of control preferred shopping in small clothing stores, didn't preplan their shopping and were "less likely to be fashion opinion leaders and less likely either to desire or to search for fashion-related information," (Darley & Johnson, 1993, p. 149).

In a similar study, Poole and O'Cass (2002) investigated that effects of personality traits on preference for shopping online versus malls. They argued that significant differences in preferences will be observed between individuals with internal versus external LOC. To test their hypothesis, the researchers surveyed 569 employees from a city council, and members from two online forums. The results showed that internal LOC individuals exhibited greater preference for the online shopping environment, because it allowed them to experience greater level of perceived control. Conversely, external LOC individuals preferred shopping in malls, because they sought "an environment where they

can experience pleasure at a lower level of perceived control," (Poole & O'Cass, 2002, p. 1775).

Aaronson, Mural, and Pfoutz (1988) examined what personality traits impacted the information seeking behaviors of pregnant women. The researchers conducted an exploratory study by surveying 529 pregnant women from eight different physician practices around Seattle, Washington. The results confirmed a relationship between locus of control and information seeking behaviors. Moreover, women with higher internal LOC sought more information from print media, while external LOC women preferred radio and television as information sources. The researchers reasoned that "This may reflect the fact that obtaining information from newspapers and magazines requires more direct action by the individual. On the other hand, information obtained from television or radio is more likely to be a chance occurrence,"(Aaronson et al., 1988, p. 343).

Avtgis, Brann, and Staggers (2006) investigated the impact of patients' perceptions of control over health issues on information exchanges with doctors. To determine the effects, the researchers surveyed 537 students at a large eastern university. The results showed that patients with internal LOC reported higher levels of information contribution, while those with external LOC demonstrated little information contribution.

Research into communication practices provides evidence of an association between personal communication, locus of control and information sharing. For example, Friedrichsen and Milberg (2006) investigated the problems that physicians perceived when sharing information with terminal patients. They interviewed 30 Swedish physicians from ten different clinics. One of the key findings of the study showed that doctors perceived a certain loss of control (e.g. of emotions, professionalism, confidence)

when sharing bad news with terminal patients. Physicians felt that maintaining control was critical during the process of information sharing which aimed at achieving a sense of understanding with the patient.

Libert et al. (2003) examined whether a relationship exists between physicians' locus of control and their communication skills. They hypothesized that physicians with external LOC will engage in more informative and supportive conversations with cancer patients than the ones with internal LOC. To test their hypothesis, the researchers used simulated interviews with 81 doctors and clinical interviews with 75 doctors, all from Belgium. The results confirmed that LOC influenced physicians' communications style where "physicians with external LOC gave more appropriate information in the highly emotional simulated interview and less premature information in the clinical interview than physicians with internal LOC," (Libert et al., 2003, p. 507). Moreover, doctors with external LOC were found to exhibit higher levels of perceived stress, higher levels of depersonalization, and less personal growth.

In another study, Libert et al. (2006) investigated the impact of locus of control on the acquisition of communication skills during training programs for physicians. The researchers posited that internal LOC physicians will acquire greater communications skills during training and will use such skills (e.g. open ended questions, seeking and clarifying information) to a greater degree than doctors with external LOC. A total of 67 doctors were interviewed and the results analyzed. The researchers found that after the training, doctors with internal LOC exhibited to a greater degree the use of more directive questions, greater assessing functions (e.g. checking, summarizing), between negotiations with patients, and decreased use of premature information. The researchers concluded

that doctors with external LOC "could also feel less confident in their ability to handle the consequences of communication skills promoting disclosure of concerns and hence decide not to use them," (Libert et al., 2006, p. 561).

Rubin (1993) investigated the impacts of locus of control on communication motivation, avoidance, and satisfaction from individual interactions. The researcher surveyed 400 undergraduate students at a large Midwestern university. The results revealed that individuals with external locus of control regarded communication as less satisfying, tended to avoid it, and exhibited anxiety when communicating with others.

McCroskey, Daly, and Sorensen (1976) investigated the effects of communication apprehension and personality variables (locus of control, anxiety, confidence, self-control). They surveyed 189 elementary and secondary teachers and found positive correlation between communication apprehension and external LOC.

Avtgis and Rancer (1997) studied the relationships between individual's traits, such as argumentativeness and verbal aggressiveness, and locus of control orientation. In a study of 210 participants at a large Midwestern university, the researchers found that locus of control orientation impacted both argumentativeness and verbal aggressiveness. Individuals with internal locus of control orientations reported lower avoidance levels of argumentativeness ("which predisposes individuals in communication situations to advocate positions on controversial issues while simultaneously refuting the positions that others hold on those issues," (Avtgis & Rancer, 1997, p. 442)). In contrast, individuals oriented toward external locus of control exhibited higher levels of verbal aggressiveness ("attacking the self-concept of another in order to inflict psychological pain,"(Avtgis & Rancer, 1997, p. 442).

To understand how these results impact individual knowledge exchange practices, it is important to examine the traits that facilitate the communication's behavioral process. One classification system that organized such personal traits was proposed by Infante, Rancer, and Womack (1997). The system suggests that communication behavior is influenced by an individual's apprehension, presentation, adaptation, and aggressive traits. Relationship between the apprehension traits (consisting of communication apprehension, receiver apprehension, and willingness to communicate), argumentativeness, and verbal aggressiveness has also been found (Edwards, Bello, Brandau-Brown, & Hollems, 2001; Infante & Rancer, 1982; Schrodt & Wheeless, 2001; Wheeless, 1975; Wheeless, Preiss, & Gayle, 1997). These studies reported a negative relationship between argumentativeness and receiver apprehension, and a positive correlation between verbal aggressiveness and communication difficulty. Moreover, in a study among 208 participants of on-going task groups, Anderson and Martin (1999) found that argumentative rather than verbally aggressive group members, experienced higher communication satisfaction, better consensus, and a greater sense of cohesion.

Studies have demonstrated relationships between internal locus of control, information acquisition, and learning motivation. For example, Boone and Van Witteloostuijn (2005) studied the impact of locus of control on information acquisition in teams. The researchers hypothesized that internal LOC teams will engage in greater information gathering with decision-making context. To test their hypothesis, the researchers surveyed 178 individuals from 44 teams that participated in a simulation exercise. The final results showed that individuals with internal LOC processed information better than individuals with external LOC. The researchers noted that if

internal LOC team members were added to team, the team experienced an increased information-processing capacity "resulting in more information acquisition behavior and, as a result, better team performance," (Boone & Van Witteloostuijn, 2005, p. 903).

Colquitt, LePine, and Noe (2000) conducted a meta-analysis study to determine the effects of personal characteristics (e.g. locus of control) on training motivation. The researchers analyzed a total of 106 articles from a variety of journals related to human psychology, personality, and organizational behaviors. The researchers found that individuals with internal LOC exhibited strong motivation to learn, and higher self-efficacy, while people with external LOC learned more and had higher transfer levels of declarative knowledge.

Studies also demonstrate a relationship between locus of control and trust. For example, Frost et al. (1978) investigated variables (e.g. locus of control and social power) that impacted trust among individuals. To determine any potential relationships, the researchers surveyed 59 Brigham Young University undergraduate students. They found that individuals who possessed internal LOC were trusted more by their peers than those with external LOC. The researchers concluded that individuals invested their trust in someone who had "internal locus of control, and therefore being somewhat less subject to external and situational forces," (Frost et al., 1978, p. 108).

Carnevale and Wechsler (1992) studied the impact of psychological factors on the formation of individual trust toward organizations. They hypothesized that individuals with internal LOC will have higher levels of organizational trust than individuals with external LOC. The researchers surveyed 1279 employees at a driver's licensing agency. The results confirmed the hypothesis. The researchers concluded that employees with

internal LOC perceived less threat from their work environment, took greater responsibility for their experience at work, and had greater capacity for trust.

Summary

The review of literature examined the knowledge sharing process as a set of knowledge seeking (knowledge demand) and knowledge contributing (knowledge supply) activities (Ardichvili et al., 2003). The theory of information foraging was proposed as model to explain individuals' knowledge sharing behaviors (Pirolli & Card, 1999). Analysis of the literature on knowledge seeking revealed a host of individual factors that impacted knowledge seeking behaviors (e.g. perceived information and source quality, perceived trust, perceived transformational leadership, perceived time constraints, perceived time cost and time savings, perceived time pressure, perceived ease of knowledge accessibility). Moreover, work-related factors were also found to impact knowledge seeking behaviors (e.g. task-relevant expertise, task interdependence, task complexity, role ambiguity, work load, and work conflict).

The literature review demonstrated that extrinsic factors (e.g. status change, promotions, raises, and organizational rewards) and intrinsic motivators (e.g. enjoyment in helping others, altruism, feeling of personal achievement) affected knowledge contributing practices. Further, individual characteristics (e.g. agreeableness, conscientiousness, openness to experience, self-efficacy, sense of belonging, knowledge sharing self-efficacy and sense of self worth), organizational characteristics (e.g. ethical culture, social ties, community identity, social awareness, organizational climate, organizational capital, and perceived management/organizational support) and work-

related characteristics (e.g. in-role behavior, task conflict, decentralization, work engagement, and job involvement) also impacted knowledge contributing behaviors.

Three major barriers to knowledge sharing (time, communication, and trust), and three underlying factors that potentially contributed to these barriers (i.e. role conflict, role ambiguity, and locus of control) were also reviewed. The analysis recognized a link between job characteristics, time limitations, and organizational roles. It also established a need for research into: 1) how on-the-job role conflict and role ambiguity impact employees' knowledge seeking behaviors via the use of ICTs, and 2) how perceived locus of control impacts employees' knowledge contributing behaviors via ICTs. In the next chapter, a model that integrates the potential factors impacting knowledge seeking and knowledge contributing via ICTs is proposed. Furthermore, the methodology used to validate the model is also examined.

Chapter 3

Methodology

Introduction

This section describes the elements of the research design and lays out the method used to conduct the study. First, a review of the type of study, setting, unit of analysis, and time horizon are provided. These are followed by a synopsis of each step from the methodology.

Details of Study

The goal of this research was to answer two questions:

1) What are the potential factors that contribute to the commonly accepted barriers to knowledge sharing?

2) How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing?

To answer the first question, a literature review and a descriptive study in the form of content analysis were conducted to identify potential factors resulting in individual knowledge sharing barriers at work. Next, a causal modeling study in the form of hypotheses testing was performed to investigate the factors' impact on the knowledge seeking and knowledge contributing behaviors of employees via ICTs.

Since the study sought to examine the impact of variables on individual knowledge seeking and knowledge contributing behaviors, each employee response was treated as a data source. Therefore, the study population was employees of organizations who use ICTs for the purpose of knowledge sharing. Of particular interest were users of ICTs that offer peer-to-peer communication, group communication, collaboration capabilities, and were designed to facilitate real time conversations, information sharing, online meetings, and electronic repositories (e.g. email, instant messaging, micro/wiki blogging, activity streaming, and content collaborating). Products with such functionalities include: Microsoft's suite (e.g. Microsoft Outlook, SharePoint, Skype, Yammer), Google's suite (e.g. Google Mail, Google +, Google Cloud Connect, Google Docs), IBM's Lotus suite, EMC's Center Stage, Glasscubes, Twitter, Facebook, Wordpress, YouTube, GotoMeeting, and WebEx.

The data collection was performed via the use of a survey. As a result, the time horizon for this study was cross-sectional (Sekaran & Bougie, 2009). Extant literature provided the foundation for this study's approach. For example, Yan et al. (2013) conducted a cross-sectional study of employees who participated in Web 2.0 virtual communities for the purposes of knowledge seeking, knowledge contributing, and shared content creation. Similarly, Pee (2011) conducted a cross-sectional study on employees of organizations that used EKRs for knowledge-intensive professional work. Paroutis and Saleh (2009) investigated knowledge sharing determinants among employees using Web 2.0 technologies for collaboration purposes. Chen and Hung (2010) studied factors that influenced knowledge sharing in professional virtual communities of practice dedicated

to information exchange on topics such as operating systems, databases, programming, and network skills.

Figure 2 outlines the high-level methodology approach, followed by a description of each step:

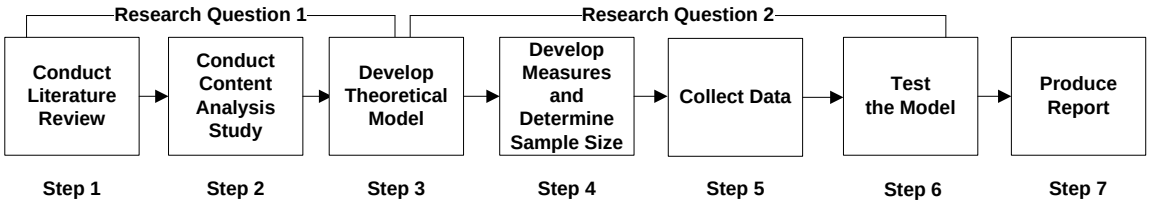

Figure 2. Methodology Approach

Step 1 - Conduct Literature Review

To address the first research question, an extensive review of the literature covering a wide spectrum of studies within a variety of fields was performed in chapter 2 to investigate potential barriers to knowledge sharing. Creswell (2003) noted that through literature reviews researchers can refine the breath of their topic and inform their audience about the significance of their studies. Levy and Ellis (2006a) explained that the literature review represents the foundation for all scholarly research and proposed a three-stage model (input, processing, output) to organize it. The literature review of this study was organized around their model.

During the input stage, quality knowledge management literature from journals and conferences within a variety of domains such as information systems, information technology consulting, healthcare, education, research, government and new product development were reviewed. Keyword searches on knowledge barriers, knowledge sharing constraints, knowledge impediments, knowledge obstacles, and knowledge

hurdles were used. Backward and forward searches were performed on selected sources to further refine the results (Webster & Watson, 2002).

During the first step of the processing stage, knowledge of the articles was demonstrated through meaningful descriptions. Next, summary and interpretation of the results were used to demonstrate comprehension of the literature. Levy and Ellis (2006a) proposed the use of a table during the third step (application) as a method to identify and categorize the major concepts relevant to the study. As a result, a literature review matrix was prepared as outlined in Table 1 with columns that identified resource citations, type of study, knowledge behavioral context, identified knowledge sharing barriers and potential causes (Appendix A).

		Knowledge Behavior Context		Noted Barriers		
Authors	Study Type/Sample	Seeking	Contributing	Lack of Time	Poor Communication	Lack of Trust

Table 1. Literature Review Matrix

During the fourth step (analysis), significance of the selected research was identified. This was followed by the synthesis step where integration of the selected literature and generalization of the concepts were performed. Finally, recommendation and conclusions based on the reviewed literature were performed in the sixth step (evaluation).

Step 2 - Conduct Content Analysis Study

Next, a content analysis study was conducted on the articles indentified in the literature review in order to extract potential contributing factors to knowledge sharing

barriers. Content analysis is one of the fastest growing techniques in quantitative research and has been defined as the "systematic, objective, quantitative analysis of message characteristics," (Neuendorf, 2002, p. 1). It has been widely used in the area of knowledge management for the purposes of categorizing KM frameworks (Heisig, 2009), clustering of organizations with KM implementation stages (Lee & Kim, 2001), model testing of knowledge contribution (Wasko & Faraj, 2005), determination of antecedents to knowledge sharing (Taylor & Wright, 2004), scale development for measuring knowledge management behaviors (Darroch, 2003), and factor extraction for KMS diffusion (Quaddus & Xu, 2005). The method allowed the researcher "to analyze (large amounts of) textual information and systematically identify its properties, such as the presence of certain words, concepts, characters, themes, or sentences," (Sekaran & Bougie, 2009, p. 386).

The content analysis consisted of six stages (Krippendorff, 1989): 1) Design – context definition, exploration of data sources, and identification of construct; 2) Unitizing – definition of unit of analysis; 3) Sampling; 4) Coding – categorizing the units; 5) Drawing inferences – demonstration of relationship between coded data and constructs; and 6) Validation.

Stage 1 – Design

Berg (2001) proposed two types of content analysis: manifest, which is focused on physically present elements that can be counted, and latent – the interpretation of the symbolic meaning of the message. He argued that both can be used during a content analysis study. For this study, a mixed approach of manifest and latent analysis of the data was utilized. An example of a manifest content analysis is presented in the following

excerpt: “The consequence is that more tasks have to be done in the same amount of time. The more workflow interruptions that occur, the more time that is lost (by the accomplishment of these additional tasks) and the accumulating time loss likely leads to time pressure,” (Baethge & Rigotti, 2013, p. 5). In this example, the researcher coded the text as ‘work load’ under the ‘lack of time’ barrier since it demonstrated a link between work-related stress and time pressure (see table 2 for sample coding schema). Similarly, content of articles that have physically present keywords that explicitly linked role stress to lack of time, or personal characteristics to poor communication skills and to lack of trust barriers were captured and counted as part of the manifest content analysis process.

In contrast, an example of a latent content analysis concerning the effects of role conflict was interpreted from the following text: “We expect that individuals who feel busy will prioritize task performance at the expense of knowledge sharing,” (Connelly et al., 2013, p. 3). In this instance, the content of the text implied that work-related conflict (keyword is ‘busy’) led to limited time to perform certain tasks at the expense of other tasks. Such content interpretations were coded as ‘work conflict’ under the ‘lack of time’ barrier as part of the latent content analysis process.

Stage 2 – Unitizing

The unit of analysis for the proposed study consisted of phrases, sentences and paragraphs. Weber (1990) argued that sentences are used as units when the researcher is looking for “words or phrases that occur closely together,” (p.22). In addition, Weber recommended the phrases as coding units in the instances when there is limited number of coders (as was the case with this study).

Stage 3 – Sampling

The sampling method used in the study was purposive and consisted of articles examined during the literature review. Article selection was based on their relevance to the goal of this study (Creswell, 2003). The analysis was focused on articles related to the discipline of knowledge management from the domains of information systems, information technology consulting, healthcare, education, research, and new product development. Articles that referred to knowledge sharing barriers as well as to knowledge seeking and knowledge contributing behaviors were targeted. Sources for knowledge management articles were databases as recommended by Levy and Ellis (2006b). These included ABI/Inform Complete-ProQuest, ACM Digital Library, IEEE Computer Society Digital Library, Computers and Applied Sciences Complete - EBSCO host, Wiley Online Library - Blackwell Publishers, IBI Global Science Direct – Elsevier, Taylor & Francis, JSTOR, ProQuest Computing – ProQuest, and SpringerLink - Springer.

Stage 4 – Coding

A single coder, the researcher, was used to perform the coding in this study. A number of studies reported successful use of single coders in their studies. For example, Marti and Seifert (2012) used a single coder during the content analysis stage to develop a conceptual framework for quantitative assessment of companies' strategies. Heisig (2009) used a single coder in his study to analyze 160 KM frameworks from research and practice. Ahuvia (2001) reported that a single coder was sufficient for interpretive content analysis studies.

The researcher used both an inductive and deductive approach to determine the categories for content analysis. Berg (2001) suggested that during the inductive approach,

the researcher absorbed him/herself in the articles to determine the theme or meaning of the authors' message, while the deductive approach relied on schemes grounded in theory. The meaning unit (coding unit) used in the study was a mixture of words and textual references. The categories for the coding were words that represented specific themes. For example, coded sentences, or paragraphs that described increased task conflict, task interdependence, as well as any associated synonyms were categorized under the category *job complexity*. These categories were assigned to specific concepts that constituted variables in a typical research hypothesis (Berg, 2001). These concepts were determined during the content analysis review of each article. The final grouping of the categories percolated to a single concept (role conflict in this case).

Table 2 demonstrates an example of the coding sheet. In it, code refers to the unit's alpha-numerical id; description includes the unit's text (phrase, sentence or paragraph) extracted from the article; article section identifies where the reference in the article occurred; researchers indicates the article's authors; study type denotes the type of research described in the article; barrier denotes notation of associated knowledge barrier; category refers to the number of times the concept appeared in the article; and concept indicates an inferred variable.

Code #	Description	Article Section	Researchers	Study Type	Barrier	Category	Concept

Table 2. Sample Coding Sheet

The following keywords were used during the coding phase to discover sentences and paragraph references for the variables identified in this study: job, work, responsibility, duties, activities, task, role, conflict, ambiguity, rewards, awards, promotion, interdependency, policy, complexity, uncertainty, need, and problem. Based on the

analysis, the following categories percolated for the role conflict variable: *job role, job responsibility, job complexity, job conflict, job interdependence, resource conflict, and role conflict*. In addition, the following categories percolated for the role ambiguity variable*: job clarity, job expectation, job duties, job responsibility, job clarity, and role ambiguity*. Finally, the following categories percolated for the locus of control variable: *job awards, personality, job advancement, and job control*.

Stage 5 – Drawing Inferences

Descriptive statistics, such as frequency distribution of the number of occurrences recorded for each of the coded units and concepts, were analyzed in order to determine the magnitude of observations and demonstrate more fully the overall analysis (Berg, 2001). The count stopped when no new concepts appeared in the selected literature. Special attention was paid to eliminate potential overlapping between concepts and to ensure no unit was counted twice. Concepts that percolated from the content analysis were used to answer the first research question for this study "What are the potential factors that contribute to the commonly accepted barriers to knowledge sharing?"

Stage 6 - Validation

Testing the reliability of the coding ensured that the procedures can be reliably reapplied. Since a single coder (the researcher) was used for the coding process, Riffe, Lacy, and Fico (2005) recommended the coder "tests the reliability against herself at two points in time – testing the stability of coding. This tests whether slippage has occurred in the single coder's understanding or application of the protocol definitions," (p. 123).

Random selection of certain number of units was performed for the reliability test. The number of units was determined by the following formula proposed by Riffe et al. (2005): $\mathbf{n = [(N-1)(SE)^2 + PQN]/[(N-1)(SE)^2 + PQ]}$

n = the sample size of the reliability check

N = total number of content units from the coding

P = population level of agreement

SE = standard error

Q = (1-P)

Once the random samples were selected, the researcher recoded them and compared them against the original coding. Observed agreement was calculated as a percentage of units for which the two test results matched. Reliability level above 70% agreement between the tests was achieved and was considered acceptable (Riffe et al. 2005). Measure to determine whether a perfect agreement, or agreement by chance had occurred was performed using a formula to calculate Cohen (1960) kappa statistic. This coefficient of agreements between the tests represented "the proportion of joint judgments in which there is agreement, after chance agreement is excluded," (Cohen, 1959, p. 46). Kappa equal to 1.0 indicates perfect agreement between the tests, a value of 0 indicates agreement as a result of chance, while a negative number indicated less than chance agreement. Kappa values between .61 and .8 are indicative of substantial agreement, while values between .21 and .4 are considered fair agreement (Viera & Garrett, 2005). The kappa value of .7, achieved in this study, was considered indicative of substantial agreement.

Step 3 - Develop Theoretical Model

This section outlines the theoretical model and hypotheses of the conducted study. The second research question investigated in this study was:

2) How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing?

To address this question, a theoretical model derived from the review of literature, identified theories (information foraging and social exchange theories) and the content analysis study was developed (Figure 3) to demonstrate causal links between the exogenous variables (role conflict, role ambiguity, and locus of control) and the endogenous variables (knowledge seeking and knowledge contributing behaviors). Specific hypotheses and recommended instruments to measure the causal links are provided next.

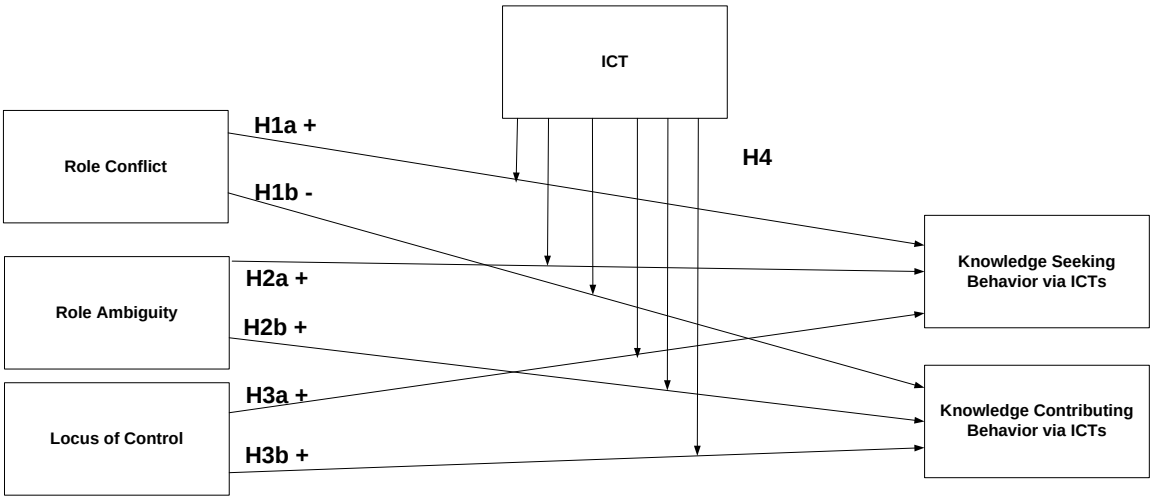

Figure 3. Proposed Theoretical Model

Role Conflict Hypotheses

Employees seek to resolve their role conflicts by engaging in information seeking about their roles, expectations and values from internal sources (colleagues and

supervisors), and external groups (sources outside their work group) (Sparrowe & Liden, 1997). For example, organizational ICT users engage in information sharing related to task and time coordination (Riemer, Altenhofen, & Richter, 2011), requests for factual knowledge from their colleagues (Seebach, 2012), and specific updates relevant to daily work activities (Zhao & Rosson, 2009). Moreover, in accordance with the information foraging theory (Pirolli & Card, 1999), it was argued that employees will seek knowledge via ICTs as long as it takes them the least amount of effort and time to locate it, while achieving the maximum value of information relevant to their role conflict. As a result, it was proposed that:

H1a. Role conflict positively impacts knowledge seeking behaviors via ICTs.

Knowledge contribution requires time and effort to complete. Role conflict, characterized by lack of time and resources to complete tasks, constricts employees' abilities to engage in knowledge contributing behaviors. This reduction in knowledge contributing is explained by the social exchange theory, which states that opportunity costs are "rewards foregone from alternative behavior not chosen," (Kankanhalli et al., 2005, p. 116). Since knowledge contribution diverts employees from completing other tasks during the limited time they have, knowledge contribution was perceived as an opportunity cost. Therefore, it was proposed that:

H1b. Role conflict negatively impacts knowledge contributing behaviors via ICTs.

Role Ambiguity Hypotheses

Rizzo et al. (1970) role ambiguity scale includes items that measure clarity about role responsibilities, time allocation, relationships with others, guides, policies, and the ability to predict sanctions as outcomes of behavior. Individuals faced with expectations of their new duties tend to seek clarification and engage in information seeking behaviors (Hsieh, 2009; Miller & Jablin, 1991). They engage in socialization practices in order to transfer tacit knowledge that can assist them in completing their new roles (Nonaka, 1994). These practices require continuous informal communication for the purposes of knowledge transfer in situations when low ambiguity is present. Individuals experiencing higher levels of ambiguity face larger number of task uncertainties that require greater effort and time to attain valuable information to resolve their role ambiguity (Pirolli & Card, 1999). As a result, it was argued that higher role ambiguity negatively impacts knowledge seeking, while low role ambiguity results in increased knowledge seeking behaviors. The hypothesis was proposed as:

H2a. Role ambiguity positively impacts knowledge seeking behaviors via ICTs.

According to Grace, Zhao, and boyd (2010), employees used ICTs to share information usually exchanged in informal places (e.g. by the water cooler, or when bumping in the hallway). These conversations led to sharing of random ideas, noteworthy items, or other personal experience that can clarify ambiguities. Riemer et al. (2011) discovered that ICTs are used for discussions, clarification, informal communication, and problem solving. Moreover, according to the social capital theory (Bourdieu, 1986), individuals who build social networks end up benefiting from their value in the long run

as a result of reciprocity that promotes knowledge contribution among the member-network. As with the prior hypothesis, it was expected that low role ambiguity led to increased knowledge contributing behaviors. As a result, it was proposed that:

H2b. Role ambiguity positively impacts knowledge contributing behaviors via ICTs.

Locus of Control Hypotheses

Individuals with high external locus of control believe that factors such as luck, fate, or powerful others determine what happens to them (Rotter, 1966). A study on predictors of knowledge sharing behaviors among 120 members of trustee boards found that "stronger internal locus of control is more likely to demonstrate increased intention to share knowledge" (Thakadu, Irani, & Telg, 2013, p. 20). Therefore it was proposed that:

H3a. Internal locus of control positively impacts knowledge seeking behaviors via ICTs;

H3b. Internal locus of control positively impacts knowledge contributing behaviors via ICTs.

ICT Hypothesis

Finally, ICTs have been shown to impact individual motivation to share knowledge (Hendriks, 1999). As argued in prior hypotheses, information foragers will seek to minimize effort and time on searching for valuable knowledge, while maximizing the value of the discovered knowledge. ICTs were anticipated to increase this rate of return by providing quick access to stored knowledge and/or knowledge sources. As a result, ICTs were expected to exert influence on the strength of the relationships between the

proposed variables. Consequently, ICT was added to the model as a categorical moderating variable and it was proposed that:

H4. ICTs moderate the relationships between the exogenous and endogenous variables.

Step 4 – Develop Measures and Determine Sample Size

This section describes the instrument scales that were used to measure the constructs of the proposed study, goodness of fit measures, as well as population and sample size.

Scales

Full version of the questions for each construct is included in Appendix B. Role conflict and role ambiguity scales (9 items for role conflict and 6 items for role ambiguity) were measured using a 7-point scale ranging from very false (1) to very true (7). These scales were developed by Rizzo et al. (1970) for the purposes of testing role stress in complex organizations. The researchers tested the scales with a sample of 298 employees from the managerial, technical, research and engineering ranks of a large company. The scales have been successfully applied in studies within the domains of information systems (Tarafdar et al., 2007), military and civil services (Johnson & Stinson, 1975), retail sales (Knight et al., 2007), and manufacturing and services (Tang & Chang, 2010). A mean (between 1 and 7) was calculated so that higher scores indicated high role ambiguity, or high role conflict.

Spector (1988)'s Work Locus of Control Scale (WLOC) was used to measure participants' locus of control. There were eight items in the scale that measured the belief of employees about control of work outcomes. One half of the scale items measured external WLOC (e.g., "getting the job you want is mostly a matter of luck") and the other

half measured internal WLOC (e.g., "people who perform their jobs well generally get rewarded"). External WLOC was represented by high scores, while internal WLOC was represented by low scores. Wei and Si (2013) used Spector's scale in their study on counterproductive work behaviors among 398 employees at a large multinational company. Similarly, Sprung and Jex (2012) used the WLOC scale in their study on work stressors among 191 full-time non-self-employed workers in the United States. The original WLOC instrument used 6-scale anchors where 1 = Disagree very much and 6 = Agree very much. The WLOC scale used in this study was converted to a 7-point Likert scale with anchors 1 = Strongly disagree and 7 = Strongly agree in order to maintain consistency with the other instruments.

Knowledge seeking and knowledge contributing behaviors were measured via scales that were originally developed by Van den Hooff and Hendrix (2004) and then modified by De Vries, Van den Hooff, and Ridder (2006) to demonstrate clear separation between the knowledge seeking (collecting) and knowledge contributing (donating) behaviors. De Vries at el. (2006) reported that while the reliabilities of these scales were measured at .72 and .68 (with .54 correlation between each other) in prior studies, in their 2006 study, Cronbach's alpha was measured at .75 for knowledge seeking and .84 for knowledge contributing, with intercorrelation of the scales = .69 ($p < .01$). The original instrument used 5-point Likert scale and consisted of a total of eight items. For the present study, the scale was modified to a 7-point Likert scale and the wording of the items was modified in order to fit the ICT context of this study. Description of the scale items and survey validation process of the instrument are provided in the survey validation section. In order to minimize confusion around the broad descriptor "ICT," knowledge seeking and

knowledge contributing scales were prefaced with a general definition of ICTs (e.g. "ICTs are combination of email, instant messaging, micro/wiki blogging, online forums, and knowledge repositories."). Additionally, a question for the type of ICT used was added to each of the knowledge scales to assist the researcher in determining the common set of ICTs used for each behavior.

Population and Sample Size

According to Chui et al. (2012), knowledge workers spend 28 hours of their work week (61%) sharing knowledge, communicating and collaborating internally with their colleagues and only 12 hours (39%) on role-specific tasks. Of the 28 hours, 28% is dedicated to reading and answering e-mails, 19% to searching and gathering information, 14 % communicating and collaborating. Some researchers report that email is still the main communication form in the business world. According to Levenstein (2013), there were 929 million business email boxes worldwide in 2013 and the figure is expected to exceed 1.1 billion by the end of 2017. Moreover, there were 100 billion sent and received business emails. This number is expected to top 132 billion by 2017.

In addition, a survey of 4200 executives reported that 70% of their companies use social technologies such as social networking, blogs/microblogs, wikis, discussion forums, and shared workspaces (Chui et al., 2012). The same report projected that the use of such technologies can increase knowledge workers' productivity by up to 25%.

As a result, the population of this study was considered the entire group of employees who used ICTs (e.g. email, instant messaging, micro/wiki blogging, online forums, and knowledge repositories) to seek and contribute knowledge. An example of a system that provides online forum and knowledge repository functionality was Microsoft's

SharePoint Services and according to Low (2011), the population of Microsoft SharePoint users was over 100 million (including 78% of the Fortune 500 companies); however, this system did not provide instant messaging, or email services to its users. Accordingly, the sample of participants was not delimited based on a system name, but based on the system type (i.e. only employees who used email, instant messaging, micro/wiki blogging, online forums, or knowledge repositories were sampled). Furthermore, in order to delimit the scope of the study, the specific job category of analyst was selected as described in the delimitations section of this report.

Extant literature on factor analysis presents a wide range of recommendations concerning the appropriate sample sizes. For example, a sample of at least 100 participants is considered sufficient to perform factor analysis (Gorsuch, 1983; Kline, 1979), while recommendations for samples between 200 and 300 are considered good sizes (Cattell, 1978; Comrey & Lee, 1992; Guilford, 1954). Green (1991) proposed the following formula to calculate sample size for multiple regression studies:

$$\mathbf{n \geq 50 + 8m}$$

n = sample size

m = the number of independent variables

Using this formula, a sample size of 74 was calculated (50+8*3). Since this sample size was lower than the minimum size of 100, another formula proposed by Bartlett, Kotrlik, and Higgins (2001) was used.

$$\mathbf{n_o = [(t)^2 * (s)^2] / (d)^2}$$

n_o = sample size

t = alpha level of.025 in each tail = 1.96

s = population standard deviation

d = acceptable margin of error

Based on this formula, a sample size of 118 was calculated:

$$\mathbf{n_0 = [(1.96)^2 * (1.167)^2] / (7*.03)^2 = 118}$$

In this formula, the estimated standard deviation in the population of 1.167 was based on the variance deviation estimate calculated for a 7-point scale and divided by 6 (number of standard deviations that included 98% of the possible range values (Bartlett et al., 2001)). The acceptable estimated margin of error for mean (d) was = .21 (7-point scale * .03 acceptable margin of error).

Other researchers recommended larger sample sizes. Bentler and Chou (1987) noted that while the ratio of sample size to number of parameters can be as low as 5:1, 10:1 for arbitrary distributions, a larger ratio was preferred in order to derive to correct evaluation of the model. Loehlin (1992) and Weston and Gore (2006) suggested sample sizes of 200 or more for structural equation modeling (SEM) studies. Since research shows that average response rate for surveys is approximately 20% (Kaplowitz, Hadlock, & Levine, 2004; Sheehan, 2001), 1368 participants were invited to participate in this study in order to achieve the recommended sample size. A total of 498 responses were received and 173 participants were disqualified. The final analysis of the study included 326 responses.

Step 5 – Collect Data

This section addresses the data collection method for the causal study. It describes the design of survey instruments, reliability and validity testing, and final survey administration.

To conduct the study, a cross-sectional survey was adopted since individual, self-reported data was required to address the second research question, as well as a generalization of results to a larger population was necessary (Rea & Parker, 2005). Sekaran and Bougie (2009) proposed three design principles for the questionnaire design: 1) principles of wording, 2) general appearance, and 3) principles of measurement. The first two are addressed below, while the latter was already addressed in step 4.

Adhering to the principles of wording, short questions not exceeding 20 words were used in the instrument (Oppenheim, 1986). Personal information, such as respondents' names were not collected in order to preserve the anonymity of the participants. Demographic data, such as age, gender, educational level, annual income, and location (based on census region) was provided by SurveyMonkey for each participant in order to determine sample characteristics. Furthermore, general appearance of the survey required a good introduction that identified the researcher, survey's purpose, assurance of confidentiality, and gratitude for participation (Sekaran & Bougie, 2009). The survey can be found in Appendix B and permissions to use the survey instruments in Appendix C.

IRB Approval

Prior to the survey validation, the researcher completed the Nova Southeastern University Institutional Review Board (IRB) forms and submitted the survey instrument for IRB review and approval. The IRB approval was received on February 11, 2014 and can be found in Appendix D.

Survey Validation

The role conflict, role ambiguity and work locus of control scales have been tested repeatedly for internal consistency reliability. Cronbach's alpha scores for the role

conflict scale were reported at .81 by Rizzo et al. (1970) in a study of 199 employees from the headquarters of a plant and .82 in a second study among 91 engineers. The same studies reported alpha scores of .78 and .80 for the role ambiguity scales. Spector's (1988) locus of control scale achieved alpha ranges between .72 and .86 for internal control, and between .85 and .87 for external control in three separate studies (Macan, Trusty, & Trimble, 1996). For the purpose of this study, Cronbach's alpha values close to the reported ranges were expected for each of the three scales.

The wording of the survey items used to measure the endogenous variables (knowledge seeking and knowledge contributing behaviors) were modified from the original instrument developed by De Vries et al. (2006) in order to fit the context of the this study. For example, one of the original knowledge contribution items of the instrument states: "When I've learned something new, I tell my colleagues about it." This item was modified to "I use the ICT to tell my colleagues when I've learned something new about my job." The rewording of the instrument items ensured that the questions measured behaviors performed via ICT systems. In this study, ICTs were defined as systems that supported communications processes for the purposes of sharing knowledge within organizations and this clarification was also included in the final survey instrument. Moreover, since one of the delimitation factors was to solicit users of such systems, ambiguities associated with the terms ICT versus KMS were not expected to occur.

To determine the understandability (clarity) of the questions and the loading (whether only a single response was applicable) of the modified instrument, the scale was validated with a purposive sample of six experts. Extant literature demonstrates that such sample

sizes were sufficient to determine instrument clarity. For example, Myers et al. (2006) used a convenience sample of four to pretest the clarity of their instrument. Abraham et al. (2004) used five participants for their pilot test, while Hart, Jan Hultink, Tzokas, and Commandeur (2003) used six participants. The participants were selected based on the same characteristics of the respondents to the final survey. These characteristics included full time employees that fulfilled the job functions of analysts and used ICTs to share knowledge within their organizations. Furthermore, knowledge of survey preparation techniques was required in order to leverage recommendations for improvement of the instrument items.

Based on the identified characteristics, experts were contacted by the researcher, informed about the purpose of the study and asked if they were willing to participate in the validation of the instrument. Participants that expressed interest were provided with a word document containing the modified scale items. Participants were asked to respond to the instrument statements as well as mark Yes/No responses for whether they believed the items were clear and whether the items allowed only one response. An example of the feedback form is enclosed in Appendix E. Participants were also asked to provide recommendations for rewording of items where necessary and were solicited to provide their perspectives on the clarity of the term 'ICTs.' After the researcher reviewed each participant’s response, the researcher interviewed each participant individually to address the reasons behind any items with No responses. Any differences in opinions were addressed in follow-up interviews with the participants. Based on the comments, the survey items were modified to accommodate any additional changes. Consolidated list of the feedback from the expert panel is provided in Appendix E.

De Vries et al. (2006) reported Cronbach's alpha value of .75 for the knowledge seeking scale and a value of .84 for the knowledge contributing scale in their study. In this study, Cronbach's alpha for the knowledge seeking scale achieved a value of .85 (with the first item being dropped from the scale), while the knowledge contributing scale achieved .87.

Final Survey Administration

The following section describes the approach used to administer the final survey. Using the SurveyMonkey Audience services, a sample of full-time employed analysts who used ICTs at work (e.g. email, instant messaging, micro/wiki blogging, online forums, and knowledge repositories) were contacted from organizations within a variety of industries (e.g. health care, consumer goods, financial services, government, etc.) and invited to take the survey located at a SurveyMonkey.com website (Appendix F). The invitation sent to the users included an introductory letter informing the users of the purpose of the study, disclosure notice, and a link to the survey site, which was accessible via the major Internet browsers (e.g. Internet Explorer, Firefox, Chrome, and Safari). On the second and fourth day of the survey, reminders were sent only to those participants who had not taken the survey (Appendix G). Reminder emails were administered by SurveyMonkey Audience personnel without the involvement of the researcher in order to safeguard the identity of the participants. The survey ran for a period of five days and allowed the participants to leave the survey at any point. No private information was collected at any point.

To delimit the survey only to users of ICT systems, each participant was pre-qualified prior to taking the survey. The pre-qualification process was conducted by requiring each

participant to answer an initial question before taking the survey. The pre-qualification question (provided in Appendix H) asked: "Do you use any of the following systems at work: Email, Instant Messaging, Micro/wiki blogging, Online forums, or Knowledge repositories?" Depending on the selected answer, the SurveyMonkey system either allowed participants to advance to the survey (those that answered Yes), or displayed: "Thank you for your input. Unfortunately, you do not qualify for this survey," and disqualified the participants.

Step 6 - Test the Model

Screening of Data

Once the final results were collected, the data was screened for missing data, distributional properties, outliers and unengaged responses using the SPSS software. The survey site forced participants to answer each question in order to advance to the next one. This ensured that there were no missing responses to any of the questions. Any participant who responded with the same value for every single question was excluded from the final analysis. Similarly, the standard deviations of the latent variables were examined and any that contain zero were eliminated (the same answers on all questions).

To examine the distributional properties of the variables, the data was screened for skewness (to determine whether the distribution differed from a normal distribution) and kurtosis (to determine the relative concentration of data values). Skew index greater than 1 or less than –1 was considered problematic, while cutoff of values of +/– 10 was considered "problematic" kurtosis (Kline, 2005). Influential outliers that had the potential to impact the results were eliminated from the final analysis. Scatter plots were used to

determine any outliers that contained standardized scores of more or less than 3.29 standard deviations from the mean and these were excluded (Bollen, 1989b; Hua, 2010).

Mahalanobis distance statistics (data point's measure of the distance from a common point) for p-value of 0.001 were used to identify and remove multivariate outliers (Kline, 2005). Multicollinearity was diagnosed via a regression where one of the variables was considered the dependent while the rest was designated as independent variables. Any bivariate correlations with values higher than r = .85 were flagged as potential problems. The variance inflation factor (VIF) was used to determine multicollinearity issues (e.g. values higher than 10) (Kline, 2005).

Confirmatory Factor Analysis

SEM, which has been used for testing reflective, formative, or both types of indicators (Fornell & Larcker, 1981), was employed to test the model. Prior to testing the hypotheses, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed in order to establish validity, reliability and good fit of the measurement model (Anderson & Gerbing, 1988). Further, CFA was also used in this study, because the proposed model was based on specific hypotheses (Walker & Maddan, 2008).

The two-stage model proposed by Bowen and Guo (2011) was used to perform the CFA. The first stage included specifying the model. This stage consisted of four steps: 1) Expressing the hypotheses in a diagram with identified relationships between the observed and latent variables. The diagram indicated the latent variables and the observed variables that load on each of latent ones; 2) Setting the scale for each latent variable. Kline (2005) recommended fixing one of the factor loadings to 1.0 for each latent variable in the model in order to tie the other factors to this specific reference point; 3)

Identifying the measurement error (and if error terms are correlated) for each observed item; 4) Indicating correlated latent variables. Correlations that exceed the 0.85 threshold suggested one latent variable as the cause of the observed items as opposed to two (Kline, 2005).

The second stage included the model estimation. This was accomplished through series of iterations that continued "until parameter adjustments no longer result in smaller minimization values, that is, the difference between the discrepancy function associated with the current model-implied matrix is below a convergence criterion," (Bowen & Guo, 2011, p. 101). In this study, the use of maximum likelihood estimator (ML) was applied as it was recommended for the study's proposed sample size and data type (Bollen, 1989).

Structural Equation Modeling Analysis

The SEM analysis was conducted using the AMOS software to test the relationships between the constructs. It consisted of the same stages as the CFA analysis. During the first stage, the model was specified including the directional relationships among the latent and observed structural variables, and error terms were identified for the endogenous variables (AMOS defaults the paths from structural errors to dependent variables to = 1.0) (Bowen & Guo, 2011). During the second stage, estimation of the SEM model was performed using ML. Bowen and Guo also recommended that the fit of the measurement model was established before the structural model testing in order to ensure that accurate validity and reliability scores were used to test the constructs. Bowen and Guo noted that the testing of the SEM model (third step) can be done by validating the measurement quality, and providing support for the hypothesis.

Once the testing of the SEM model was completed, evaluation of the model fit was performed. Root Mean Square Error of Approximation (RMSEA) was used to test the fit as "The RMSEA is a measure of how close the implied matrix is to the observed variance–covariance matrix," (Bowen & Guo, 2011, p.144). Browne, Cudeck, Bollen, and Long (1993) recommended RMSEA value of less than or equal 0.05 (with 90% confidence interval), as an indicator of approximate fit.

Next, parameter estimates were evaluated for factor loadings and to eliminate latent variables with non-significant variances (e.g. value of 0 since they do not represent meaningful differences among participants) (Bowen & Guo, 2011). Tests for the effects of the categorical moderator variable ICT on the relationship of the predictor to the criterion variables were performed. The sample was divided into categories (e.g. type of ICT such as email, instant messaging, micro/wiki blogging, online forums, or knowledge repositories) and a Chi-square test of the significance of the difference between designated structural parameters across groups was performed (Sauer & Dick, 1993). The discrete moderator shaped homogeneous groups within the sample after the parameters were constrained across each category. Moreover, consideration of equivalent models was performed, which included examination of different variations of the hypotheses in order to explain why the causal model was accepted.

Step 7 – Produce the Report

The final stage in the methodology includes a report of the results. The results section is organized around the research questions and the supporting data from the content analysis, expert panel validation, and the CFA and SEM analyses. Administration of the final survey and reliability tests are also addressed in detail. Discussion of each variable

from the model is performed, including comparing and contrasting with existing literature to determine contribution of the research. Finally, conclusions, implications, recommendations, generalizability of the results, and relevance of the study to the knowledge management body of knowledge are presented in support of the research questions

Summary

This chapter addressed the methodology approach for the proposed study. A three-stage literature review approach and a six-stage content analysis study were presented in order to demonstrate how the first research question was addressed concerning the identification of factors that contribute to the common knowledge sharing barriers. Next, a theoretical model derived from the literature review and content analysis was proposed. A set of five variables and seven hypotheses were outlined, followed by a description of the survey method used to test the model. Finally, statistical methods used to screen the surveyed data (skewness, kurtosis, Mahalanobis distance, and multicollinearity) and to analyze the data (confirmatory factor analysis and structural equation modeling) were addressed.

Chapter 4

Results

Introduction

Chapter 4 is organized around the analysis in support of the two research questions proposed in the study. It begins with examining the results of the literature review and content analysis study that were conducted in support of the first research question: What are the potential factors that contribute to the commonly accepted barriers to knowledge sharing? Next, results from the survey and a detailed analysis of the validity, reliability, confirmatory factor analysis, and structural equation modeling are provided in support of the seven hypotheses proposed in chapter 3 that answer the second research question: How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing?

Literature Review and Content Analysis Results

To uncover the potential factors that contribute to the commonly accepted barriers to knowledge sharing, a total of 103 articles (Appendix A) were sampled as part of the literature review analysis stage. The articles were selected from the following information sciences databases as recommended by Levy and Ellis (2006): ABI/Inform Complete-ProQuest, ACM Digital Library, IEEE Computer Society Digital Library, Computers and Applied Sciences Complete - EBSCO host, Wiley Online Library - Blackwell Publishers, IBI Global Science Direct – Elsevier, Taylor & Francis, JSTOR, ProQuest Computing – ProQuest, and SpringerLink - Springer.

Of the total sample of articles, 49% (50 articles) addressed both knowledge seeking and contributing behaviors, 31% (32 articles) addressed only knowledge seeking behaviors, and 20% (21 articles) addressed only knowledge contributing behaviors. Table 3 provides frequency of occurrences of each barrier and percentages of the total for each behavior. The results indicated that nearly three quarters of the knowledge seeking articles (72%) cited lack of time as a major inhibitor in the search for knowledge. The lowest barrier among the knowledge seeking articles was poor communications skills (31%). On the other hand, 74% of both knowledge seeking and knowledge contributing articles cited lack of trust as major inhibitor, followed by lack of time (64%) and poor communication skills (62%).

	Barriers		
Behaviors	**Lack of Time**	**Poor Comm. Skills**	**Lack of Trust**
Knowledge Seeking	72% (23)	31% (10)	47% (15)
Knowledge Contributing	67% (14)	76% (16)	67% (14)
Both (Knowledge Seeking and Knowledge Contributing)	64% (32)	62% (31)	74% (37)
Cumulative	***68% (103)***	***56% (103)***	***63% (103)***

Table 3. Summary of Literature Review Analysis

Only 15% of the articles on knowledge seeking identified both lack of time and poor communication skills as major inhibitors (Table 4). From the knowledge contributing studies, the majority (76%) cited poor communication skills as a major knowledge transferring inhibitor, while 29% of the knowledge contributing articles cited both lack of time and lack of trust as major barriers (Table 5). Similarly, articles on both knowledge seeking and knowledge contributing behaviors cited poor communication skills and lack

of trust among the highest barriers (44%), while the lowest barriers cited by articles on both behaviors (only 30%) were lack of time and poor communications skills (Table 6).

Knowledge Seeking Behaviors		
Lack of Time and Poor Comm. Skills	Lack of Time and Lack of Trust	Poor Comm. Skills and Lack of Trust
5	11	4
15%	29%	16%

Table 4. Results on Combined Barriers for Knowledge Seeking Articles

Knowledge Contributing Behaviors		
Lack of Time and Poor Comm. Skills	Lack of Time and Lack of Trust	Poor Comm. Skills and Lack of Trust
10	8	12
33%	29%	40%

Table 5. Results on Combined Barriers for Knowledge Contributing Articles

Knowledge Seeking and Knowledge Contributing Behaviors		
Lack of Time and Poor Comm. Skills	Poor Comm. Skills and Lack of Trust	Lack of Trust and Lack of Time
19	24	21
30%	44%	32%

Table 6. Results on Combined Barriers for Articles on Both Behaviors

Following the literature review analysis, a content analysis study was conducted on the same sample of 103 articles. During the coding phase, searches identified in the methodology section of this study were used to eliminate 42 sources since those contained no references for any of the variables proposed in the study. Of the remaining

61 sources, a total of 199 references for the role conflict, the role ambiguity, and the locus of control variables were identified (Appendix I).

Table 7 provides the frequency distributions and percent of totals for the appearances of all variables across the different knowledge sharing articles.

Behavior	Total	Role Conflict		Role Ambiguity		Locus of Control	
		Frequency	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*
Knowledge Seeking	**129**	47	36%	77	60%	5	4%
Knowledge Contributing	**35**	12	34%	7	20%	16	46%
Knowledge Seeking and Knowledge Contributing	**69**	22	32%	31	45%	16	23%

Table 7. Frequency Distribution and Percent for All Variables

The role conflict variable was coded through seven different categories that collectively appeared 80 times throughout the sources (Table 8). Two of these categories (job complexity and job interdependence) accounted for 70% of the references. The role ambiguity variable was coded through five different categories that appeared 123 times throughout the sources (Table 9). One of these categories (job clarity) accounted for 76% of all references. Finally, the locus of control variable was coded through four different categories that appeared 39 times (Table 10). One of these categories (job awards) accounted for 62% of all references.

Role Conflict		
Category	***Frequency***	***Percent***
Job Complexity	36	45%
Job Interdependence	20	25%
Job Conflict	9	11%
Role Conflict	6	8%
Resource Conflict	5	6%
Job Role	4	5%

Table 8. Frequency Distribution and Percent for Role Conflict Categories

Role Ambiguity		
Category	***Frequency***	***Percent***
Job Clarity	94	76%
Job Duties	10	8%
Job Expectation	8	7%
Role Ambiguity	8	7%
Job Responsibility	3	2%

Table 9. Frequency Distribution and Percent for Role Ambiguity Categories

Locus of Control		
Category	***Frequency***	***Percent***
Job Awards	24	62%
Job Advancement	6	15%
Job Control	5	13%
Personality	4	10%

Table 10. Frequency Distribution and Percent for Locus of Control Categories

The results of the literature review and content analysis revealed three potential contributors to the most common knowledge sharing barriers: role conflict, role ambiguity, and locus of control. These were considered sufficient to provide an answer to the first research question: What are the potential factors that contribute to the commonly accepted barriers to knowledge sharing?

Survey Analysis

Based on the contributing factors discovered during the literature review and the content analysis study, a survey was conducted to investigate the seven hypotheses proposed in chapter 3 in support of the second research question of this study: How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing? To collect the data for the analysis of these hypotheses, a survey instrument was distributed via email by the SurveyMonkey Audience team. Survey invitations were sent to1,368 participants with characteristics that fit the delimitation criteria specified in chapter 1 of this study. The active survey period began on March 5, 2014 and concluded on March 10, 2014.

Before the hypotheses testing was performed, screening of the collected survey data was done in order to ensure the data was reliable, useful, and valid for testing the causal model of the study. The data screening process reported below included tests for: missing data, unengaged responses, univariate and multivariate outliers, normality, linearity, homoscedasticity, and multicollinerarity. Additionally, response rate and respondents' demographics were also provided.

Response Rate

The survey process returned 498 responses. Of these, 173 responses were disqualified since they responded negatively to the question: "Do you use any of the following systems at work: Email, Instant Messaging, Micro/wiki blogging, Online forums, or Knowledge repositories?" The remaining 326 respondents successfully completed the survey, yielding a response rate of 23.8%.

Missing Data

As specified in chapter 3, the survey was designed to make every question a required question. If respondents didn't answer a required question, they were unable to advance to the next question. This ensured that no data was missed during the survey collection. Analysis of the data frequency and descriptive statistics confirmed there was no missing data.

Unengaged Responses

Standard deviations for the independent and dependent variables were calculated via SPSS. Five cases contained standard deviations equal to 0 (Cases 18, 79, 288, 308, and 320). All survey responses with standard deviation equal to 0 were visually inspected to determine whether the respondents were engaged through the survey. The visual inspection revealed that these cases contained the same responses from every single question, suggesting the respondents were unengaged. These five cases were removed from the final analysis. Additionally, three more cases were visually inspected and removed due to unengaged responses on all but one question of the survey (standard deviations <.6) (Cases 27, 106, 199).

Univariate and Multivariate Outliers

Cases with extreme values on one of the variables (standardized scores in excess of +/- 3.29) were considered univariate outliers, while cases with extreme values on two or more variables were considered multivariate outliers (Tabachnick & Fidell, 2007). The z-scores for each variable were calculated. Two univariate outliers with z-scores over 3.29 were detected and removed from the analysis (Case 76 and 292).

To detect multivariate outliers, the Mahalanobis distance (D^2) was computed using linear regression, and two cases with p=0 (Case 40, D^2=.02, and Case 31, D^2=.05) were removed from the final analysis.

Demographics

Demographic analysis was conducted on the remaining 314 cases. The sample contained approximately 10% more males than females (Table 11).

Gender

	Frequency	Percent
Male	172	54.8
Female	142	45.2
Total	314	100.0

Table 11. Frequency Distribution and Percent for Gender

Nearly 70% of the respondents were between the ages of 30 and 60 (Table 12).

Age

	Frequency	Percent
18-29	55	17.5
30-44	113	36.0
45-60	105	33.4
> 60	41	13.1
Total	314	100.0

Table 12. Frequency Distribution and Percent for Age

Nearly three quarters of the sample had attained an associate's or higher college degree (Table 13).

Education

	Frequency	Percent
Less than high school degree	1	.3
High school degree	10	3.2
Some college	65	20.7
Associate or bachelor degree	138	43.9
Graduate degree	100	31.8
Total	314	100.0

Table 13. Frequency Distribution and Percent for Education

64% of the respondents had six or more years of work experience.

Work Experience

	Frequency	Percent
1-5 years	112	35.7
6-10 years	80	25.5
11-15 years	41	13.1
16-20 years	30	9.6
>20 years	51	16.2
Total	314	100.0

Table 14. Frequency Distribution and Percent for Work Experience

The majority of the respondents (87.6%) earned an annual income of $50,000 or more (Table 15).

Income

	Frequency	Percent
$0 - $24,999	7	2.2
$25,000 - $49,999	32	10.2
$50,000 - $99,999	109	34.7
$100,000 - $149,999	75	23.9
$150,000+	91	29.0
Total	314	100.0

Table 15. Frequency Distribution and Percent for Education

Approximately 60% of the respondents worked in mid-size companies with over 500 employees (Table 16).

Company Size

	Frequency	Percent
1-50 employees	62	19.7
51-500 employees	61	19.4
501-2000 employees	43	13.7
2001-10,000 employees	69	22.0
>10,000 employees	79	25.2
Total	314	100.0

Table 16. Frequency Distribution and Percent for Education

By far, the largest industry represented by the sample (22%) was government, followed by financial services (12.7%), and telecommunications and internet (6.7%) (Table 17).

Industry

	Frequency	Percent
Advertising and Marketing	13	4.1
Agriculture	6	1.9
Airlines, Aerospace, and Defense	9	2.9
Automotive	5	1.6
Business Support and Logistics	14	4.5
Construction, Machinery and Home	4	1.3
Education	20	6.4
Entertainment and Leisure	11	3.5
Finance & Financial Services	40	12.7
Food and Beverages	5	1.6
Government	69	22.0
Health Care and Pharmaceuticals	21	6.7
Insurance	17	5.4
Manufacturing	12	3.8
Nonprofit	13	4.1
Retail and Commercial Durables	12	3.8
Real Estate	6	1.9
Telecommunications, Technology, Internet and Electronics	32	10.2
Utilities, Energy, and Extraction	5	1.6
Total	314	100.0

Table 17. Frequency Distribution and Percent for Industry

Finally, 21% of the sample resided in the Pacific region of the United States, followed by the South Atlantic (19.4%) and the Middle Atlantic (13.4%) (Table 18).

Location

	Frequency	Percent
New England	18	5.7
Middle Atlantic	42	13.4
East North Central	36	11.5
West North Central	28	8.9
South Atlantic	61	19.4
East South Central	10	3.2
West South Central	27	8.6
Mountain	26	8.3
Pacific	66	21.0
Total	314	100.0

Table 18. Frequency Distribution and Percent for Location

Normality

To determine the normality of the variables' distributions, West, Finch, and Curran (1995) recommended assessing the histograms and absolute values of skewness (symmetry) and kurtosis (peakedness) of the variables' data distribution in sample sizes greater than 300. Substantial non-normality results in absolute skewness values greater than 2 and absolute kurtosis values greater than 7. Visual inspections of the normal probability plots were performed to determine any amount of deviations from the diagonals (Tabachnick & Fidell, 2007). All absolute values were within the specified ranges and as a result, the data was considered normally distributed.

Linearity

Tests for linearity were performed using deviation from linearity of the composite variables (Argyrous, 2005). In all tests, the significant values were greater than .05 (Table 19). As a result, it was concluded that the independent and dependent variables were linearly related.

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Comp_KS * Comp_RC	Between Groups	(Combined)	2050.361	52	39.430	1.383	.054
		Linearity	38.593	1	38.593	1.353	.246
		Deviation from Linearity	2011.768	51	39.446	1.383	.055
	Within Groups		7442.926	261	28.517		
Comp_KC * Comp_RC	Between Groups	(Combined)	1845.920	52	35.498	1.135	.260
		Linearity	24.743	1	24.743	.791	.375
		Deviation from Linearity	1821.177	51	35.709	1.142	.252
	Within Groups		8162.742	261	31.275		
Comp_KS * Comp_RA	Between Groups	(Combined)	997.550	30	33.252	1.108	.325
		Linearity	259.840	1	259.840	8.655	.004
		Deviation from Linearity	737.710	29	25.438	.847	.695
	Within Groups		8495.736	283	30.020		
Comp_KC * Comp_RA	Between Groups	(Combined)	1166.611	30	38.887	1.245	.184
		Linearity	397.832	1	397.832	12.733	.000
		Deviation from Linearity	768.778	29	26.510	.848	.694
	Within Groups		8842.052	283	31.244		
Comp_KS * Comp_WLC	Between Groups	(Combined)	1122.957	38	29.552	.971	.523
		Linearity	7.569	1	7.569	.249	.618
		Deviation from Linearity	1115.388	37	30.146	.990	.490
	Within Groups		8370.329	275	30.438		
Comp_KC * Comp_WLC	Between Groups	(Combined)	1471.307	38	38.719	1.247	.162
		Linearity	1.411	1	1.411	.045	.831
		Deviation from Linearity	1469.896	37	39.727	1.280	.138
	Within Groups		8537.355	275	31.045		

Table 19. Test for Linearity

Homoscedasticity

According to Tabachnick and Fidell (2007), "The assumption of homoscedasticity is that the variability in scores for one continuous variable is roughly the same at all values of another continuous variable," (p. 85). To determine whether homoscedasticity was present, scattered plots were produced where the dependent variables' standardized residuals were regressed onto the standardized predicted values. No pattern in the data was observed, therefore the assumption that homoscedasticity was present was accepted.

Multicollinearity

Multicollinearity occurs when the variables contain redundant information and as a result are not needed in the analysis (Tabachnick & Fidell, 2007). To determine if the variables were highly correlated (>.90), Pearson product moment correlation coefficient was calculated among the variables. None of the correlations exceeded correlation values of .659 (Table 20).

Variable		CompKS	CompKC	CompRC	CompRA	CompWLC
CompKS	Pearson Correlation	1	.659**	.064	.165**	.028
	Sig. (2-tailed)		.000	.260	.003	.618
CompKC	Pearson Correlation	.659**	1	.050	.199**	-.012
	Sig. (2-tailed)	.000		.380	.000	.834
CompRC	Pearson Correlation	.064	.050	1	-.371**	.278**
	Sig. (2-tailed)	.260	.380		.000	.000
CompRA	Pearson Correlation	.165**	.199**	-.371**	1	-.303**
	Sig. (2-tailed)	.003	.000	.000		.000
CompWLC	Pearson Correlation	.028	-.012	.278**	-.303**	1
	Sig. (2-tailed)	.618	.834	.000	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

Table 20. Pearson Coefficient

Furthermore, a Variable Inflation Factor (VIF) for each independent variable was calculated. All VIF values ranged from 1.08 to 1.16 (Tables 21-23) and were within the VIF threshold limit of 10 (Hair, Anderson, Tatham, & Black, 1998). As a result, the conclusion was drawn that multicollinearity was not problematic.

Model		Collinearity Statistics	
		Tolerance	VIF
1	Comp_RA	.908	1.101
	Comp_WLC	.908	1.101

Table 21. Role Conflict VIF

Model		Collinearity Statistics	
		Tolerance	VIF
1	Comp_WLC	.923	1.084
	Comp_RC	.923	1.084

Table 22. Role Ambiguity VIF

Model		Collinearity Statistics	
		Tolerance	VIF
1	Comp_RC	.862	1.160
	Comp_RA	.862	1.160

Table 23. Work Locus of Control VIF

The data screening process confirmed that the data was clean and ready for further statistical analysis. Furthermore, an EFA was conducted to assess construct validity. First, Cronbach's alpha values were calculated on the instrument items and these yielded the following results: KS = .852; KC = .874; RC = .894; RA = .748; WLOC = .843. Principal components analysis with varimax rotation, and Kaiser normalization was performed on all constructs. Several items were removed to arrive to a clean pattern matrix without cross-loadings. The procedure produced a five-factor model with factor loadings that explained 68% of the total variance (eigenvalues >1).

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was the next step in the statistical analysis. It was necessary in order to test whether the collected data fit the proposed theoretical model in chapter 3 as well as the factor structure (Anderson & Gerbing, 1988). The CFA consisted of the following steps described below: model specification, model estimation, tests for reliability and validity (including common method variance), and tests for measurement model invariance.

First, model specification was performed in AMOS (Bowen and Guo, 2011), by expressing in a diagram the latent variables and the observed variables that load on each of the latent ones. One of the factor loadings for each latent variable was set to 1.0 in the model in order to tie the other factors to this specific reference point (Kline, 2005). Measurement errors were set for each observed item. Covariances between the latent variables were also set.

Next, model estimation was performed using the maximum likelihood estimator (ML) as it fit the study's sample size and data type (Bollen, 1989). Series of iterations were performed on the model by covarying the error terms with the highest values of the modification indices within variables until no smaller minimization values could be reached. Additionally, items that cross loaded on factors were removed. The model fit was assessed based on the following evaluations (Ryu, Ho, & Han, 2003):

- Absolute fit measures including observed normed x^2 (x^2/df), goodness of fit index, (GFI) and root mean square error of approximation (RMSEA);
- Incremental fit measures including normed fit index (NFI), adjusted goodness of fit (AGFI), and comparative fit index (CFI);

- Parsimonious fit measures including parsimony goodness-of-fit index (PGFI) and parsimony normed fit index (PNFI).

The model fit (Table 24) was considered estimated as soon as it reached the established literature thresholds (Ahn, Ryu, & Han, 2007; Bollen, 1989a; Browne & Cudeck, 1992; McDonald & Marsh, 1990; Wheaton, 1977). The final CFA model is demonstrated in Figure 4.

Fit index	Scores	Recommended cut-off value
Absolute fit measures		
Chi-squares/degree of freedom (x^2/df)	1.76	<2[a]; <3[b]; <5[b]
GFI	0.909	≥0.90[a]; ≥0.80[b]
RMSEA	0.049	<0.08[a]; <0.1[b]
Incremental fit measures		
NFI	0.91	≥ 0.90[a]
AGFI	0.882	≥0.90[a]; ≥0.80[b]
CFI	0.959	≥0.90[a]
Parsimonious fit measures		
PGFI	0.701	The higher, the better
PNFI	0.768	The higher, the better

Notes: Acceptability: [a]acceptable; [b]marginal

Table 24. Overall Fit Indices of the CFA Model

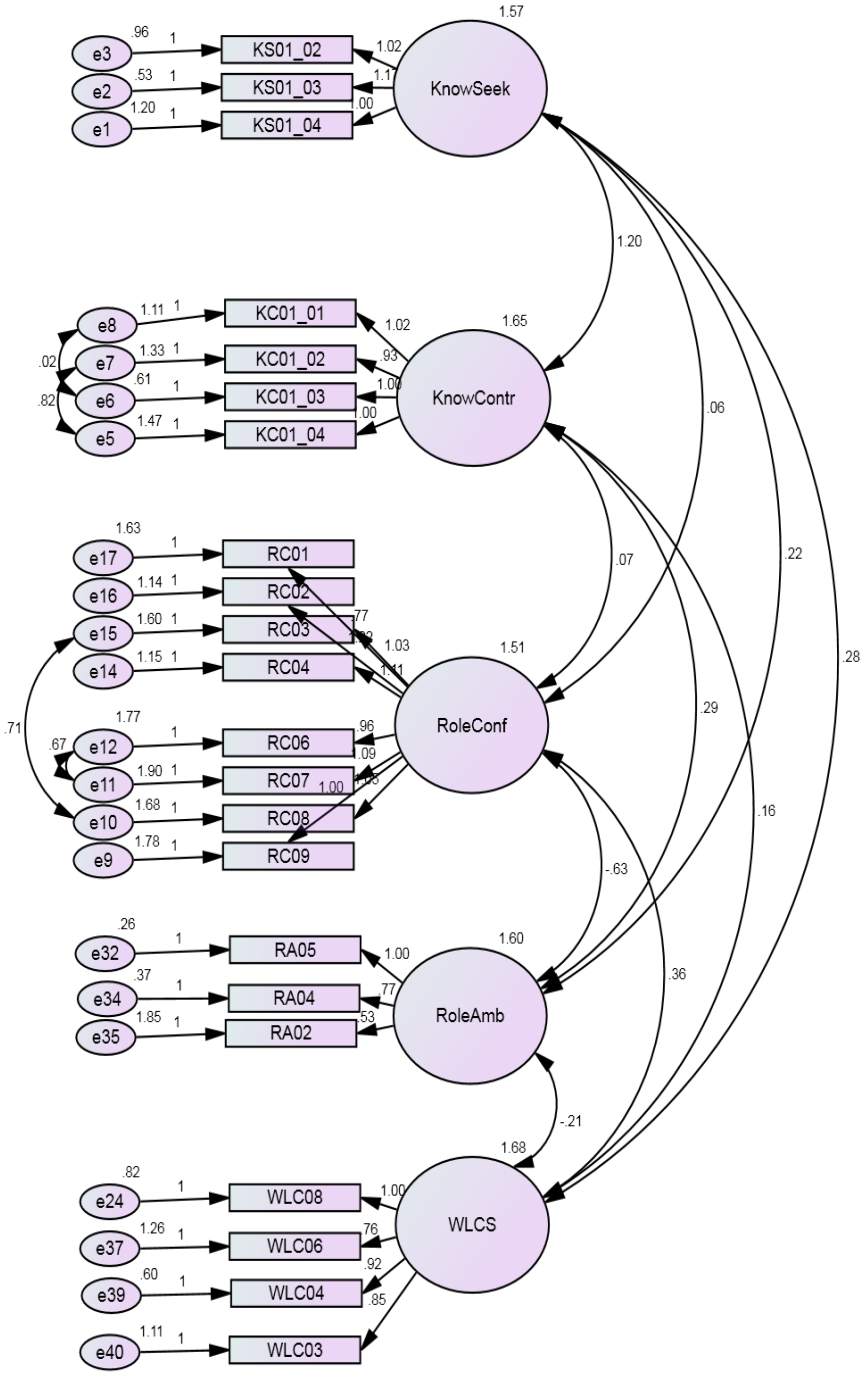

Figure 4. Estimated CFA Model

Reliability and Validity

Table 25 provides the reliability and validity values for the estimated model. Construct reliability (CR) (the degree to which the scale indicators reflect underlying factors) is considered a good measure of reliability and internal consistency. All CR values were calculated at >.80, ensuring that each of the items loaded on a single indicator.

Convergent validity is achieved when the average variance explained (AVE) is greater than the unexplained variance (AVE >.5) (Fornell & Larcker, 1981). All values for AVE met the established literature threshold.

Finally, to determine whether the measures were unrelated, a test for discriminant validity was performed and the square root values of all AVEs (on the diagonal) were evaluated. All values were below the established threshold of <.85 (Campbell & Fiske, 1959). As a result, it was established that the criteria for construct reliability, convergent validity, and discriminant validities were satisfied.

	CR	AVE	MSV	ASV	WLCS	KnowSeek	KnowContr	RoleConf	RoleAmb
WLCS	0.848	0.584	0.052	0.027	0.764				
KnowSeek	0.857	0.667	0.549	0.150	0.173	0.817			
KnowContr	0.855	0.597	0.549	0.148	0.097	0.741	0.773		
RoleConf	0.889	0.501	0.163	0.055	0.227	0.041	0.043	0.708	
RoleAmb	0.801	0.592	0.163	0.058	0.129	-0.139	-0.180	0.404	0.769

Table 25. Reliability and Validity Values

Common Method Variance

Since all the survey data was collected through the same questionnaire during the same period of time, systematic measurement error can impact the estimates of the relationships between the constructs. Such error, attributed to common method variance,

often stems from the measurement method. According to Podsakoff, MacKenzie, Lee, and Podsakoff (2003) the common method variance (CMV) is "variance that is attributable to the measurement method rather than to the constructs the measures are assumed to represent" (p.879). Williams and Brown (1994) argued that when there is CMV present, the measurement intercorrelation can be either inflated or deflated, resulting in measurement errors. To detect any presence of CMV, Harman's single-factor test was conducted (Harman, 1976). All the five variables were entered into an exploratory factor analysis, using unrotated principal axis factoring and constrained to a single factor. The results indicated a single factor that explained only 19% of the variance.

In addition, common latent factor (CLF) was added to the model to determine the variance that is common to all factors. This method uses the CLF to capture the common variance among all observed variables in the model. The standardized regression weights from the model were compared to the standardized regression weights of a model without the CLF to determine whether differences required the retention of the CLF during the computation of the structural model (Bollen, 1989b). Since none of the compared values exceeded .08, it was concluded that the presence of CMV was not of significant size to impact the interpretations of the results.

Measurement Model Invariance

In order to determine whether the various items of the survey instruments held the same meaning across the different groups (email, instant messaging, online forums, and knowledge repositories), tests for invariance were performed (Meredith, 1993). First, a configural invariance test was conducted to determine model fit when the four groups

(for ICT type: email, instant messaging, online forums, and knowledge repositories) were computed with and without cross-group path constraints. Since the model fit was within expected thresholds (x^2/DF=1.63, GFI=.840, RMSEA=.034, NFI=.833, AGFI=.792, CFI=.926, PGFI=.647, PNFI=.703), it was concluded that configural invariance was present (the four groups were equivalent).

Additionally, a metric invariance test was performed by constraining the regression weights of latent factors of the CFA model to 1 and naming the regression weights so that the paths were constrained to be equal to each other (Figure 5). Next, the Chi-square differences between the unconstrained and constrained models were calculated (Table 26). The resultant p-value (.49) was not significant and therefore it was concluded that the four groups were invariant (not different).

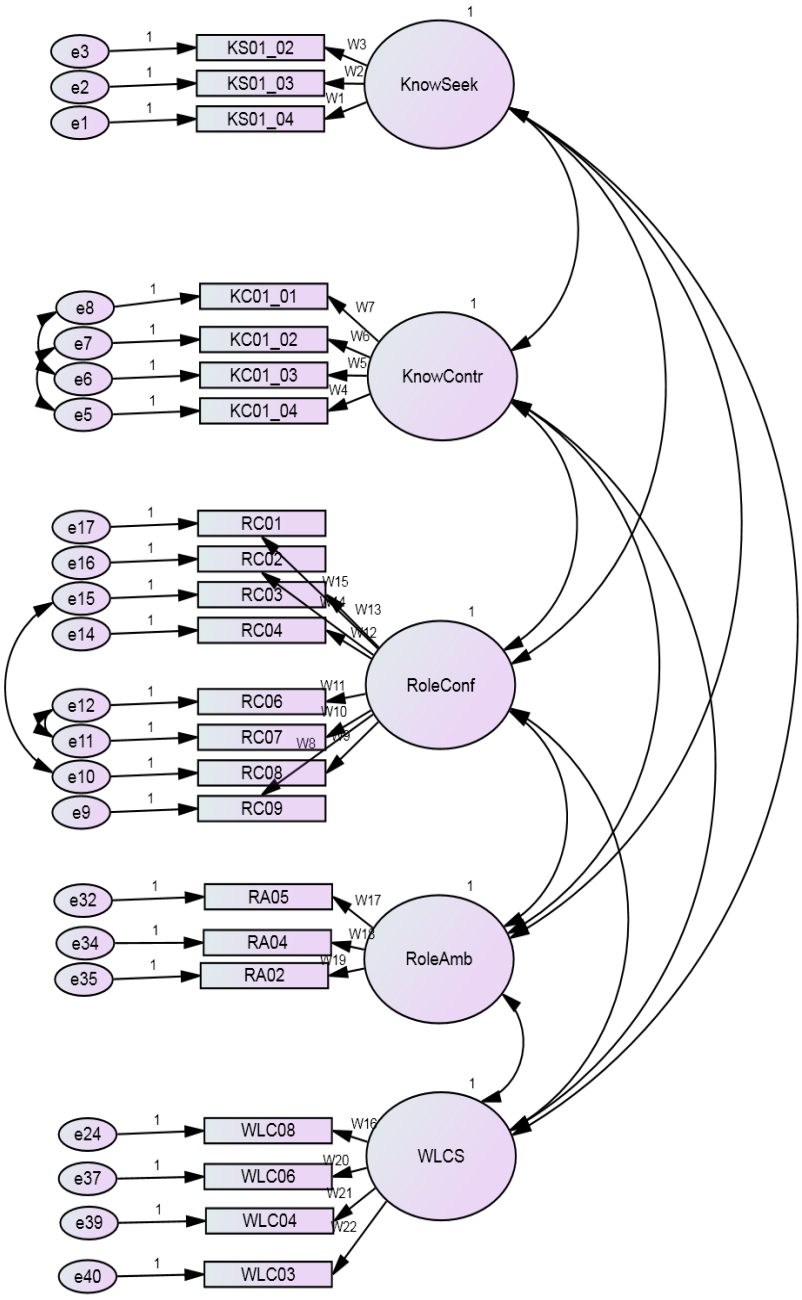

Figure 5. Constrained CFA Model

	Chi-square	df	p-val
Overall Model			
Unconstrained	1272.045	780	
Fully constrained	1337.591	846	
Number of groups		4	
Difference	65.546	66	0.493

Table 26. Chi-square Metric Invariance Test

The CFA produced a good fit measurement model from the observed and latent variables. Next, structural equation modeling was conducted to test the proposed hypotheses in chapter 3.

Structural Equation Modeling

Structural equation modeling (SEM) was conducted to estimate the causal relationships between the constructs of the proposed theoretical model. It consisted of the following steps described below: model specification, model estimation, test for multi-group moderation, and hypotheses testing.

As with CFA, the first step of the SEM process was specification of the model. The model was specified using the CFA measurement model. The correlations between the endogenous variables were removed and directional relationships among the latent and observed variables were identified following the proposed hypotheses model identified in chapter 3.

Next, the SEM model estimation was performed using ML. Series of iterations were performed on the model by covarying the error terms with the highest modification indices within variables until no smaller minimization values could be reached. An improvement to the model was made when a regression line was added between the knowledge seeking and knowledge contributing variables (as they appeared to be

causally correlated) to account for the correlation between the endogenous variables. The model fit (Table 27) was considered estimated when the threshold values were met (Bollen, 1989a; Browne & Cudeck, 1992; McDonald & Marsh, 1990; Wheaton, 1977).

Fit index	Scores	Recommended cut-off value
Absolute fit measures		
Chi-squares/degree of freedom (x^2/df)	1.659	<2[a]; <3[b]; <5[b]
GFI	0.833	≥0.90[a]; ≥0.80[b]
RMSEA	0.035	<0.08[a]; <0.1[b]
Incremental fit measures		
NFI	0.831	≥0.90[a]; ≥0.80[b]
AGFI	0.787	≥0.90[a]; ≥0.70[b]
CFI	0.924	≥0.90[a]
Parsimonious fit measures		
PGFI	0.652	The higher, the better
PNFI	0.713	The higher, the better

Notes: Acceptability: [a]acceptable; [b]marginal

Table 27. Overall Fit Indices of the SEM Model

Multi-Group Moderation Based on ICT System Type

Before conducting hypotheses testing, tests for the effects of the categorical moderator variable ICT on the relationship of the predictors to the criterion variables were performed in AMOS. Multi-group moderation tests were necessary in order to determine whether the hypothesized relationships in a model differed based on the value of the moderator (ICT type: email, instant messaging, online forums, and knowledge repositories). To conduct these tests, the dataset was split along values of the categorical variable (ICT), followed by tests of the model with each set of data.

Four groups were created (email, instant messaging, online forums, and knowledge repositories) based on the responses from the survey. Grouping for micro/wiki blogging was not performed in AMOS using ML due to insufficient number of responses related to

this system type. Factor loadings were analyzed, and the effects between role conflict and knowledge contribution and locus of control and knowledge contribution were trimmed from the model due to insignificant p values. Model fit was estimated again and the new model's values met the expected thresholds (x^2/DF=1.659, GFI=.833, RMSEA=.035, NFI=.831, AGFI=.787, CFI=.924, PGFI=.652, PNFI=.713). The resultant model was used to estimate the moderating effects of each ICT system type on the relationships between the other variables. Figure 6 demonstrates the final SEM model (the values indicate path coefficients for the email group).

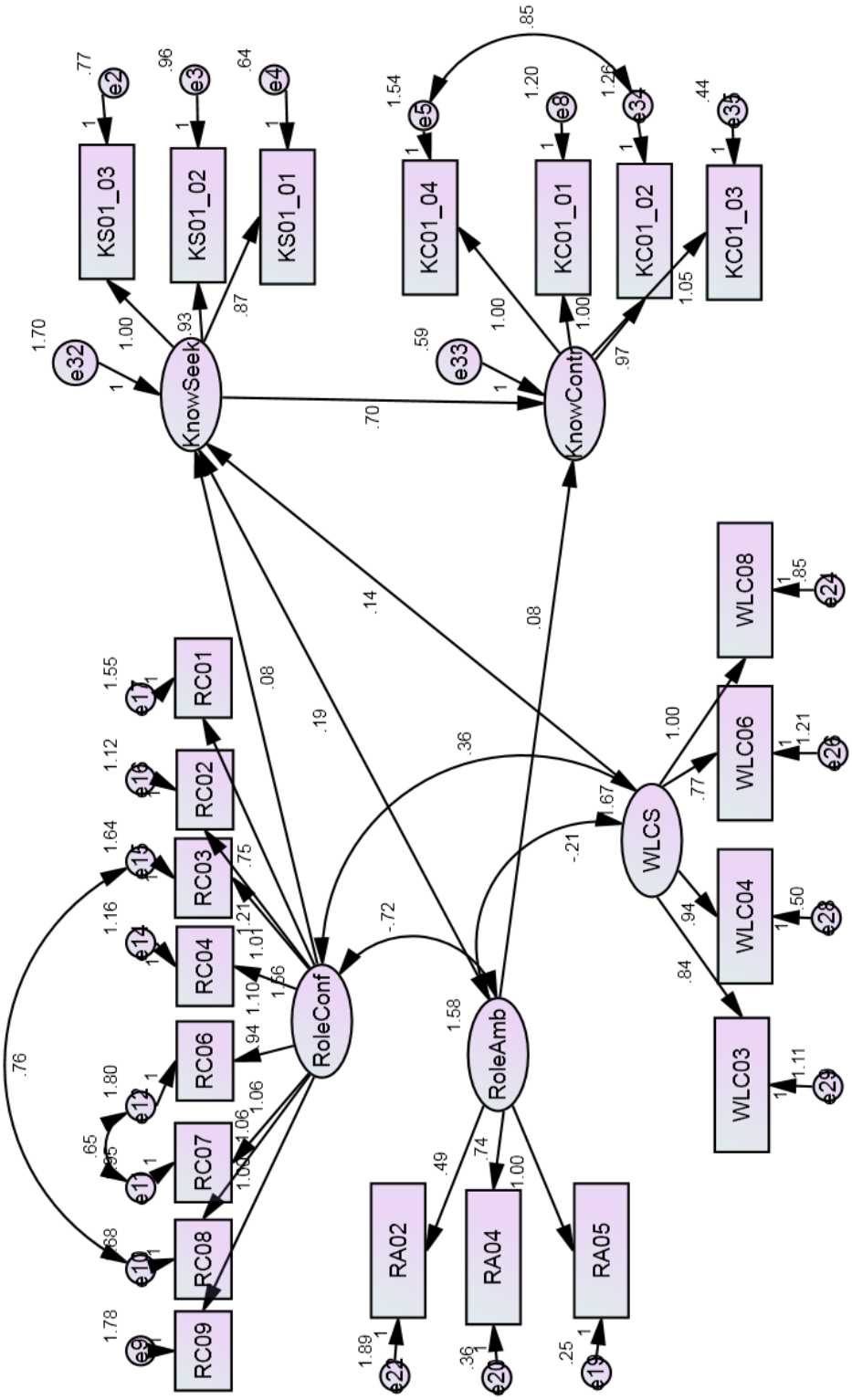

Figure 6. Final SEM Model

Hypothesis Testing

This section of the SEM analysis included tests of the seven hypotheses proposed in chapter 3 in order to answer the second research question: How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing?

Table 28 shows the results of the hypotheses testing based on the multi-group moderation of the SEM model by ICT type described in the previous section.

Hypothesis H1a posited that role conflict positively impacts employees' knowledge seeking behaviors via ICTs. This was supported only for users of online forums and was rejected for all other ICT types. Next, H1b posited that role conflict negatively impacts employees' knowledge seeking behaviors via ICTs. No support was found for this hypothesis and as a result, it was rejected.

Hypothesis 2a proposed that role ambiguity positively impacts knowledge seeking behaviors via ICTs. This hypothesis was supported for users of all ICT system types except knowledge repositories. H2b, which posited that role ambiguity positively impacts knowledge contributing behaviors via ICTs, was also supported for all ICTs except knowledge repositories.

To determine the impact of internal versus external LOC on the knowledge seeking behaviors (hypothesis H3a), each case was coded for high (external LOC) versus low (internal LOC) value as recommended by Spector (1988). Next, the SEM model was tested for each group. The results demonstrated that internal locus of control impacted knowledge seeking behaviors, thus providing support for H3a (Table 29). No support was found for the H3b where internal LOC positively impacted knowledge contributing behaviors. As a result, H3b was rejected.

The last hypothesis (H4) proposed that ICTs moderate the relationships between the exogenous and endogenous variables. Tests for the moderating effect of the number of ICT systems used were conducted and the results demonstrated support for this hypothesis. The results of these tests were provided in the next section.

ICT Type	Hypothesis	Hypothesized Path			Path Coeficient (β)	Remarks
Email	H1a	KnowSeek	<---	RoleConf	0.08	Rejected
	H1b	KnowContr	<---	RoleConf	0.08	Rejected
	H2a	KnowSeek	<---	RoleAmb	0.18*	Supported
	H2b	KnowContr	<---	RoleAmb	0.09**	Supported
	H3a	KnowSeek	<---	WLCS	0.13**	Supported
	H3b	KnowContr	<---	WLCS	-0.05	Rejected
Instant Messaging	H1a	KnowSeek	<---	RoleConf	0.07	Rejected
	H1b	KnowContr	<---	RoleConf	0.04	Rejected
	H2a	KnowSeek	<---	RoleAmb	0.24*	Supported
	H2b	KnowContr	<---	RoleAmb	0.19*	Supported
	H3a	KnowSeek	<---	WLCS	0.14*	Supported
	H3b	KnowContr	<---	WLCS	-0.09	Rejected
Online Forums	H1a	KnowSeek	<---	RoleConf	0.34**	Supported
	H1b	KnowContr	<---	RoleConf	0.08	Rejected
	H2a	KnowSeek	<---	RoleAmb	0.41*	Supported
	H2b	KnowContr	<---	RoleAmb	0.28*	Supported
	H3a	KnowSeek	<---	WLCS	0.1	Rejected
	H3b	KnowContr	<---	WLCS	-0.11	Rejected
Knowledge Repositories	H1a	KnowSeek	<---	RoleConf	-0.09	Rejected
	H1b	KnowContr	<---	RoleConf	0.15	Rejected
	H2a	KnowSeek	<---	RoleAmb	0.2	Rejected
	H2b	KnowContr	<---	RoleAmb	-0.06	Rejected
	H3a	KnowSeek	<---	WLCS	0.35*	Supported
	H3b	KnowContr	<---	WLCS	-0.001	Rejected

*$p \leq .05$; **$p \leq .10$

Table 28. Hypotheses Testing Results Based on ICT Type

Hypothesis	Hypothesized Path			Path Coeficient	Remarks
H3a	KnowSeek	<---	WLCS	0.18**	Supported

***p≤.10*

Table 29. Internal Locus of Control Testing Result

Table 30 displays the percent of variances explained in knowledge seeking and knowledge contributing for each type of ICT. Low R-squared values are not uncommon for cross-sectional analyses since human behavior is difficult to predict (Wooldridge, 2012).

ICT Type	Knowledge Seeking R^2	Knowledge Contributing R^2
Email	0.04	0.60
Instant Messaging	0.09	0.77
Online Forums	0.23	0.62
Knowledge Repositories	0.14	0.73

Table 30. Squared Multiple Correlations

Moderating Effect of the Number of ICT Systems Used

This section details the test conducted in support of hypothesis 4. To test the moderating effect of the number of ICT systems used on the relationships between the exogenous and endogenous variables in SPSS, two separate categorical variables were created. The categories in each variable were classified on the basis of the answers received on two questions from the survey: 'What type of ICT system do you use to seek knowledge (select more than one if it applies)', and 'What type of ICT system do you use to seek or contribute knowledge (select more than one if it applies)' Five categories were created in each variable: category 1- one system; category 2- two systems; category 3- three systems; category 4- four systems, and category 5- five systems) (Tables 31-32).

	Frequency	Percent
One system	82	26.1
Two systems	116	36.9
Three systems	75	23.9
Four systems	31	9.9
Five systems	10	3.2
Total	314	100

Table 31. Categorical ICT Seeking Variable (ICT_seek_ADD)

	Frequency	Percent
One system	129	41.1
Two systems	115	36.6
Three systems	52	16.6
Four systems	14	4.5
Five systems	4	1.3
Total	314	100

Table 32. Categorical ICT Contributing Variable (ICT_Contr_ADD)

Prior to the analysis of the moderation effects, each predictor variable was centered in accord with the recommendations by Aiken and West (1991). To examine the interaction effect, scatter plots were created where the endogenous variables (knowledge seeking and knowledge contributing) were regressed on the predictor variables with a categorical moderator (categorized across the number of systems) (Howell, 2013). The plots represented the correlation effects of role conflict, role ambiguity, and locus of control on knowledge seeking and knowledge contributing based on the various ICT groups.

The strongest negative correlation effect between role conflict and knowledge seeking was found to be .21 % ($\sqrt{r^2} = \sqrt{.047}$) for people who used four systems (Figure 7). In other words, as role conflict increased, knowledge seeking decreased among users of four ICT systems. In contrast, a strong positive correlation effect was found for people who used two systems ($r = .17$), or as role conflict increased, knowledge seeking increased among users of two ICT systems. No effect was found for people who used only one system.

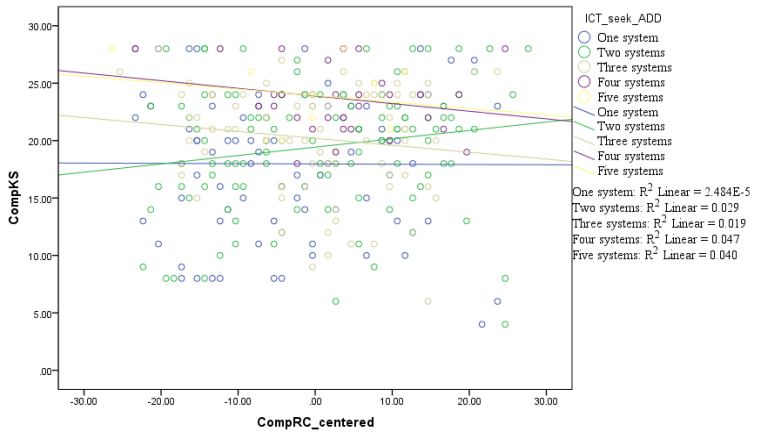

Figure 7. RC/KS Moderation Effect

The strongest negative correlation effect between role conflict and knowledge contributing was found to be .63 % ($\sqrt{r^2} = \sqrt{.40}$) for people who used five systems (Figure 8). In this case, when participants used five ICT systems, knowledge contribution decreased as role conflict increased. Conversely, a strong positive effect was found between role conflict and knowledge contributing for people who used four systems (r = .26).

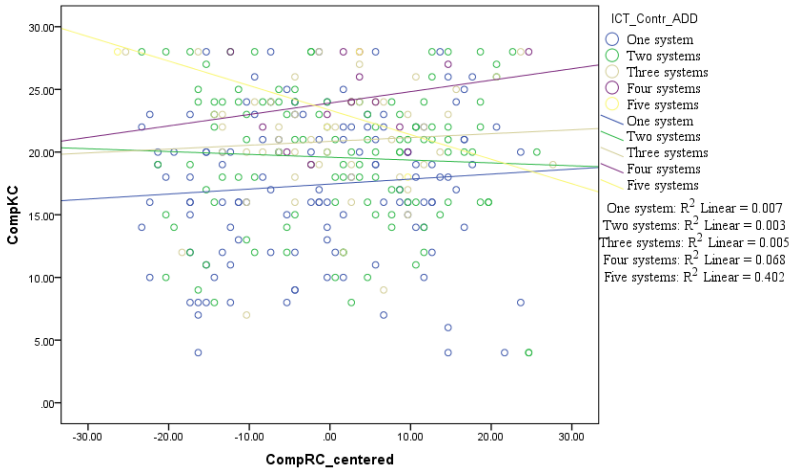

Figure 8. RC/KC Moderation Effect

As expected, the majority of effects between role ambiguity and knowledge seeking were found to be negative for high role ambiguity, with the strongest effect .62 %

($\sqrt{r^2} = \sqrt{.386}$) between the variables among users of five systems (Figure 9). In other words, as role ambiguity increased, knowledge seeking decreased (and vice versa). The only exception was among users of two ICT systems where knowledge seeking increased when role ambiguity increased (r = .03).

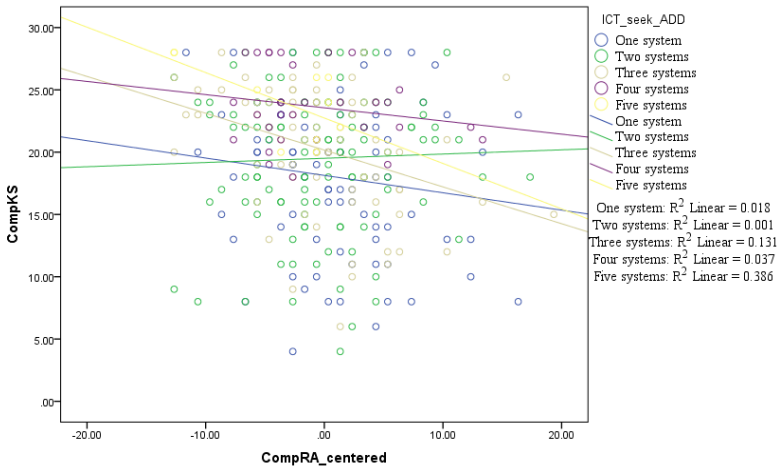

Figure 9. RA/KS Moderation Effect

Similarly, higher role ambiguity resulted in decreased knowledge contributing with the strongest effect between the variable at .9 % ($\sqrt{r^2} = \sqrt{.812}$) for people who used five systems (Figure 10).

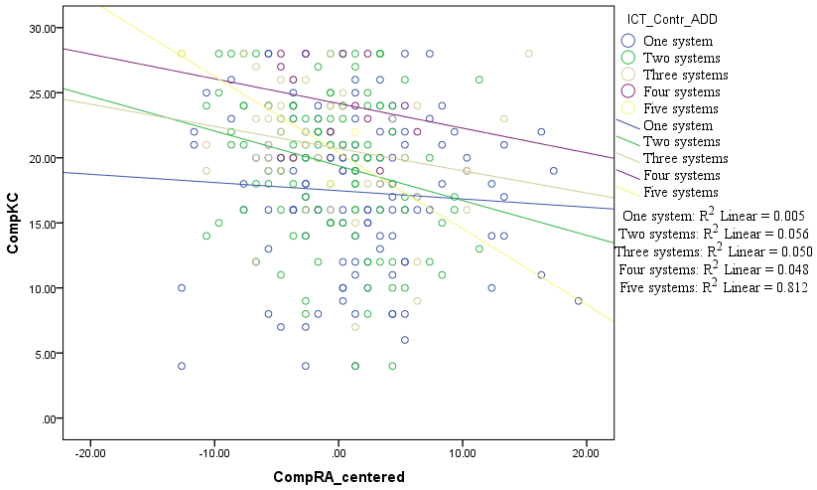

Figure 10. RA/KC Moderation Effect

The strongest positive correlation effect between locus of control and knowledge seeking was found to be .1 % ($\sqrt{r^2} = \sqrt{.011}$) for people who used two systems (Figure 11).

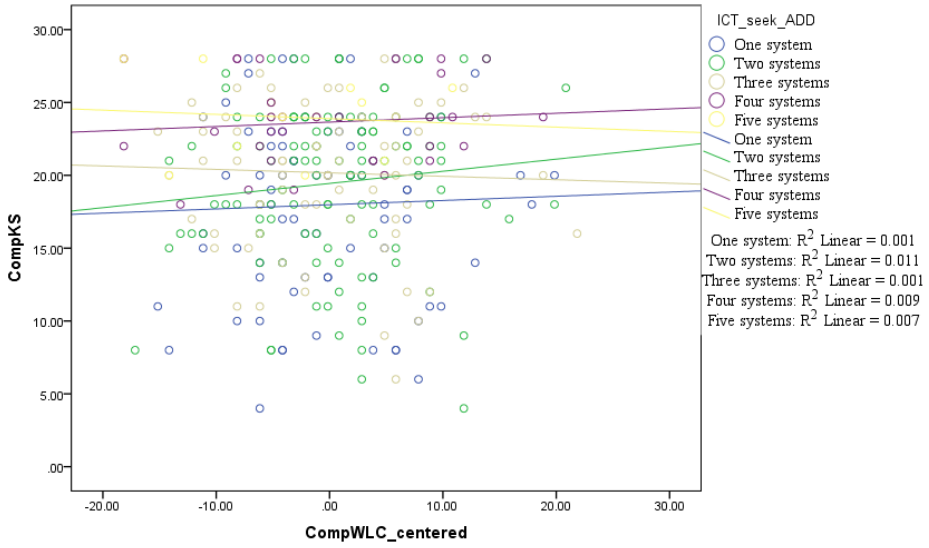

Figure 11. LOC/KS Moderation Effect

The strongest negative correlation effect between locus of control and knowledge contributing was found to be .91 % ($\sqrt{r^2} = \sqrt{.84}$) for people who used five systems (Figure 12). A small positive correlation effect was found among the variables for people who used three systems (r = .1).

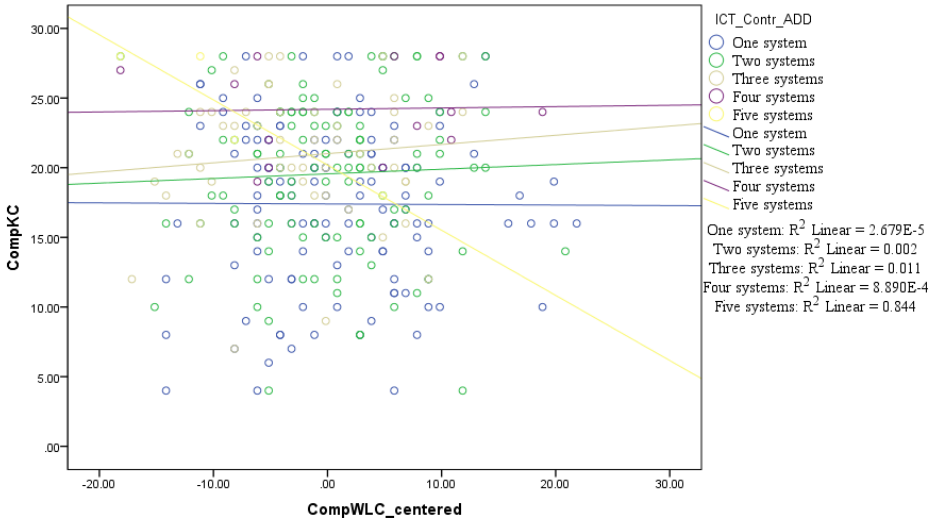

Figure 12. LOC/KC Moderation Effect

Based on the results of the multi-group moderations and the regressions based on the moderating effect by the number of ICTs used, it was concluded that the ICT variable acted as a moderator and exerted influence on the relationships between the proposed variables, thus lending support for H4.

Summary

This chapter presented the results of a three-step analysis identified in the methodology section of this document. It was organized around the two research questions that motivated this research. The first research question asked: What are the potential factors that contribute to the commonly accepted barriers to knowledge sharing? To answer this question, a literature review analysis examined 103 articles on knowledge seeking and knowledge contributing behaviors. It identified three major knowledge sharing barriers (lack of time, poor communications skills, and lack of trust). Based on this analysis, a content analysis study was performed on the same articles, which identified a total of 199 references regarding three major contributors to these barriers. As a result, the answer to the first question was: role conflict, role ambiguity, and locus of control.

The second research question of the study was: How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing? To answer this question, a survey, consisting of 41 questions, was designed, validated by a panel of six experts and distributed to 1,368 employees. The survey yielded 314 useful responses and the data was analyzed using confirmatory factor analysis and structural equation modeling techniques.

The final results demonstrated that the proposed contributors impacted employees' use of ICT differently. For example, employees used three types of ICTs to seek and contribute knowledge when low role ambiguity was present (the exception being knowledge repositories). Conversely, employees only used online forums to seek knowledge when they experienced role conflict and avoided using any of the four ICTs to contribute knowledge when role conflict was present. The results also demonstrated that employees with internal locus of control used all four types of systems to seek knowledge, but avoided the same systems to contribute knowledge. Finally, ICT was found to moderate the relationships between the proposed contributors and the knowledge seeking and knowledge contributing behaviors.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Introduction

The goal of this study was to gain an understanding of the contributing factors that influence common knowledge sharing barriers in the workforce and to determine the impact of these factors on the knowledge seeking and knowledge contributing behaviors of employees through the use of ICTs. This chapter presents the conclusions that were derived from the study based on the two research questions. Next, a set of limitations are discussed, followed by implications for the KM community. Finally, specific recommendations and potential future research are addressed. The chapter concludes with a summary of the research.

Conclusions

This research argued that organizations failed to transfer and retain knowledge through technology among their employees not because of lack of ICTs or their complexity, but as a result of hidden factors that cultivated knowledge sharing barriers and inhibited sharing practices. To substantiate this argument, the study proposed to determine the answers to two research questions: 1) What are the potential factors that contribute to the commonly accepted barriers to knowledge sharing?, and 2) How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing?

To answer the first research question, an extensive literature review was conducted on 103 knowledge management articles. The results uncovered three major contributors to the common knowledge sharing barriers. Of these, role conflict and role ambiguity were found to contribute to employees' lack of time to seek or contribute knowledge. Locus of control was found to promote employees' poor communication skills and lack of trust to share knowledge. Next, a content analysis was conducted to validate the results of the literature review. The results substantiated the findings from the literature review in that role conflict, role ambiguity, and locus of control inhibited employees' knowledge seeking and knowledge contributing behaviors.

To answer the second research question, seven hypotheses were tested via a CFA and SEM analyses of the survey responses received from 314 full-time employees. Five types of ICTs were used to investigate the knowledge sharing practices of the employees: email, instant messaging, micro/wiki blogging, online forums, and knowledge repositories.

Role Conflict

First, it was hypothesized (H1a) that role conflict would positively impact employees' knowledge seeking behaviors via ICTs. The results supported this hypothesis for employees who used online forums. This finding was explained by the propositions of the information foraging theory (Pirolli & Card, 1999). Online forums (e.g. internet message boards) are ICTs characterized by lengthier online conversational posts (when compared to the short messages relayed by the instant messaging ICTs) that are organized under specific categories known as threads. Users of online forums enjoy benefits that are not afforded by the other three ICT types. For example, an employee needs specific

knowledge due to an increased level of role conflict brought by conflicting demands from multiple authorities. The employee forgoes the time consuming effort of typing up an email message, avoids engaging a colleague in an online chat due to the time required to explain the knowledge need, and ignores the effort required to drill through a variety of topics in a knowledge repository due to time constraints. Instead, the user chooses to seek knowledge within the topic and time ordered threads of an online message board where the hidden prey (knowledge answer) is found among the discussions between several individuals. This process of maximizing the benefit of discovering the knowledge, while minimizing the costs (time investment) associated with locating it, is the essence of the information foraging theory.

Further analysis on the moderating effect of the number of ICTs used showed that as role conflict increased, knowledge seeking behaviors also increased for employees who used two systems. Conversely, the opposite effect was found for employees who used more than two systems. The results showed that as their role conflict increased, their knowledge seeking behaviors decreased. Again, the findings coincided with the propositions of the information foraging theory, where knowledge seekers trade costs (in this case time) for the opportunities to uncover knowledge, but only up to a certain level.

Extant literature suggests an association among role conflict, role ambiguity, and ICT number and complexity (Beehr, 1976; Miles & Perreault Jr, 1976; Tarafdar et al., 2007). For example, organizations increase the number of ICTs in order to improve employees' productivity, increase communication, and decrease production time (Borghans & Weel, 2006). At the same time, a greater number of ICTs translates into increased complexities and an increase in employees' time required to learn how to operate and use them. If an

employee's role conflict is increased at this time, perceived time pressure also increases, leading to a decrease in the amount of time available for knowledge sharing practices. This research provides evidence in support of this statement. The results suggest that for employees who used more than two ICTs, a negative influence on the relationship between their role conflict and knowledge sharing practices was observed with decreased levels of knowledge seeking behaviors.

Hypothesis 1b posited that role conflict would negatively impact employees' knowledge contributing behaviors via ICTs. The results of the CFA and SEM analyses did not support this hypothesis for users of a single system; however, this hypothesis was supported for employees who used two systems when the moderating effect of the number of ICTs was examined. As it was argued in H1a, role conflict creates increased time pressure for employees, and its effect was exacerbated when multi-system complexities were added to this mix. The resultant effect was a negative impact on employees' knowledge contributing behaviors.

Additional analysis of the endogenous variables revealed that knowledge seeking proved to be a very strong predictor of knowledge contributing, especially for users of knowledge repositories (β=.9, which explained nearly 80% of the total variance) (Table 33).

ICT Type	Path			Path Coeficient (β)	R^2
Email	KnowContr	<---	KnowSeek	0.76*	0.60
Instant Messaging	KnowContr	<---	KnowSeek	0.84*	0.77
Online Forums	KnowContr	<---	KnowSeek	0.65**	0.62
Knowledge Repositories	KnowContr	<---	KnowSeek	0.9*	0.79

p ≤.001; **p≤.05

Table 33. Predictor of Knowledge Contributing

As noted earlier, extant KM literature provides evidence that extrinsic factors such as organizational rewards, promotions, raises, and incentives motivate knowledge contributing behaviors (Hsu et al, 2007; Kankanhalli et al., 2005; Watson & Hewett, 2006). It is probable that the predictor strength of knowledge seeking behaviors for knowledge repository users was based on the extrinsic motivational factors. Knowledge repository ICTs typically store identifiable information of the original knowledge contributor, thus ensuring contribution practices can be tracked and contributors rewarded.

Intrinsic factors such as reciprocity, enjoyment in helping others, altruism, and personal achievement have been also found to serve as motivating factors to knowledge contributing behaviors (Kankanhalli et al., 2005; Wagner & Prasarnphanich, 2007). These factors may explain the predictor strength of knowledge seeking for users of email and instant messaging ICTs where knowledge was exchanged as a result of a direct request from a knowledge seeker. Moreover, the contributed knowledge in these types of ICTs was typically not stored for organization-wide use (as in the case of instant messaging ICTs). The findings for these specific ICTs and in the case of hypothesis 1b are best explained by the social capital theory (Bourdieu, 1986) which proposes that individuals who build social networks benefit from the value created by these networks since these networks foster reciprocity (a social capital norm) which in turn facilitates the flow of knowledge among the network members. Email and instant messaging ICTs facilitate a direct contact between socially connected knowledge sources with established trusting relationships. As a result, users rely on their networks for knowledge seeking and in turn reciprocate by contributing knowledge.

Role Ambiguity

Hypothesis 2a stated that role ambiguity positively impacts knowledge seeking behaviors via ICTs. The results supported this hypothesis for employees who used each of the investigated ICT systems. Role ambiguity was the strongest predictor of knowledge seeking among users of online forums (β=.41, $p \leq .05$), followed by users of instant messaging (β=.24, $p \leq .05$). As with the conclusions reached with hypothesis 1b, knowledge seekers select the type of ICT that will yield the highest benefit for the least costs. Online forums and instant messaging systems are among the ICTs that require the least amount of time to uncover hidden knowledge. Moreover, the moderating-effect analysis revealed that for employees who used two systems, as role ambiguity increased so did their knowledge seeking behaviors. The inverse effect observed in H1a was also observed for users of more than two systems. For these employees, as role ambiguity increased, knowledge seeking decreased due to time pressures and effort required to overcome multi-systems' complexities.

Hypothesis 2b stated that role ambiguity positively impacts knowledge contributing behaviors via ICTs. The results demonstrated support for this hypothesis among users of all ICTs with the exception of knowledge repositories. The strongest predictor coefficient was for online forums (β=.28, $p \leq .05$). This finding is consistent with the proposition of the social exchange theory (Blau, 1964) that individuals make a determination whether to engage in knowledge contribution on the basis of a cost/benefit analysis. In this case, an ICT (such as email, instant messaging, or an online forum) that facilitates two-way communication between a seeker and a contributor affords its users a chance to engage in a direct exchange of a commodity (e.g. knowledge) through an interaction. Similarly,

users of two ICTs reported that as ambiguity increased, their knowledge seeking behaviors also increased. In contrast, analysis of users of more than two systems showed the inverse effect observed in the prior hypotheses. For these employees, as role ambiguity increased, knowledge contributing decreased.

An unanticipated result from the analysis of the role ambiguity's impact on knowledge contribution showed that knowledge seeking mediated the relationship between role ambiguity and knowledge contributing behaviors via ICTs. This finding is in line with the proposition of the social exchange theory that individual relationship decisions are driven by the benefits derived and costs incurred during the exchange (Blau, 1964). Monge and Contractor (2003) argued that relationships between individuals were based on the calculated worth of these relationships where worth was equal to the benefits minus the costs. The worth was greatest when the benefits outweigh the costs. In this study, employees who experienced role ambiguity contributed knowledge to others via ICTs through the knowledge seeking process despite the cost involved in this exchange.

Locus of Control

Hypothesis 3a posited that internal locus of control positively impacts knowledge seeking behaviors via ICTs. The results supported this hypothesis among users of all ICTs with the exception of online forums. The strongest predictor coefficient was for users of knowledge repositories (β=.35, $p \leq .05$). This was not unexpected as internals tend to accept responsibilities for their own actions, while blaming themselves for their failures due to lack of effort to obtain necessary information (Storms & Spector, 1987). Since internals believe in controlling their own destiny, they'll tend to rely on their own search efforts to uncover hidden information in ICTs where the data is highly codified

and requires structured searching (e.g. knowledge repositories). If they are unable to uncover the information needed to make a decision, internals will turn for direct help from others via ICTs that will allow them to engage and potentially control the flow of information (via instant messaging and email).

Conversely, no support was found for the H3b hypothesis, which posited that internal LOC positively impacted knowledge contributing behaviors. A reason for the lack of support for this hypothesis was that internal LOC employees found greater enjoyment and preferred to engage in a face-to-face and word-of-mouth communication with others because this allowed them to maintain control of the situation (Flaherty et al., 1998; Lam & Mizerski, 2005). Internals may also perceive the act of engaging in knowledge contribution via ICTs as a loss of emotional control that can only be experienced via in-person interaction with others. Moreover, engagement in knowledge contributing via ICTs may be perceived as a time consuming event that further erodes internals' control over their personal time.

Additional analysis was performed to examine whether any of the hypotheses were supported for employees with external LOC (Table 34). In sharp contrast to internals (where LOC was the only predictor of knowledge seeking), knowledge seeking behaviors for external LOC employees were also predicted by role conflict and role ambiguity (with role ambiguity being the strongest predictor among the three). As with internals, no support was found for the knowledge contributing hypotheses among externals either.

WLC Type	Hypothesis	Hypothesized Path			Path Coeficient (β)	Remarks
External	H1a	KnowSeek	<---	RoleConf	0.16**	Accepted
	H2a	KnowSeek	<---	RoleAmb	0.26*	Accepted
	H3a	KnowSeek	<---	WLCS	0.16**	Accepted

*p ≤.05; **p≤.10

Table 34. Hypothesis Testing for External LOC

The last hypothesis (H4) posited that ICTs moderate the relationships between the exogenous and endogenous variables. As demonstrated in the discussion thus far, the results showed that ICT was found to moderate the strength of the relationships between the contributors and the knowledge seeking and knowledge contributing behaviors. For example, in one instance (H1a) a specific ICT influenced the relationship between role conflict and knowledge seeking. In other instances (H2a and H2b), the number of ICTs influenced the relationships between role ambiguity, knowledge seeking, and knowledge contributing behaviors. As a result, this hypothesis was found to be supported.

Finally, textual analysis of the ICT brands used by the respondents to seek and contribute knowledge was conducted. The email systems most commonly used for seeking and contributing knowledge were IBM's Lotus Notes and Google's Gmail. Most common instant messaging systems were Microsoft's Lync and Skype. For micro/wiki blogging, respondents listed Microsoft's Yammer and Facebook. Among the online forums, the most commonly cited were Google's and Yahoo's, while Microsoft's SharePoint and Wikipedia were cited as frequently used knowledge repositories.

Limitations

One limitation of this study was the purposive sample. Since SurveyMonkey Audience was used as a medium to obtain participants to the study, the respondents

sample may not have been a representation of the entire population. Moreover, although the sample was reflective of the population, as noted in the demographics section in chapter 4, it consisted of employees who joined a program to take surveys. As a result, it was probable that the sample was skewed somewhat from that of the overall population.

Scovetta (2013) argued that the data collection method was also a limitation. Despite the use of established and empirically tested instruments, some of the respondents might not have comprehended the instruments' meaning and might have provided responses that conflicted with their true beliefs. Similarly, a limitation of this study was the inability to determine the beliefs and responses of those who choose not to complete the survey as the researcher was unable to get in touch with any of them and discuss these beliefs.

Another potential limitation of the study was its generalizability across certain job types. For example, this study was delimited to respondents who occupied the position of analyst. It is conceivable that the results of this study would not apply to employees with jobs where role conflict, role ambiguity, and ICTs are not present (e.g. certain trade jobs). Furthermore, it is probable that the impacts of exogenous on the endogenous variables may be much more pronounced in jobs with greater demand on the use of ICTs (e.g. system administrators, software developers, or content managers). Finally, the moderating effect of the ICTs on the relationships among the constructs might also vary as a result of the specific type or number of ICTs used in these positions.

Implications

This section addresses the implications of the present study on the field of knowledge management, effects on the professional practice, and future research. First, specific

contributions to the KM literature are discussed. This is followed by examination of the study's potential impacts on professional organizations.

Contribution to the KM Literature

The current gap in the KM literature on how to effectively promote knowledge sharing among employees in organizations exists because barriers that inhibit knowledge sharing practices are poorly understood. This study enhanced the KM body of knowledge by providing an in-depth view of several barriers that are often disregarded in KM studies. For example, Bock et al. (2005) noted that their study overlooked time, communication, and structural barriers to knowledge sharing and urged other researchers to expand on these barriers. The findings of this study shed light on three of these barriers (lack of time, poor communication skills, and lack of trust) and their individual roles in the knowledge sharing process within organizations.

In their study on KS in virtual communities, Chiu et al. (2006) found a number of structural, relational and cognitive factors that motivated the knowledge seeking behaviors of 308 IS professionals; however, the researchers didn't investigate what motivated knowledge contributing behaviors. As a result, they urged future researchers to study why individuals choose to contribute knowledge online. In response to their call, the results of this study advanced the KM understanding on specific factors (i.e. role conflict, role ambiguity and LOC) that motivated individuals to contribute knowledge using ICTs.

The present study also extended prior KM models by incorporating employees' knowledge-sharing behaviors via specific technology agents. For example, Connelly and Kellowey (2003) called upon future researchers to determine whether knowledge sharing

technology (e.g. emails, or knowledge repositories) has any impact on knowledge sharing practices. The findings in this study showed that ICTs play an important moderating role in the relationship between employees' organizational roles and their knowledge sharing practices. Connelly and Kellowey also questioned whether separate knowledge sharing practices existed among different occupations and how these practices were influenced by employees' commitment to their roles. This study provided partial answers to these questions. The results showed that the conflict and ambiguity of the analyst role in 19 different industries influenced knowledge sharing behaviors via ICTs. Moreover, the study demonstrated that employees' personal LOC also influenced these behaviors.

Chennamaneni, Teng, and Raja (2012) proposed a unified model for knowledge sharing behaviors in their study among 180 MBA students at a large state university in the Southwest United States. Although their contribution deepened understanding on intrinsic and extrinsic motivational factors for knowledge sharing, they acknowledged that future research should investigate factors such as personality traits and task interdependence as potential influences of knowledge sharing. The present study fulfilled this call and extended their model by demonstrating how one personal characteristic (LOC) and two job characteristics (role conflict and role ambiguity) impacted knowledge sharing behaviors in organizations.

The results of the present study extend another appeal for future research issued by Connelly et al. (2013), this one searching an answer to the question on how perceived time pressure influences knowledge seekers' behaviors. In their study of 403 undergraduate students, the researchers found that perceived time pressure prevented students from sharing their knowledge as it fostered feelings of preoccupation. This study

showed that perceived time pressures were in fact symptoms of the conflict and ambiguity in the roles of individuals and it was precisely these contributors that influenced the knowledge seeking and contributing practices. Furthermore, the results demonstrated that these contributors positively influenced the behaviors in question.

Kankanhali, Tan, and Wei (2005) reasoned that "sufficient 'slack' time may also promote knowledge seeking from EKRs," (p. 1164). They proposed that this could be accomplished by integrating EKR usage with employees' existing roles where time to seek knowledge from an EKR becomes part of the regular work schedule. The findings of this study showed that time pressure resulted from role constraints that had a negative effect on knowledge sharing behaviors (e.g. high role ambiguity negatively impacted knowledge sharing practices).

The results of the study offered explanations for several observations made by Santos et al. (2012). In their study, the researchers found that certain ICTs were perceived by employees as inadequate tools for KS due to the extra time required for login, folder navigation (in order to locate specific codified knowledge), and uploading of new documents. As a result, the researchers argued that "people use knowledge management systems for some weeks and then switch back to e-mail. The subjects consider that the main reason for that is it requires too much time. They are aware that it only requires a few extra seconds, but for the participants, it is still much faster to open an e-mail and attach a file," (p. 35). The results of this study propose explanations as to why email is the preferred medium to facilitate direct or indirect communication between employees and how this ICT influenced the relationships between employees' roles and their knowledge sharing behaviors.

Another contribution to the KM body of knowledge was the operationalization and validation of the instruments used to measure knowledge seeking and knowledge contributing behaviors via ICTs. Peinl (2011) proposed several KM instruments and argued that "most of the instruments proposed in literature are singular measures that are not aligned with other measures and are either organizational, human-oriented or technical," (p.1). Until recently, the majority of instruments from the KM literature measured knowledge sharing behaviors for specific KM systems, such as message boards, forums, electronic knowledge repositories, or virtual communities (Bock et al., 2005; Kankanhali et al., 2005; Teh & Sun, 2011; Wasko & Faraj, 2005; Yan et al., 2013). In this study, although the original instruments were adapted from De Vries et al. (2006), the items were modified to offer greater insight into the universal characteristics of the knowledge seeking and knowledge contributing behaviors via ICTs. Moreover, the use of an expert panel in the validation of the modified instrument greatly improved the instruments' reliability values, thus contributing a more adequate means to measure such behaviors.

Finally, a contribution of this research to the KM literature was the use of a causal modeling approach. For example, Despres and Chauvel (1999) argued that "The bulk of academic/practitioner literature on knowledge is case-based and anecdotal, e.g. pre-paradigmatic," (p. 112). Demarest (1997) noted that KM is a soft discipline, not particularly useful beyond augmenting the corporate culture. Lloria (2008) argued that there is still "a lack of models based on the use of information technology as a basis for knowledge management," (p. 87). The model proposed in this study provided not only a rich example of how technology can be used to influence KM in organizations, but also a

viable example of a quantitative approach to data analysis that could be applied in future research initiatives on KM.

To sum up, the present study contributed to the KM literature by closing the gap between knowledge sharing barriers, the use of ICTs for knowledge seeking and contributing, and the factors that contributed to these barriers. Results from the study provided a broader understanding of the predictors of employees' knowledge seeking and contributing behaviors via several types of ICTs, while the theoretical model and the quantitative approach served as examples for future research practices.

Impacts on Professional Organizations

The present research provided several practical implications for organizations. First, the study added value to managers of the US based businesses who already invest nearly $290 billion on ICTs to prevent loss of knowledge (US Census, 2013). It did so by pinpointing specific ICTs that could enhance employees' knowledge seeking and knowledge contributing behaviors. For example, research reported that employees spend 61% of their work week using ICTs to share knowledge, communicate and collaborate with other coworkers (Chui et al., 2012). Of these 61%, 28% is dedicated to reading and answering e-mails, 19% to searching and gathering information, 14 % communicating and collaborating. Email is still the predominant communication form with 929 million business email boxes worldwide in 2013 (Levenstein, 2013). This study explained the need for this predominant ICT. The results showed that email users who sought knowledge from other coworkers were extremely likely to also contribute knowledge through the same medium (β=.76). Similarly, organizations with employees that

experienced low to moderate levels of role ambiguity were likely to both seek knowledge (β=.18) and contribute knowledge (β=.09) to others via email.

The present study provided evidence to support the need for investments in a synchronous ICT (e.g. instant messaging). This ICT was found to benefit organizations whose employees experienced low to moderate role ambiguity roles. For these organizations, users of instant messaging not only sought knowledge from others when they experienced role ambiguity (β=.24), but also contributed knowledge (β=.19) via the same ICT.

The study showed that organizations may also benefit from investments in asynchronous ICTs such as online forums and message board. Specifically, organizations that implemented online forums and whose employees experienced high role conflict saw an increase in the level of knowledge seeking via these ICTs (β=.34) while users with low to moderate role ambiguity also sought (β=.41) and contributed knowledge (β=.28) via these ICTs. It is also prudent to issue a note of caution to managers who consider implementing multiple new systems. As shown, organizations need to be cognizant of the complexities and perceived time pressures that emerge among employees with the introduction of multiple new systems.

The study also demonstrated that employees with high internal LOC sought knowledge via email (β=.13), instant messaging (β=.14), and knowledge repositories (β=.35). For these employees, role conflict and role ambiguity didn't play parts in their knowledge sharing practices. Conversely, employees with high external LOC not only sought knowledge via the same synchronous and asynchronous ICTs, but also engaged in knowledge seeking when they experienced conflict and ambiguity in their roles. As a

result, organizations need to be aware of their employees' LOC styles prior to engaging in strategic ICT investments as this may enable them to set realistic expectations for specific knowledge sharing practices.

Finally, the study showed that most common email systems on the market were IBM's Lotus Notes and Google's Gmail. Moreover, most common instant messaging systems were Microsoft's Lync and Skype. Among the online forums and message boards, the most common were Google's and Yahoo's, while Microsoft's SharePoint and Wikipedia were the most frequently used knowledge repositories. These findings may assist management in their investment decision by allowing them the opportunity to investigate what functionality offered by each of these ICTs can best suit their organization's needs.

Recommendations

This section provides specific recommendations for improvement of organizational practices. A discussion on potential future areas of research is also included.

Recommendation for Organizations

This research demonstrated the existence of an intricate web of relationships and interactions between role conflict, role ambiguity, locus of control, the number and type of ICTs, and knowledge seeking and knowledge contributing behaviors. As a result of this complexity, it is recommended that any organization planning to introduce new ICTs, or increase the number of ICTs in an effort to improve their employees' productivity, should also pay special consideration to employees' existing levels of role conflict and role ambiguity. As shown, the existence of multiple ICTs may have adverse effects on the employees' level of knowledge sharing. These negative effects surface when employees' increased perceptions of time pressures to deliver existing workloads collide with steep

learning curves associated with acquiring knowledge on how to use the new ICTs. Companies should beware of these conflicts and pay close attention to the level of role conflict and role ambiguity of their employees in times of new technology launches. Management must ensure that when new systems are introduced, employees' roles remain unchanged otherwise organizations may see a decrease in knowledge sharing practices.

This study also demonstrated that role ambiguity positively influenced knowledge contributing behaviors and this relationship was mediated by knowledge seeking behaviors. As a result, organizations can increase knowledge contributing practices of their employees by ensuring that their role ambiguity levels remain low. To accomplish this, management needs to make certain that employees:

- Are aware of the authority they possess in their organizational roles;
- Have clearly planned goals;
- Have their time adequately divided among their work tasks;
- Have clear understanding of the expectations in their positions;
- Have clear direction on how to do their jobs.

Additionally, to increase employees' knowledge seeking behaviors, organizations need to urge staff to use ICTs to communicate among each other about any newly acquired knowledge. Together, these recommendations will ensure that the right factors remain at play in order to influence both types of knowledge sharing behaviors via ICTs.

Finally, the study also showed that LOC was a good predictor of knowledge seeking behaviors. In fact, while internals were influenced only by their LOC to seek knowledge, externals were also influenced by role conflict and role ambiguity to seek knowledge.

Since externals are known to be communication apprehensive (McCroskey et al., 1976), organizations need to consider implementing training programs that are designed to improve communication skills among externals. These programs may help employees overcome the poor communication skill barriers created by their LOC. This in turn may break the barriers to knowledge sharing introduced by the employees' role conflict and role ambiguity and allow them to engage more freely in knowledge sharing practices.

Future Research

Future research should expand KM understanding of the specific effects of ICT systems on knowledge sharing behaviors. First, research should investigate what ICT capacities (e.g. direct or indirect communication features) contribute to the increase in knowledge seeking and knowledge contributing practices. Moreover, studies may examine whether specific groupings of ICTs (both synchronous and asynchronous) have any significant effects on knowledge sharing behaviors. Such studies will expand our understanding on what specific behavioral patterns are influenced by specific ICT characteristics and enhance the knowledge management body of knowledge.

While the present study demonstrated that knowledge seeking and knowledge contributing practices increased when two ICTs were used, it didn't provide evidence of what ICT types influenced such behaviors. Future research may focus on such combinations and determine how they enhance or inhibit knowledge sharing among employees.

Second, future studies should examine whether there is an optimum number of ICT systems and an optimum level of knowledge sharing that can be achieved through a certain number of features of ICTs. The present study investigated five ICTs (email,

instant messaging, micro/wiki blogging, online forums, and knowledge repositories) and showed that in some instances, a combination of the five systems had significant effects on the relationships between role conflict, role ambiguity and knowledge sharing behaviors. Future studies should find an answer to the questions: How many is too many and why?

Third, this study didn't consider emerging technologies such as mobile collaboration, and ambient or artificial intelligence and their potential effects on KM in organizations. Future research should investigate how emerging new technologies can facilitate specific knowledge sharing behaviors.

Fourth, future research should also examine the effects of social media systems (e.g. micro/wiki blogging) on the relationships between role conflict, role ambiguity, and LOC on knowledge sharing behaviors. The sample size in the current study contained few numbers of users of such ICTs and as a result, a reliable analysis could not be performed.

Finally, role overload occurs when employee's abilities to perform certain task are exceeded by that role's expectations (Schaubroeck, Cotton, & Jennings, 1989). While the effect of role overload on knowledge seeking and knowledge contributing behaviors was not examined in this study, it also represents a good candidate for future research.

Summary

Extant KM literature suggests that effective knowledge exchange between experts and novices improves the competitive advantage of organizations; however, a gap in the literature exists that explains what factors promote common knowledge sharing barriers such as lack of time, poor communications skills, and lack of trust. To bridge this gap, this study proposed to answer two research questions.

The first research question asked: What are the potential factors that contribute to the commonly accepted barriers to knowledge sharing? To answer this question, a comprehensive three-stage literature review was performed on 103 KM articles. It examined the knowledge sharing process as a set of knowledge seeking and knowledge contributing behaviors and proposed the theory of information foraging as a model to explain these behaviors. Three major barriers to knowledge sharing were extracted from the literature review: lack of time, poor communication skills, and lack of trust. Three underlying factors that promoted these barriers were also proposed: role conflict, role ambiguity, and locus of control.

Next, a six-stage content analysis study was conducted on the same 103 articles in order to determine whether the proposed contributors were valid. The content analysis study identified a total of 199 references that percolated to three observed major contributors to the knowledge barriers examined during the literature review. These potential contributors included role conflict, role ambiguity, and locus of control.

The second research question of the study was: How do these factors impact employees' use of ICTs for knowledge seeking and knowledge contributing?
To answer this question, a causal knowledge sharing model was developed and seven hypotheses proposed that explained the impact of the contributory factors on employees' knowledge sharing practices via ICTs.

A survey consisting of 41 questions was developed and validated via a panel of six experts prior to its distribution to 1,368 full-time analysts from a variety of industries that used ICTs at their places of employment. The data of 314 useful responses were analyzed

using confirmatory factor analysis and structural equation modeling techniques to validate the proposed model.

The final results from the analysis confirmed that the proposed contributors impacted employees' knowledge sharing practices via ICTs. Knowledge seeking and knowledge contributing behaviors were predicted by role conflict, role ambiguity, and locus of control, while ICT was found to moderate the strength of the predictors. In addition, the propositions of three separate theories were found to explain the results of this study.

First, information foraging theory was used to explain role conflict as a predictor to knowledge sharing behaviors where employees select specific ICTs to discover hidden knowledge while minimizing time costs associated with searching for this knowledge. Next, social capital theory was used to explain the knowledge contributing behaviors of employees where individuals used the benefits of their social networks to reciprocate their knowledge with others.

Finally, the social exchange theory explained the mediating role that knowledge seeking played on the relationship between role ambiguity and knowledge contributing behaviors via ICTs. The results suggested that employees contributed knowledge to others through the process of knowledge seeking despite the costs associated with the effort involved.

This study made several contributions to the KM body of knowledge. First, the knowledge gap on factors that contributed to common knowledge sharing barriers was closed. An improved knowledge sharing instrument was proposed to measure the knowledge seeking and contributing behaviors of employees. Furthermore, the study

provided a schematic frame on how to conduct future quantitative studies in the KM literature.

The study also provided specific implications for organizations. Organizations are encouraged to be mindful to the level of role conflict and role ambiguity of their employees, the specific characteristics of the ICTs, and their quantity prior to deploying these systems. As demonstrated by the results, both quantity and functionality of ICTs exhibited specific moderating effects on the predictors and criterions. Moreover, management should be aware of their employees' internal versus external LOC as each of these types have a different effect on the knowledge seeking practices.

Future research should focus on determining the effects of specific ICT functions and groupings of ICTs on knowledge sharing behaviors. Additionally, optimum number of ICTs versus optimum level of knowledge sharing achieved should also be examined. Finally, it is recommended that the moderating effects of social media systems on the predictor and criterions should be also examined.

Appendix A

Literature Review Matrix

		Knowledge Behavior Context		Noted Barriers		
Authors	**Study Type/Sample**	**Seeking**	**Contributing**	**Time**	**Communication**	**Trust**
Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	X	X	X	X	X
Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	X	X		X	X
Al-Ani, Wilensky, Redmiles and Simmons (2011)	Empirical field study/N=43	X		X		X
Anderson, Glassman, McAfee, and Pinelli (2001)	Survey/N=872	X			X	
Andrews and Delahaye (2000)	Qualitative/N=15	X	X			X
Ardichvili, Page, and Wentling (2003)	Qualitative	X	X			X
Ashford and Cummings (1983)	Exploratory	X		X		X
Baethge and Rigotti (2013)	Qualitative/N=133	X		X		
Bock, Zmud, Kim and Lee (2005)	Survey/N=154	X				X
Bock, Kankanhali and Sharma (2006)	Survey/N=134	X		X		
Borgatti and Cross (2003)	Survey/N=72	X		X		X
Braganza, Hackney & Tanudjojo (2009)	Case-based	X		X		
Byström and Järvelin (1995)	Qualitative/N=17	X		X		
Cabrera and Cabrera (2005)	Exploratory		X	X	X	X
Cabrera, Collins and Salgado (2006)	Survey/N=372	X	X	X	X	X
Carrillo, Robinson, Al-Ghassani, and Anumba (2004)	Survey/N=53	X	X	X		
Chai and Kim (2012)	Survey/N=212		X		X	X
Chen, Zhang and Vogel (2011)	Survey/N=139	X	X	X	X	
Chiu, Hsu and Wang 2006	Survey/N=310		X		X	X
Chowdhury (2005)	Survey/N=164	X	X		X	X
Connelly, Ford, Turel, Gallupe, and Zweig (2013)	Experiment/N=403		X	X		
Cramton (2001)	Qualitative/N=13	X	X	X	X	
Creyer, Bettman, and Payne (1990)	Experiment/N=81	X	X	X		
Cross and Sproull (2004)	Qualitative/N=40	X				X
Cross, Rice and Parker (2001)	Survey/N=34	X		X	X	X
Durcikova, Fadel, Butler, and Galletta (2011)	Survey/N=110	X	X	X		
Fidel and Green (2004)	Qualitative/N=32	X		X		X
Flowers, Xia, Burnett, and Shapiro (2010)	Survey/N=173		X	X	X	X
Fugate, Thomas, and Golicic (2012)	Experiment/N=126	X	X	X		X
Gray and Meister (2004)	Survey/N=313	X			X	
Gray and Durcikova (2006)	Survey/N=110	X		X		X
Gu and Mendonça (2009)	Experiment/N=11	X		X		
Haas and Witte (2001)	Observation	X	X	X		
He, Fang, and Wei (2009)	Survey/N=201	X		X		X
He and Wei (2009)	Survey/N=186	X	X	X		X
Hertzum and Pejtersen (2000)	Case-Based	X		X	X	
Holste and Fields (2010)	Survey/N=202	X	X		X	X
Hsu, Ju, Yen and Chang (2007)	Survey/N=274		X			X
Huber (1991)	Exploratory	X			X	
Huber and Kunz (2007)	Experiment/N=40	X		X		
Humayun and Gang (2013)	Survey/N=73	X				X
Jarvenpaa and Majchrzak (2008)	Survey/N=104	X	X	X		X

		Knowledge Behavior Context		Noted Barriers		
Authors	**Study Type/Sample**	**Seeking**	**Contributing**	**Time**	**Communication**	**Trust**
Kankanhalli, Tan and Wei (2005)	Survey/N=150		X	X		X
Keegan and Turner (2001)	Qualitative/N=44	X	X	X	X	X
Ko, Kirsch, and King (2005)	Survey/N=118	X	X		X	
Kumar and Ganesh (2009)	Exploratory	X	X			X
Lee and Thomas (2008)	Qualitative/N=16	X		X		
Levin and Cross (2004)	Survey/N=127	X	X		X	X
Liao (2006)	Survey/N=254	X	X			X
Lin, Tan, and Chang (2008)	Mix method/N=174	X	X	X	X	X
Lin, Wu and Yen (2012)	Mix method	X	X	X	X	X
Lu, Zhou and Leung (2011)	Survey/N=166		X		X	X
Madzar (2001)	Survey/N=75	X				X
Markus (2001)	Exploratory	X	X	X	X	X
Masrek and Edang, 2012	Survey/N=265		X		X	X
Miller and Jablin (1991)	Exploratory	X			X	
Modi and Mabert (2007)	Survey/N=114	X	X	X	X	X
Muthusamy and White (2005)	Survey/N=144	X	X	X		X
Nakano, Muniz Jr, and Batista Jr (2013)	Qualitative/N=14	X	X	X	X	X
Nelson and Cooprider (1996)	Qualitative/N=132	X	X		X	X
Ngah and Ibrahim (2010)	Survey/N=257		X		X	
Nov (2007)	Survey/N=151		X	X		
O'Reilly (1982)	Survey/N=163	X		X	X	X
Pardo, Cresswell, Thompson, and Zhang (2006)	Case-based	X	X			X
Paroutis and Saleh (2009)	Case-Based		X	X	X	X
Pentland (1992)	Ethnography	X	X	X		
Pirolli and Card (1999)	Experiment/N=8	X		X		
Radaelli, Mura, Spiller, and Lettieri (2011)	Surveys/N=226					X
Renzl (2008)	Survey/N=201	X	X			X
Rice, Collins-Jarvis, and Zydney-Walker (1999)	Surveys/N=292		X	X	X	X
Ridings, Gefen, and Arinze (2002)	Surveys/N=663	X	X		X	X
Riege (2005)	Exploratory	X	X	X	X	X
Rosen, Furst, and Blackburn, 2007	Survey/N=200	X	X	X	X	X
Sandhu, Jain, and Ahmad (2011)	Survey/N=170	X	X	X	X	X
Santos, Soares and Carvalho (2012)	Qualitative/N=24	X	X	X	X	
Savolainen (2006)	Exploratory	X		X		
Seba, Rowley, and Delbridge (2012)	Qualitative/N=15	X	X	X		X
Staples and Webster (2008)	Survey/N=824	X	X		X	X
Song and Teng (2008)	Survey/N=149	X	X		X	X
Southon, Todd, and Seneque (2002)	Qualitative/N=21	X	X		X	X
Su and Contractor (2011)	Survey/N=110	X		X	X	X
Sun and Scott (2005)	Delphi team/N=17	X	X	X	X	X
Syed-Ikhsan and Rowland (2004)	Survey/N=154	X	X		X	
Teh and Sun (2012)	Survey/N=116		X	X	X	
Thomas, Esper, and Stank (2010)	Survey/N=204	X	X	X	X	
Thomas, Fugate, and Koukova (2011)	Experiment/N=126	X	X	X		
Tokar, Aloysius, Waller, and Williams (2011)	Experiment/N=106		X	X	X	

		Knowledge Behavior Context		Noted Barriers		
Authors	**Study Type/Sample**	**Seeking**	**Contributing**	**Time**	**Communication**	**Trust**
Tseng and Kuo (2010)	Survey/N=161		X	X	X	X
Vandenbosch and Huff (1997)	Field Study/N=36	X		X		
Van den Hooff and Ridder (2004)	Survey/N=417	X	X	X	X	X
Van der Kleij, Lijkwan, Rasker, and De Dreu (2009)	Experiment/N=72	X	X	X	X	
Wagner and Prasarnphanich (2007)	Survey/N=35		X	X	X	X
Wang and Noe (2010)	Exploratory	X	X	X	X	X
Wasko and Faraj (2005)	Survey/N=593		X	X	X	X
Wasko and Faraj (2000)	Survey/N=342		X	X		
Watson and Hewett (2006)	Survey/N=430	X	X	X		X
Willem and Buelens (2009)	Case-Based		X	X	X	
Williams (2008)	Mixed method/N=522	X	X	X		X
Xu, Kim and Kankanhalli (2010)	Survey/N=425	X	X		X	X
Xu, Tan and Yang (2006)	Survey/N=154	X		X		
Xu, Zhang and Zhang (2010)	Survey/N=35	X		X	X	X
Yeh, Lai, and Ho (2006)	Case Study		X		X	X
Yitzhaki and Hammershlag (2004)	Survey/N=233	X			X	
Yuan, Rickard, Xia, and Scherer (2011)	Mix methods/N=49	X		X		X

Appendix B

Survey Questions

Role Conflict Questions

	Very False						Very True
1. I have to do things that should be done differently.	1	2	3	4	5	6	7
2. I work under incompatible policies and guidelines.	1	2	3	4	5	6	7
3. I receive and assignment without the manpower to complete it.	1	2	3	4	5	6	7
4. I have to buck a rule or policy in order to carry out an assignment.	1	2	3	4	5	6	7
5. I work with two or more groups who operate quite differently.	1	2	3	4	5	6	7
6. I receive incompatible requests from two or more people.	1	2	3	4	5	6	7
7. I do things that are apt to be accepted by one person and not accepted by others.	1	2	3	4	5	6	7
8. I receive an assignment without adequate resources and materials to execute it.	1	2	3	4	5	6	7
9. I work on unnecessary things.	1	2	3	4	5	6	7

Role Ambiguity Questions

	Very False						Very True
	1	2	3	4	5	6	7
1. I feel certain about how much authority I have in my position.	1	2	3	4	5	6	7
2. I have clearly planned goals for my job.	1	2	3	4	5	6	7
3. I am sure I divide my time properly while performing my tasks.	1	2	3	4	5	6	7
4. I know my responsibilities in my position.	1	2	3	4	5	6	7
5. I know exactly what is expected of me in my position.	1	2	3	4	5	6	7
6. I receive lucid explanations of what I have to do in my job.	1	2	3	4	5	6	7

Work Locus of Control Questions

	Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neutral	Slightly Agree	Somewhat Agree	Strongly Agree
1. On most jobs, people can pretty much accomplish whatever they set out to accomplish	1	2	3	4	5	6	7
2. If you know what you want out of a job, you can find a job that gives it to you	1	2	3	4	5	6	7
3. Getting the job you want is mostly a matter of luck	1	2	3	4	5	6	7
4. Promotions are usually a matter of good fortune	1	2	3	4	5	6	7
5. Promotions are given to employees who perform well on the job	1	2	3	4	5	6	7
6. It takes a lot of luck to be an outstanding employee on most jobs	1	2	3	4	5	6	7
7. People who perform their jobs well generally get rewarded	1	2	3	4	5	6	7
8. The main difference between people who make a lot of money and people who make a little money is luck	1	2	3	4	5	6	7

ICTs are email, instant messaging, micro/wiki blogging, online forums, or knowledge repositories

ICT Knowledge Seeking Questions	Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neutral	Slightly Agree	Somewhat Agree	Strongly Agree
1. When I need specific knowledge, I use the ICT system to ask my colleagues about it.	1	2	3	4	5	6	7
2. I use the ICT system to stay informed of what my colleagues know.	1	2	3	4	5	6	7
3. When I need to learn new knowledge, I use the ICT system to ask my colleagues to teach me what they know	1	2	3	4	5	6	7
4. When a colleague is good at something, I use the ICT system to ask them to teach me how to do it.	1	2	3	4	5	6	7
5. What type of ICT system do you use to seek knowledge (select more than one if it applies)?	Email	Instant Messaging	Micro/Wiki Blogging	Online forums	Knowledge Repositories		
6. Please provide the name(s) of the ICT system(s) you use to seek knowledge at work (e.g. Outlook, Lotus Notes, Yammer, Lync, etc.)							

ICTs are email, instant messaging, micro/wiki blogging, online forums, or knowledge repositories

ICT Knowledge Contributing Questions	Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neutral	Slightly Agree	Somewhat Agree	Strongly Agree
1. I use the ICT system to tell my colleagues when I've learned something new about doing my job.	1	2	3	4	5	6	7
2. I use the ICT system to keep my colleagues informed of what I am doing.	1	2	3	4	5	6	7
3. I use the ICT system to share knowledge I have with my colleagues.	1	2	3	4	5	6	7
4. I regularly use the ICT system to tell my colleagues what I am doing.	1	2	3	4	5	6	7
5. What type of ICT system do you use to contribute knowledge (select more than one if it applies)?	Email	Instang messaging	Micro/Wiki Blogging	Online forums	Knowledge Repositories		
6. Please provide the name(s) of the ICT system(s) you use to contribute knowledge at work (e.g. Outlook, Lotus Notes, Yammer, Lync, etc.)							

Demographic Question

1. What is your gender?	Male	Female			
2. What is your age?	<21	21-29	30-34	35-39	40-
3. What is your education level?	Highschool	College (2 yrs)	University (4 yrs)	Graduate School	
4. How many years of work experience in your current position?	1-5 years	6-10 years	11-15 years	16-20 years	>20 years
5. To the best of your knowledge, your company has between:	1-50 employees	51-500 employees	501-2000 employees	2001-10,000 employees	>10,000 employees

6. To the best of your knowledge, your company's industry is:

- Advertising & Marketing
- Agriculture
- Airlines, Aerospace, Defense
- Automotive
- Business Support & Logistics
- Construction, Machinery & Home
- Education
- Entertainment & Leisure
- Finance & Financial Services
- Food & Beverages
- Government
- Health Care & Pharmaceuticals
- Insurance
- Manufacturing
- Nonprofit
- Retail & Commercial Durables
- Real Estate
- Telecommunications, Technology, Internet & Electronics
- Utilities, Energy, and Extraction

Appendix C

Permissions to Use Survey Instruments

To: pspector@usf.edu;
Cc: Timothy Ellis;

Dr. Paul Spector
Department of Psychology, PCD 4118
University of South Florida
Tampa, FL 33620 USA
pspector@usf.edu

January 13, 2014

Dear Dr. Spector,

My name is Simon Cleveland and I am a doctoral candidate at Nova Southeastern University. Presently, I am engaged in my dissertation research: Rethinking knowledge sharing in organizations: A causal model to predict employees' knowledge seeking and knowledge contributing behaviors via information and communication technologies (ICT) and my dissertation adviser is Dr. Timothy Ellis (copied).

I encountered the research you completed entitled Development of the work locus of control scale (1988) and would like your written permission to use your WLCS 8-item survey instrument in my research and to include it in the appendix of my dissertation.

Please do not hesitate to contact me if you would like to discuss this matter or would like more information.

Thank you for your kind consideration.

Respectfully,

Simon Cleveland
Doctoral candidate at Nova Southeastern University
2764 Orange Grove Trail
Naples, FL 34120
Sc1674@nova.edu

Spector, Paul <pspector@usf.edu>
Mon 1/13/2014 7:36 PM

mark as unread

To: Simon Cleveland;

- You forwarded this message on 1/13/2014 8:49 PM.

Bing Maps | + Get more apps

Dear Simon:

You have my permission to use in your research any of my instruments I have provided on my website, including the WLCS. You can find details about them in the Scales section of my website http://shell.cas.usf.edu/~spector. I allow free use for noncommercial research and teaching purposes in return for sharing of results. This includes student theses and dissertations, as well as other student and nonstudent research projects. Copies of the scale can be reproduced in a thesis or dissertation as long as the copyright notice is included as indicated on the website. Results can be shared by providing an e-copy of a published or unpublished research report (e.g., a dissertation). You also have permission to translate any of my scales into another language under the same conditions in addition to sharing a copy of the translation with me. Be sure to include the copyright statement, as well as credit the person who did the translation with the year.

Thank you for your interest in my scales, and good luck with your research.

Best,

Paul Spector, Distinguished Professor
Department of Psychology
PCD 4118
University of South Florida
Tampa, FL 33620
813-974-0357
pspector@usf.edu

Permission to use Role Conflict and Role Ambiguity Scales

DELETE REPLY REPLY ALL FORWARD ...

mark as unread

Simon Cleveland
Tue 1/14/2014 11:29 AM

To: permissions@sagepub.com;

• You forwarded this message on 1/14/2014 11:55 AM.

Dear Sir or Madam,

My name is Simon Cleveland and I am a doctoral candidate at Nova Southeastern University. Presently, I am engaged in my dissertation research: Rethinking knowledge sharing in organizations: A causal model to predict employees' knowledge seeking and knowledge contributing behaviors via information and communication technologies (ICT) and my dissertation adviser is Dr. Timothy Ellis.

I encountered the research you published in the 1970 Administrative Science Quarterly (Vol 15., issue 2, pp. 150-163) entitled Role Conflict and Ambiguity in Complex Organizations and authored by John R. Rizzo, Robert J. House, and Sidney I. Lirtzman.

I have attempted to contact them to request their permission to use the Role Conflict and Role Ambiguity Scales in my research, but without success. I would like your written permission to use Role Conflict and Role Ambiguity Scales instrument in my research and to include it in the appendix of my dissertation.

Please do not hesitate to contact me if you would like to discuss this matter or would like more information.

Thank you for your kind consideration.

Respectfully,

Simon Cleveland
Doctoral candidate at Nova Southeastern University
2764 Orange Grove Trail
Naples, FL 34120
Sc1674@nova.edu

RE: Permission to use Role Conflict and Role Ambiguity Scales

DELETE REPLY REPLY ALL FORWARD ...

Binur, Michelle <Michelle.Binur@sagepub.com> on behalf of permissions (US) <permissions@sagepub.com> mark as unread
Tue 1/14/2014 12:51 PM

To: Simon Cleveland;

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Dear Simon,

Thank you for your request. You can consider this email as permission to reprint the material as detailed below in your upcoming dissertation. Please note that this permission does not cover any 3rd party material that may be found within the work. We do ask that you properly credit the original source. Please contact us for any further usage of the material.

Best regards,
Michelle Binur

Appendix D

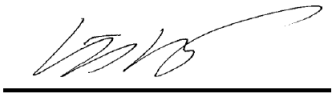
IRB Approval

NOVA SOUTHEASTERN UNIVERSITY
Office of Grants and Contracts
Institutional Review Board

MEMORANDUM

To: Simon Cleveland

From: Ling Wang, Ph.D.
Institutional Review Board



Date: Feb. 11, 2014

Re: *Rethinking knowledge sharing in organizations: A model to predict employees' knowledge seeking and knowledge contributing behaviors via information and communication technologies (ICT)*

IRB Approval Number: wang02151404

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. 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 these 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 REACTIONS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2020 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: Protocol File

3301 College Avenue • Fort Lauderdale, FL 33314-7796 • (954) 262-5369
Fax: (954) 262-3977 • Email: *inga@nsu.nova.edu* • Web site: www.nova.edu/cwis/ogc

Appendix E

Expert Panel E-mail Invitation and Validation Form

Dear _____,

As part of my doctoral dissertation at Nova Southeastern University I am forming a team to gain expert counsel prior to launching a survey to 2,000 Information and Communication Technology (ICT) users. In this study, ICTs are defined as email, instant messaging, micro/wiki blogging, online forums, or knowledge repository systems. The goal of this research is to determine the impact of role stress and locus of control on employees' knowledge sharing behaviors. You are invited to participate because you are considered an ICT expert and user.

For your information, this research has been approved by the Institutional Review Board (IRB) at Nova Southeastern University. The IRB has responsibility to ensure that all academic research conducted at Nova Southeastern University is conducted in an ethical manner respecting the rights of all participants.

All of your work can be done from your home or office and you wouldn't know who the other expert panel members are. You are invited to validate the attached 10-question survey in order to help determine whether the questions are:

1) Understandable: Did you have to read the item more than once to understand what was asked? Was the meaning of the question clear and straightforward?

2) Loaded: In your opinion was the item worded in a way that there was a single obvious answer for you?

For questions 1 through 8, please add one of the numbers from the scale that best applies to your answer. For questions 9 and 10, you can select more than one answer if it applies.

In the final section, I'd like to know whether the wording of questions 1 through 10 were understandable and/or loaded. Please put an X in either the Yes or No boxes and provide comments on any necessary re-wording or clarification. When finished, please email back the excel file. I will follow up with a phone call if further clarification is necessary.

Thank you for agreeing to participate and I look forward to your feedback.

Respectfully,

Simon Cleveland
sc1674@nova.edu
Doctoral Candidate
Nova Southeastern University

In the survey section below, please add one of the numbers from the scale below that best applies to your answer

Survey Section

Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neutral	Slightly Agree	Somewhat Agree	Strongly Agree
1	2	3	4	5	6	7

1. When I need certain knowledge, I use the ICT system to ask my colleagues about it.
2. I use the ICT system to stay informed of what my colleagues know.
3. When I need to learn something, I use the ICT system to ask my colleagues about their abilities.
4. When a colleague is good at something, I use the ICT system to ask them to teach me how to do it.
5. I use the ICT system to tell my colleagues when I've learned something new.
6. I use the ICT system to keep my colleagues informed of what I am doing.
7. I use the ICT system to share information I have with my colleagues.
8. I regularly use the ICT system to tell my colleagues what I am doing.

9. What type of ICT system do you use to contribute knowledge (select more than one answer if it applies)?

Email	Instant messaging	Micro/Wiki Blogging	Online forums	Knowledge Reporsitories

10. What type of ICT system do you use to contribute knowledge (select more than one answer if it applies)?

Email	Instant messaging	Micro/Wiki Blogging	Online forums	Knowledge Reporsitories

In this section, I'd like to know whether the wording of questions 1 through 10 above were understandable and/or loaded.
Please put an X in either the Yes or No boxes below and provide comments on the necessary clarification

Question #	Understandable		Loaded		Comments
	Yes	No	Yes	No	
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

		Panel Expert 1 (G)					
#	Question	Rating	Understandable		Loaded		Comments
			Yes	No	Yes	No	
1.	When I need certain knowledge, I use the ICT system to ask my colleagues about it.	7		X		x	"Certain" has two meanings, i.e. "specific" and "with a high degree of certitude". I don't know which meaning you are referring to in the question.
2.	I use the ICT system to stay informed of what my colleagues know.	7	x			x	Question #3 is only slightly different from question #2, Q2 refers to passive engagement, Q3 refers to active engagement. If the questions had similar wording with the active/passive contrast emphasized, I would understand the distinctions better. Q4 implies even deeper engagement. E.g.: Q2: When I need to learn something, I use the ICT system to see what my colleagues have shared about what they know Q3: When I need to learn something, I use the ICT system to ask my colleagues what they know Q3: When I need to learn something, I use the ICT system to ask my colleagues to teach me what they know
3.	When I need to learn something, I use the ICT system to ask my colleagues about their abilities.	7	X			X	
4.	When a colleague is good at something, I use the ICT system to ask them to teach me how to do it.	5	X			X	
5.	I use the ICT system to tell my colleagues when I've learned something new.	5	X			X	
6.	I use the ICT system to keep my colleagues informed of what I am doing.	6	X			X	I don't see the difference between Qs 6 and 8, except for the term "regularly", Is that the only difference? If so, then maybe use the term "occassionally" on Q6 so the reader know what differentiation you are seeking
7.	I use the ICT system to share information I have with my colleagues.	6	X			X	What is the difference between Q7 and 6/8? Are you differentiating between sharing "knowledge" (what I know), versus sharing activity (what I am doing)? If so, then all three questions should be worded the same with a differentiation
8.	I regularly use the ICT system to tell my colleagues what I am doing.	4	X			X	
9	What type of ICT system do you use to contribute knowledge (select more than one answer if it applies)?	Email, Instant-Messaging, Micro/Wiki Blogging	X			X	
10	What type of ICT system do you use to seek knowledge (select more than one answer if it applies)?	Micro/Wiki Blogging, Online Forums, Knowledge Repositories	X			X	Some organizations have policies that prevent a worker from posting on online forums and knowledge repositories. You may want to ask about this so you can factor out responses where a worker is forbidden from posting to a public forum
		The questions seemed very understandable and were not loaded. However, many of the questions were similar, and I don't feel they were sufficiently differentiated.					
		For example, the questions:					
		#6 - I use the ICT system to keep my colleagues informed of what I am doing.					
		#7 - I use the ICT system to share information I have with my colleagues.					
		#8 - I regularly use the ICT system to tell my colleagues what I am doing.					
		Questions 6 and 8 seem identical, with the exception of the word "regularly". Are you trying to assess the frequency of usage (e.g. regularly versus irregularly)? If so, I would structure the sentences like this:					
		#6 - I occasionally use the ICT system to keep my colleagues informed of what I am doing.					
		#8 - I regularly use the ICT system to keep my colleagues informed of what I am doing.					
		Or, an alternative approach would be to combine the questions:					
		#6 - I regularly use the ICT system to keep my colleagues informed of what I am doing (1 = never, 5 = occasionally, 7 = regularly).					
		Also, the only difference I see between questions 6 & 7 is "sharing information" (what I know) versus "sharing activity" (what I am doing). Is this what you are trying to differentiate?					
		If so, then the questions could be more clearly stated as:					
		#6 - I use the ICT system to keep my colleagues informed of what I am doing.					
		#7 - I use the ICT system to keep my colleagues informed of what I have learned.					

		Panel Expert 2 (M)					
#	Question	Rating	Understandable		Loaded		Comments
			Yes	No	Yes	No	
1.	When I need certain knowledge, I use the ICT system to ask my colleagues about it.	6	X		X		In all of the following questions, by selecting "yes", I mean there was one obvious answer for me. (not that the item was a loaded term -- had multiple meanings)
2.	I use the ICT system to stay informed of what my colleagues know.	?		X		X	I had to read the question twice. My colleagues know about what? About the task I am currently doing? General job?
3.	When I need to learn something, I use the ICT system to ask my colleagues about their abilities.	6	X		X		about their abilities or about their knowledge/skills?
4.	When a colleague is good at something, I use the ICT system to ask them to teach me how to do it.	6	X		X		
5.	I use the ICT system to tell my colleagues when I've learned something new.	4	X			X	"I've learned something new" about what? About doing my job? Doing our job?
6.	I use the ICT system to keep my colleagues informed of what I am doing.	5	X		X		
7.	I use the ICT system to share information I have with my colleagues.	6	X		X		Which information? The one that they should know?
8.	I regularly use the ICT system to tell my colleagues what I am doing.	5	X		X		
9	What type of ICT system do you use to contribute knowledge (select more than one answer if it applies)?	Email, Online Forums, Knowledge Repositories	X		X		Are questions 9 and 10 identical?
10	What type of ICT system do you use to seek knowledge (select more than one answer if it applies)?						
		A couple of comments:					
		- Are questions 9 and 10 intentionally identical?					
		- The questions about "knowledge" and "information"					
		and "learning" are a bit					
		general and can benefit from being further specified.					
		The generality made					
		them a bit difficult to answer. You might specify them					
		within the item					
		wording, or even before presenting the items for example					
		by saying: "Please					
		focus on your current job and the specific information					
		and knowledge you					
		require to do it." Or something like that.					

		Panel Expert 3 (P)					
#	Question	Rating	Understandab		Loaded		Comments
			Yes	No	Yes	No	
1.	When I need certain knowledge, I use the ICT system to ask my colleagues about it.	6					
2.	I use the ICT system to stay informed of what my colleagues know.	7					
3.	When I need to learn something, I use the ICT system to ask my colleagues about their abilities.	4			X		need to be more specific. Something can be anything
4.	When a colleague is good at something, I use the ICT system to ask them to teach me how to do it.	7					
5.	I use the ICT system to tell my colleagues when I've learned something new.	5					
6.	I use the ICT system to keep my colleagues informed of what I am doing.	6					
7.	I use the ICT system to share information I have with my colleagues.	7					
8.	I regularly use the ICT system to tell my colleagues what I am doing.	6					
9	What type of ICT system do you use to contribute knowledge (select more than one answer if it applies)?	Email, Instant Messaging, Online Forums, Knowledge Repositories					
10	What type of ICT system do you use to seek knowledge (select more than one answer if it applies)?	Email, Instant Messaging, Online Forums, Knowledge Repositories					

		Panel Expert 4 (H)					
#	Question	Rating	Understandab		Loaded		Comments
			Yes	No	Yes	No	
1.	When I need certain knowledge, I use the ICT system to ask my colleagues about it.	2	x			x	
2.	I use the ICT system to stay informed of what my colleagues know.	5	x			x	
3.	When I need to learn something, I use the ICT system to ask my colleagues about their abilities.	2	x			x	
4.	When a colleague is good at something, I use the ICT system to ask them to teach me how to do it.	5	x			x	I ask them to send me instructions on how they accomplished the issue at hand.
5.	I use the ICT system to tell my colleagues when I've learned something new.	1	x			x	
6.	I use the ICT system to keep my colleagues informed of what I am doing.	5		x		x	I would have answered #6 as to what I regularly do which then becomes virtually redundant to # 8. If interested in the diff, ask #8 first then #6. I would then take #6 to mean infrequently.
7.	I use the ICT system to share information I have with my colleagues.	7					
8.	I regularly use the ICT system to tell my colleagues what I am doing.	1		x		x	
9	What type of ICT system do you use to contribute knowledge (select more than one answer if it applies)?	Email, Micro/Wiki Blogging, Online Forums	x			x	
10	What type of ICT system do you use to seek knowledge (select more than one answer if it applies)?	Micro/Wiki Blogging, Online Forums, Knowledge Repositories	x			x	

		Panel Expert 5 (O)					
#	Question	Rating	Understandab		Loaded		Comments
			Yes	No	Yes	No	
1.	When I need certain knowledge, I use the ICT system to ask my colleagues about it.	4	X			X	
2.	I use the ICT system to stay informed of what my colleagues know.	5	X			X	
3.	When I need to learn something, I use the ICT system to ask my colleagues about their abilities.	4	X			X	
4.	When a colleague is good at something, I use the ICT system to ask them to teach me how to do it.	4	X			X	
5.	I use the ICT system to tell my colleagues when I've learned something new.	5	X			X	
6.	I use the ICT system to keep my colleagues informed of what I am doing.	5	X			X	
7.	I use the ICT system to share information I have with my colleagues.	5	X			X	
8.	I regularly use the ICT system to tell my colleagues what I am doing.	5	X			X	
9	What type of ICT system do you use to contribute knowledge (select more than one answer if it applies)?	Email, Online Forums	X			X	
10	What type of ICT system do you use to seek knowledge (select more than one answer if it applies)?	Email, Instant Messaging, Online Forums	X			X	

		Panel Expert 6 (C)					
#	Question	Rating	Understandable		Loaded		Comments
			Yes	No	Yes	No	
1.	When I need certain knowledge, I use the ICT system to ask my colleagues about it.	6		X		X	I read this multiple times to determine if you were referring to the act of asking for help, or if you meant using the ICT system as an avenue for obtaining the knowledge that you need. The response would be different for each of those versions.
2.	I use the ICT system to stay informed of what my colleagues know.	7	X			X	
3.	When I need to learn something, I use the ICT system to ask my colleagues about their abilities.	5	X			X	
4.	When a colleague is good at something, I use the ICT system to ask them to teach me how to do it.	5	X			X	I understood this to mean the act of requesting for help, not the training itself taking place through ICT.
5.	I use the ICT system to tell my colleagues when I've learned something new.	6	X			X	I understood this to mean the act of informing people about the subject of what I learned (such as an announcment or updating a profile that shows that training took place), rather than the content of what was learned.
6.	I use the ICT system to keep my colleagues informed of what I am doing.	6		X		X	This question sounded very similar to question #8, but #8 seemed more understandable.
7.	I use the ICT system to share information I have with my colleagues.	7	X			X	
8.	I regularly use the ICT system to tell my colleagues what I am doing.	6	X			X	
9	What type of ICT system do you use to contribute knowledge (select more than one answer if it applies)?	Email, Instant Messaging, Knowledge Repositories	X			X	
10	What type of ICT system do you use to seek knowledge (select more than one answer if it applies)?	Email, Online Forums, Knowledge Repositories	X			X	

Appendix F

eMail Survey - Invitation

Dear Colleague,

This invitation highlights the very important research that I, a doctoral candidate, am conducting at Nova Southeastern University. This research will help practitioners and researchers understand the impact of role stress and locus of control on employee's knowledge sharing behavior.

As professionals, you recognize the increasing importance of knowledge sharing in organizations. Yet we do not fully understand the factors that impact knowledge sharing behaviors via Information and Communication Technologies (ICTs) designed to facilitate real time conversations, information sharing, online meetings, and knowledge repositories (e.g. email, instant messaging, micro/wiki blogging, and online forums).

This invitation includes a link to the questionnaire. All responses will be kept completely confidential. There are 41 questions in the survey and completing it indicates your voluntary participation in the study, which should take no more than 20 minutes to complete. You have the right to participate or to withdraw at any time, without penalty. Please answer all questions candidly. There are no costs to you or payments made for participating in this study. Upon completion of the survey, you may choose to receive an electronic copy of the finding of this research.

The survey can be accessed at the following web browser URL:

http://test.test

Please pass this invitation along to any of your fellow colleagues that use ICTs and may be interested in helping us understand the impact of role stress and locus of control on employee's knowledge sharing behavior.

Should you have any questions you may contact me at sc1674@nova.edu or by phone at 239-293-3458. As an ICT user, your views are particularly important to the understanding of how role stress and locus of control influence knowledge sharing. Thank you in advance for helping with this very important study.

Simon Cleveland
sc1674@nova.edu
Doctoral Candidate
Nova Southeastern University

Appendix G

Survey Reminders

Dear Sir or Madam,

You recently received an invitation to take part in the very important knowledge management research that I, a doctoral candidate, am conducting at Nova Southeastern University. This research will help practitioners and researchers understand the impact of role stress and locus of control on employee's knowledge sharing behavior.

The survey should take no more than 20 minutes to complete. This is your opportunity to get involved with real leading edge research where opinion matters and will be used to influence this and the future studies of others.

This invitation includes a link to the questionnaire. All responses will be kept completely confidential. Completing the short survey indicates your voluntary participation in the study, which should take no more than 20 minutes to complete. You have the right to participate or to withdraw at any time, without penalty. Naturally, I hope that you will answer all questions candidly. There are no costs to you or payments made for participating in this study.

The survey can be accessed at the following web browser URL:

http://test.test

Please pass this invitation along to any of your fellow colleagues that use ICTs (e.g. email, instant messaging, micro/wiki blogging, online forums, or knowledge repositories) and may be interested in helping us understand the impact of role stress and locus of control on employee's knowledge sharing behavior.

Should you have any questions you may contact me at sc1674@nova.edu or by phone at 239-293-3458. As an ICT user, your views are particularly important to the understanding how role stress and locus of control influence knowledge sharing. Thank you in advance for helping with this very important study.

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Appendix H

Prequalification

Do you use any of the following systems at work: Email, Instant Messaging, Micro/wiki blogging, Online forums, or Knowledge repositories?"

☐ NO
☐ YES

Appendix I

Content Analysis Matrix

Code #	Description	Article Section	Researchers	Study Type	Barrier	Category	Concept
1	"One woman described her experience as a new consultant and the **trust** she developed with one of her project managers during an assignment in the financial services industry. To complete this project, she needed to **obtain specific information** that could only be collected through senior senior industry executives. One of the project managers shared several personal contacts, **who were instrumental in getting her tasks accomplished:** He made his connections at different banks available to us, so we got to speak to people we wouldn't get to see otherwise. Often project managers take the opportunity to talk to other influential people to build their own political connections. But he was clearly connecting us underlings to try and help us both in getting information as well as in our careers. He would also send us additional data sources with a log-in and password for all kinds of sources that were helpful to us in getting our work done. In this situation the leader of the project offered his personal network (of individuals and data sources), which was one of the most valuable assets he could have made available. He trusted the new consultant to act appropriately and professionally, despite the potential risks associated with **her lack of experience.** Through demonstrating trust in the knowledge seeker, this knowledge source was, in return, viewed as highly benevolent and so benefited in several ways."	p.72	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Trust, Communication	Job Clarity	Role Ambiguity
2	People o**ccupy roles at work that dictate how they "should" act. These expectations** can create an artificial separation between employees that erodes trust	p.71	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Trust	Job Clarity	Role Ambiguity
3	People willing to **take the time to talk** with a junior employee about the subtleties and nuances of managing a sensitive account, or dealing with a difficult supervisor, are often exposing themselves on a number of levels. Not only were knowledge sources **investing the time** to share their knowledge (taking them away from other potential duties), but they were also revealing knowledge that **left them open to second-guessing about their past decisions. By imparting this tacit knowledge, the knowledge providers are left vulnerable to having their knowledge misappropriated or misunderstood.**	p.72	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Time, Trust, Communication	Job Clarity	Role Ambiguity
4	For example, a manager we interviewed who had significant experience in a government organization was placed in charge of a new department. **He clearly did not have the subject-matter knowledge of the people reporting to him.** Early in his tenure, he made it clear that **he did not have this knowledge and did not expect to contribute to the success of the group in this fashion.** Rather, he spent time with the group talking about his experience across the agency and passed along organizational insights that many found quite useful. As a result of these interactions, people we interviewed quickly came to see the new manager as a trusted and competent source in these areas.	p. 73	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Trust, Communication	Job Clarity	Role Ambiguity
5	What I think is important is that I can count on her to do what she says she will do. It is kind of funny, but a lot of this is about **managing expectations. I used to get irritated in meetings when she indicated things that she would not be able to do. I would feel like she was slowing us down.** But I have circled to a point where I really appreciate knowing what I can rely on her for as she always comes through to the level she said she would	p.68	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Time, Trust, Communication	Job Expectation	Role Ambiguity
6	For example, one manager we interviewed described a scenario in which a new product development team decided **not to spend time ensuring that team members shared terminology and expectations.** Interestingly, this organization as a whole usually employed a step-by-step methodology for setting up and investing in teams early in their lifecycle and even provided a set of tools and exercises to guide new teams through this process. However, f**or the sake of "efficiency," this team decided to "get right to work."**	P. 69-p.70	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Time, Communication	Job Expectation	Role Ambiguity
7	Besides the frequency and richness of medium of communication, another feature of "quality" interactions is an **inquiring style of communication, where both sides feel free to share** and really listen to each other's thoughts and ideas. For example, welcoming exploration and potentially ill-formed thoughts and solutions at appropriate junctures can be critical to the development of trust in a relationship. Many **important situations in organizations are inherently ambiguous, where resolving the problem requires first framing it to make sure that the right problem is being solved**	p. 68	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Communication	Job Clarity	Role Ambiguity
8	However, the spoken or unspoken norm of many leaders in Corporate America is: "Come to me with solutions, not problems." Unfortunately **people seem to be cognitively hard-wired to dislike uncertainty and have a need to view the world as predictable and controllable**. Our interviews frequently revealed that people are more likely to seek out and **trust** others who allow exploration and brainstorming at appropriate points in a project. In many situations, **people seeking information or advice** are not completely sure of the question they are asking, much less have answers to their questions.	p. 68	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Communication	Self-control	Locus of control
9	**Ensure that decisions are fair and transparent.** People take their cues from the larger environment. As a result, there is a "trickle down" effect for trust, where the way management treats people leads to a situation where employees treat one another similarly. Thus, fair and transparent decisions on personnel matters translate into a more trusting environment among everyone. **Make promotion and rewards** criteria clear-cut, so people **don't waste time** developing a hidden agenda (or trying to decode everyone else's).	p. 67	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Time, Trust, Communication	Job awards	Locus of control
10	In one organization, a respondent critiqued his organization's promotion system: **There is a tendency to promote who you know rather than bringing in new talent.** The result is nepotism. There is so much mistrust in our promotion system now that [the organization is] bringing in independent evaluators. People are still suspicious of the outsiders, though, since they were brought in by somebody. It just seems safer to play your cards close to your chest, not to talk or stick your neck out. You don't get anything but grief if you do. This interviewee went on to indicate that mistrust in the promotion system had led to "an inbred organization" and cast suspicion on all of the reward systems, not just promotions. **Moreover, he had to spend a lot of time in this environment "decoding" what he heard to find out the truth**. Throughout the interviews, promotions and promotion standards were one of the hot buttons for respondents, along with career path, salary and evaluations. **When these were viewed as unfair, employees began to view even inconsequential comments with suspicion, a finding consistent with the literature on procedural justice. So rather than trusting someone's word, people felt that they had to check and double check what was said.** Furthermore, in	P. 69	Abrams, Cross, Lesser, and Levin (2003)	Qualitative/N=40	Trust, Communication	Job awards	Locus of control
11	The relationship that proved to exist between knowledge sharing and **trust, communication**, information systems, reward system and organization structure indicates the importance of such factors as prerequisites for the success of knowledge sharing. Such factors must be strongly emphasized in organizational cultures. The survey respondents suggested several ways to achieve this: ...**Practicing job rotation to facilitate knowledge transfer** and movement throughout the organization and increase motivation.	p. 37	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Trust, Communication	Job Duties	Role Ambiguity
12	Traditional organization structures are usually characterized by complicated layers and **lines of responsibility with certain details of information reporting procedure**s. Nowadays, most managers realize the disadvantages of bureaucratic structures in **slowing the processes and raising constraints on information flow.** In addition, such procedures often consume **great amount of time in order for knowledge to filter through every level.**	p. 25	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Time	Job Duties	Role Ambiguity
13	This implies that respondents' **knowledge sharing increases with the existence of reward systems** aligned with knowledge sharing. Therefore, the fourth hypothesis is confirmed: H4. There is a positive relationship between the **existence of a reward system** aligned with **sharing and knowledge sharing in organizations.**	P. 32	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Communication	Job awards	Locus of control
14	Although organizational culture is very important to encourage smooth **knowledge transfer**, it [knowledge sharing] ultimately depends on **employees' personalities** and their ethics. That is, if someone is objective and acknowledges that knowledge sharing is fundamental to the success of the business, this person will c**ontinue to share his/her knowledge** even with the **absence of proper rewards**, technology or the other factors and vice versa.	p. 34	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Communication	Personality, Job awards	Locus of control
15	Generally, employees in any organization tend to perceive rewards as measures for behaviors preferred and appreciated by top management. As expounded earlier, **knowledge sharing can be an internal characteristic related to one's personality.** However, it is not sufficient to rely on the good intentions of staff to spread their knowledge without reinforcing such behaviors because unrewarded behaviors usually end up fading away due to lack of praise and appreciation. The following statement by a participant further demonstrates the importance of rewards: . . . **if that [knowledge sharing] was connected to any sort of reward, I will make sure I do it [knowledge sharing] with the highest level of professionalism** and I will insure that this **communication concludes successfu**lly. Furthermore, in order for rewards to be successful in motivating staff to share their knowledge, these rewards must be properly designed to fit employees' needs and perceptions. This is because, as **highlighted earlier, ineffective or insufficient rewards can fail to reinforce knowledge sharing behavior**s. When asked whether financial or non-financial rewards are likely to	p. 34	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Communication	Personality, Job awards	Locus of control

Code #	Description	Article Section	Researchers	Study Type	Barrier	Category	Concept
16	As highlighted in the findings section, the mean scores for **trust, communication,** information systems, **rewards** and organization structure exhibited an increase as respondents' assessment for knowledge sharing improved. Therefore, one can imply that all of these factors are directly proportional to knowledge sharing in the sense that when each increases, knowledge sharing also increases.	p. 34	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Trust, Communication	Job awards	Locus of control
17	Providing effective **rewards** to reinforce **knowledge sharing behaviors** bearing in mind the variations in **employees' needs and objectives.**	p. 37	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Communication	Job awards	Locus of control
18	Also, despite the important role of **communication between colleagues**, excessive interaction may cause some staff to **waist time socializing** with others instead of **completing their tasks**, which can sometimes harm professionalism and ethics. The following response further emphasizes this point: Forming strong bonds with your colleagues at work complicates situations sometimes and makes it difficult to act professionally. For instance, one **gets confused when he/she must make an important decision that is likely to harm his/her colleague.**	p. 35	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Time, Communication	Job Clarity	Role Ambiguity
19	According to an interviewee: "**Hierarchal structures** hinder **timely communication and decelerate knowledge sharing.** **Flat structure** is the best facility for knowledge sharing	P. 38	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Time, Communication	Job Responsibility, Job Decision-making	Role Conflict, Role Ambiguity
20	The majority of the respondents seemed to agree that in their respective organizations, **certain tasks are accomplished through teamwork** (88 percent) and that c**oworkers exchange knowledge commonly while working** (81 percent).	p. 32	Al-Alawi, Al-Marzooqi, and Mohammed (2007)	Survey/N=231	Communication	Job Responsibility	Role Ambiguity
21	Other participants reported that **knowledge was needed to fill in the gaps in their expertise** and the knowledge they need to carry out their roles for given tasks. In one instance, one participant (a specialist who consults on many teams) explained his need for knowledge from the product expert as follows: "So that requires this [product expert] to come out and be able to say, 'This is what I need. These are the things that are important.' And **once I know what's important, then I can [carry out my role].**" Here we find that the participant **has a clear need for knowledge** about certain system components, **without which he would not be able to carry out his role.**	p. 30	Al-Ani, Wilensky, Redmiles and Simmons (2011)	Empirical field study/N=43	Communication	Job Duties	Role Ambiguity
22	AVTO provides its employees with the infrastructure that supports Web 2.0 for **knowledge sharing** across sites and working units; however, few of these tools are tailored to the employees' personal knowledge needs. Furthermore, when we asked some participants about the usefulness of these tools, they typically responded that the knowledge shared through blogs and wikis is interesting, to some degree, but not necessarily **useful to their roles within the organization**. One participant stated that "people dabble in [blogging]", for example. Others reported using wikis and blogs to share knowledge with both remote and collocated team members with varying degrees of success.	p. 31	Al-Ani, Wilensky, Redmiles and Simmons (2011)	Empirical field study/N=43	Communication	Job Duties	Role Ambiguity
23	A second consideration involves organizational members, who **act in the role of technological gatekeepers**—those who perform the important and crucial function of providing the connection between the organization and the external world of scientific and technological knowledge. As such, gatekeepers should **keep themselves informed** of related developments outside the organization via journals, professional conferences, and seeking out and fostering personal contacts. Much controversy exists about the extent to which gatekeepers should be **identified and rewarded** (Jain and Triandis, 1997, p. 27). Some hold that formalizing the role will undermine it.	p. 151	Anderson, Glassman, McAfee, and Pinelli (2001)	Survey/N=872	Communication	Job Duties, Job awards	Role Ambiguity, Locus of control
24	An investigation of factors affecting how engineers and scientists **seek information**...When considering oral and written information carriers, the principle of least effort was supported with a **strong preference for oral communication** over written communication. In examining how the respondents select written carriers, the decision to use or not to use a written carrier was found to be primarily a function of the perceived importance of the carrier's information to a person's work. **Task uncertainty and task complexity** were found to be significant	p. 131	Anderson, Glassman, McAfee, and Pinelli (2001)	Survey/N=872	Communication	Job Complexity, Job Clarity	Role Conflict, Role Ambiguity
25	Rogers (1983b) viewed uncertainty as the degree to which several alternatives are perceived with respect to the occurrence of an event and the relative probability of these alternatives. Thus, **uncertainty implies a lack of predictability,** of structure, and of information...Rogers (1983a) held that i**ndividuals faced with uncertainty typically seek information**...Blandin and Brown (1977) found significant positive correlations between perceived uncertainty by managers and their **reliance on external sources of information and their use of informal sources of information.**. **Complexity** has been defined as the extent to which a unit **must coordinate and joint problem solve with others** (Tushman, 1978)...Bystrom and Jarvelin (1995), in a study of civil serviceworkers in Finland, developed a qualitative model that posited that as **task complexity increases, the complexity of the information needed increases**...Hypothesis 2. **The greater the (a) task complexity and (b) task uncertainty increase, the greater the use of multiple carriers** among US aerospace scientists and engineers.	p. 134-135	Anderson, Glassman, McAfee, and Pinelli (2001)	Survey/N=872	Communication	Job Clarity, Job Complexity	Role Conflict, Role Ambiguity
26	Hypothesis 3c. The higher one's perceived level of the **task attribute of complexity**, the more likely the person will be to **use a written carrier**. Hypothesis 3d. The higher one's **perceived level of task uncertainty**, the more likely the person will be to **use a written carrier**. Hypothesis 3e. The higher one's perceived level of the **task** attribute of **complexity**, the more likely the person will be to **use a written carrier**. Hypothesis 3f. The higher one's perceived level of the **task attribute of complexity**, the more likely the person will be to **use a written carrier.**	p. 136	Anderson, Glassman, McAfee, and Pinelli (2001)	Survey/N=872	Communication	Job Clarity, Job Complexity	Role Conflict, Role Ambiguity
27	Hypothesis 2 held that **the greater the (a) task complexity and (b) task uncertainty increase, the greater the use of multiple carriers among US aerospace scientists and engineers.** To test these hypotheses, respondents were classified as users or non-users of each carrier. Table 7 contains the results of the analysis of the impact of complexity and uncertainty separately. The findings indicated that task complexity had no effect on use except in the case of the use of literature (LIT). However, increasing task uncertainty was associated with increasingly more contact with organizational colleagues (COI) and colleagues outside the organization (COO). At the two highest levels of reported uncertainty, literature found in the organization's library (LIT) was used and at the second highest level uncertainty. And, at the highest level of uncertainty, library resources such as librarians or technical information specialists (LIB) were employed. This suggests that **as uncertainty increases, respondents increase their use of less accessible carriers.** The results only marginally supported Hypothesis 2a, but strongly supported Hypothesis 2b.	p. 144	Anderson, Glassman, McAfee, and Pinelli (2001)	Survey/N=872	Communication	Job Clarity, Job Complexity	Role Conflict, Role Ambiguity
28	As **task uncertainty** increased, the **search widened from oral contacts to literature searches and, then, to consulting with library personnel.**	p. 148	Anderson, Glassman, McAfee, and Pinelli (2001)	Survey/N=872	Communication	Job Clarity	Role Ambiguity
29	Boisot (1995) drew the link between **trust** and **environmental ambiguity and uncertainty**, suggesting that **where ambiguity and uncertainty existed**, trust resided in the quality of the relationship rather than the plausibility of the message. In a similar vein, Daft and Weick (1984, p. 290) argued that **the less analysable the perceived external environment, the greater the tendency for managers to use external information** gained from personal contact with other managers. Drawing these threads together with the present findings emphasizes the role of trust in complex organizational environments, and specifically, its criticality in **knowledge-sharing** processes.	p. 806	Andrews and Delahaye (2000)	Qualitative/N=15	Trust, Communication	Job Clarity	Role Ambiguity
30	H4 The **greater the role ambiguity,** the **greater the active F SB [feedback seeking behavior].**	p. 387	Ashford (1983)	Exploratory		Job Clarity	Role Ambiguity

Code #	Description	Article Section	Researchers	Study Type	Barrier	Category	Concept
31	A second principle determinant of proactive search is the **amount of feedback information the individual receives from the task, self, and others**. If the individual receives enough information from these sources to fulfill the useful functions of feedback, then the individual will not be motivated to devote extra effort attending to feedback cues and **seeking feedback within that environment**. The **feedback that the individual receives from the task and others is sufficient and reduces the motivating appeal of having more of that same type of information available in the environment**. This observation implies that individuals will be more proactive in the feedback process when the feedback they receive is inadequate.	p. 386	Ashford (1983)	Exploratory	Communication	Job Clarity	Role Ambiguity
32	**Feedback may be of little value in situations which are rapidly changing** or in situations in which there is little consensus about appropriate behaviors and/or evaluative criteria among the various environmental actors. Even if given a lot of feedback in such situations, individuals may also actively monitor and seek additional or confirmatory feedback. Individuals in such situations may feel the feedback they receive from others is of questionable utility and generalizability and therefore they **engage in active search for additional information**. Individuals should remain relatively inactive when the behaviors **required to achieve the goal** of interest are relatively straightforward. In jobs with **routine technologies and clearly defined roles**, individuals will remain reactive with respect to the feedback information in their environment. The payoff of obtaining lots of data about how well they are achieving performance goals, for example, by devoting energy to monitoring the situation and asking others for feedback is minimal. The feedback information does not add much to what is already known and the job is so structured that it cannot be put to valuable use.	p. 386	Ashford (1983)	Exploratory	Communication	Job Clarity	Role Ambiguity
33	The current literature focuses almost exclusively on the role of feedback in improving subsequent motivation and **job performance of employees**. It is likely, however, that i**ndividuals have a wide variety of goals which they hope to achieve in a given organization. Goals such as career advancement**, making friends, and being liked may be just as important to an individual as correcting errors in **job performance**. For any of the set of goals individuals hold, they will **look to the information environment for cues and information that allow an assessment of how well they are achieving that goal.**	p. 377-378	Ashford (1983)	Exploratory	Communication	Job Clarity	Role Ambiguity
34	A second set of definitions is embedded in the view of work as taking place in an "information environment" (Hanser & Muchinsky, 1978) which the **individual monitors for personally relevant information**. Within this information environment, two types of information comprise feedback: **referent information, that which tells the worker what is required of him or her to function successfully on the job**, and appraisal information, that which tells the worker if he or she is f**unctioning successfully** (Greller & Herold, 1975).	p. 378	Ashford (1983)	Exploratory	Communication	Job Clarity	Role Ambiguity
35	**Inquiry is the second form of feedback seeking behavior. It is the individual's attempt to actually increase the amount of personally relevant data in his or her information environment by directly asking actors** in that environment for their perception and/or evaluation of the behavior in question. Inquiry can be clearly differentiated from monitoring. FSB using an inquiry strategy involves the direct asking of a given source, "How was 'X' behavior perceived, interpreted, and/or evaluated?" (e.g., "**Did I do a good job**?" "How was my speech?").	p. 385	Ashford (1983)	Exploratory	Communication	Job Clarity	Role Ambiguity
36	**Goals such as career advancemen**t, making friends, and being liked may be just as important to an individual as correcting errors in job performance. For any of the set of goals **individuals hold, they will look to the information environment for cues and information that allow an assessment of how well they are achieving that goal.**	p. 378	Ashford (1983)	Exploratory	Communication	Job Advancement	Locus of control
37	After **obtaining feedback**, an i**ndividual may decide to devote more effort toward those goals** that have the greatest probable payoff or toward that goal that seems obtainable only with extra effort. For example, feedback cues may indicate to an individual his or her potential for advancement within a firm. Such feedback can be used to assess the expected payoff of **devoting greater attention and effort to career success** within that company as compared to the payoff of devoting more time to leisure or to job search.	p. 375	Ashford (1983)	Exploratory	Communication	Job Advancement	Locus of control
38	In an ongoing interaction setting such as **knowledge sharing in an organization**, appropriate feedback is very critical. When others respond in the way that we have anticipated, we conclude that our line of thinking and behavior are correct; at the same time, r**ole taking improves as the exchange continues** (Kinch 1973, pp. 55, 77) according to role theory, which is the cornerstone of the symbolic interactionist perspective on self-concept fomiation (Gecas 1982; Kinch 1963).	p. 92	Bock, Zmud, Kim and Lee (2005)	Survey/N=154	Communication	Job Clarity, Job Duties	Role Conflict, Role Ambiguity
39	Therefore, **employees who are able to get feedback on past instances of knowledge sharing** are more likely to understand how such actions have **contributed to the work of others** and/or to improvements in organizational performance.	p. 93	Bock, Zmud, Kim and Lee (2005)	Survey/N=154	Communication	Job Clarity, Job Duties	Role Conflict, Role Ambiguity
40	They found that **job characteristics** (intellectual demands of the job) and individual characteristics (learning orientation) **determine knowledge sourcing behavior**, which in turn influences learning outcomes.	p. 358	Bock, Kankanhali and Sharma (2006)	Survey/N=134		Job Clarity, Job Duties	Role Conflict, Role Ambiguity
41	If knowledge workers perceive that the **results they obtain from a knowledge management system are useful for their work (i.e., the system can improve their job performance**), they are likely to be motivated to use the system.	p. 360	Bock, Kankanhali and Sharma (2006)	Survey/N=134		Job Clarity, Job Duties	Role Conflict, Role Ambiguity
42	The interpretation of **information needs is affected by situational (e.g. available time) and organizational factors.** The choice of action depends on the needs, the perceived accessibility (whether cognitive, economic or physical) of information channels and sources and the personal information seeking style which evolves on the basis of successfulness of attempted actions.	p. 8	Byström and Järvelin (1995)	Qualitative/N=17	Time	Job Clarity	Role Ambiguity
43	In the context of **information seeking** we are interested in information-related tasks. These can be seen as perceived (or subjective) tasks or objective tasks. The relationships of objective and perceived tasks have been considered in organizational psychology (Campbell, 1988 ; Hackman, 1969 ; Wood, 1986) where task descriptions based on perceived tasks are generally held invalid for many purposes (e.g. Roberts & Glick, 1981). However, in this study **perceived tasks** must be considered because each worker may interpret the same objective task differently (e.g. as regards its complexity) and the perceived task always forms the basis for **interpreting information needs** and the choice of promising actions for satisfying them. The literature suggests many task characteristics related to complexity : repetitivity, analyzability, apriori determinability, the number of alternative paths of task performance, outcome novelty, number of goals and **conflicting dependencies** among them, **uncertainties between performance and goal**s, number of inputs, cognitive and skill requirements, as well as the **time-varying conditions** of task performance	p. 4-5	Byström and Järvelin (1995)	Qualitative/N=17	Time	Job Clarity, Job Conflict	Role Conflict, Role Ambiguity
44	consultants are motivated to **communicate their knowledge base** as widely as possible in order to build up their reputation to i**ncrease their chances of being chosen for future projects.**	p. 730	Cabrera and Cabrera (2005)	Exploratory	Communication	Job Advancement	Locus of control
45	One of the reasons often cited for not **contributing to knowledge repositorie**s is a **reluctance to spend time on knowledge sharing.** Employees believe that they should spend their limited time on what they perceive to be more productive activities (Husted and Michailova, 2002). When these behaviours are directly evaluated and **rewarded,** employees are more likely to see them as an integral part of their **job responsibilities.**	p. 730	Cabrera and Cabrera (2005)	Exploratory	Time	Job Advancement	Locus of control
46	Empirical support for the value of interdependency for knowledge exchange comes from a study of **teams of knowledge workers** that found a positive relationship between **task interdependence** and **knowledge sharing** (Janz et al., 1997).	p. 728	Cabrera and Cabrera (2005)	Exploratory		Job Interdependence	Role Conflict
47	A good way of i**nducing knowledge sharing** is to make this type of behaviour **critical for career success**.	p. 730	Cabrera and Cabrera (2005)	Exploratory		Job Advancement	Locus of control
48	it is hypothesized that when individuals perceive a link between **knowledge sharing behaviours** (both seeking and providing) and **organizational rewards** (e.g. **career advancement**, international visibility and interesting projects or activity assignments), thy will be more inclined to participate in knowledge sharing activities. In addition, it is hypothesized that when individuals believe that there is a link between knowledge sharing behaviours and **intrinsic rewards (**e.g. reaching one's full personal and p**rofessional potential, f**eelings of pride when others use one's ideas, and feelings of accomplishment when learning from others), they will also be more inclined to participate in knowledge sharing activities.	p. 252	Cabrera, Collins and Salgado (2006)	Survey/N=372		Job awards	Locus of control
49	Recent research has demonstrated that **organizational conflict,** as an important organizational factor, has an effect on **employees' knowledge sharing** (Panteli & Sockalingam, 2005). Conflict is broadly classified into **task conflict** and relationship conflict (Jehn, 1995). **Task conflict is task-oriented and refers to differences in task-related viewpoints, such as different opinions about work procedures, task responsibility, and resource delegation** (Jehn, 1995). Task conflict is concerned with how best to achieve task goals (Amason, 1996)...Prior research has suggested that in **task conflict**, employees confronting different viewpoints tend to resolve the disagreement by scrutinizing task issues and reappraising diverse, task-related perspectives (Deutsch, Coleman, & Marcus, 2006; Olson, Parayitam, & Bao, 2007). These taskrelated involvement behaviors should **elicit debate, exchange of ideas, and sharing of task-related knowledge** (Panteli & Sockalingam, 2005).	p. 1006	Chen, Zhang and Vogel (2011)	Survey/N=139	Communication	Job Conflict, Resource Conflict	Role Conflict
50	**nonroutine tasks are complex tasks** without standard solutions and r**equire diverse information** for developing good task solutions...We focused on employees with nonroutine tasks, as their tasks **require them to share knowledge with each other to develop ideal task solutions**. By contrast, we excluded employees with routine tasks, as they follow set work procedures to perform tasks independently and are less motivated to share task-related knowledge (Lee & Leifer, 1992).	p. 1008	Chen, Zhang and Vogel (2011)	Survey/N=139		Job Complexity	Role Conflict
51	We propose that **work engagement** will be positively **related to knowledge-sharing behavior** for several reasons. First, only when they are **dedicated to their work** will employees accumulate enough professional knowledge to share with their colleagues. Second, for employees to share their task-related knowledge, it is necessary for them to **care about their task and to regard investing the extra effort as being worthwhile.** Third, when they are **engaged in their work and enthusiastic about it**, individuals will be more likely to share task-relevant knowledge to improve their work further.	p. 1015	Chen, Zhang and Vogel (2011)	Survey/N=139		Job Advancement	Locus of control
52	The results demonstrate that **task conflict** tolerates divergence of opinions and **provides diverse information required by nonroutine tasks** (e.g., Amason, 1996; Jehn, 1995), which makes employees feel safe to express themselves and to believe that they have enough informational resources to engage in their work. Work engagement then stimulates employees to share work-related knowledge.	p. 1024	Chen, Zhang and Vogel (2011)	Survey/N=139		Job Conflict	Role Conflict
53	**Cross functional interactions and professional collaboratio**n improves **complex knowledge sharing.**	p. 315	Chowdhury (2005)	Survey/N=164	Communication	Job Interdependence	Role Conflict

Code #	Description	Article Section	Researchers	Study Type	Barrier	Category	Concept
54	Scholars have proposed that a team setting improves knowledge sharing through extensive interactions and flexibility of collaborative work	p. 315	Chowdhury (2005)	Survey/N=164	Communication	Job Interdependence	Role Conflict
55	Also, a loose organization structure assists knowledge sharing as it allows communication fluidity, cross functional interactions and social networking.	p. 322-323	Chowdhury (2005)	Survey/N=164	Communication	Job Interdependence	Role Conflict
56	There is also a tendency for organizations to expect employees to engage in knowledge sharing, whereby one employee provides knowledge or expertiese to someone in order to solve a problem.	p. 1	Connelly, Ford, Turel, Gallupe, and Zweig (2013)	Experiment/N=403		Job Clarity	Role Ambiguity
57	Proactive sharing of information or opportunities was an important maintenance behavior that, to some degree, hinged on a norm of reciprocity..."To be honest, I'm questioning how much I want to put into Seth going forward. He was great on that project, but recently [he] has chewed up a lot of my time on several smaller things that did not come through. I guess I will probably try and stay in touch, but as I think about it, I am definitely becoming less responsive and I guess this in and of itself will likely diminish the odds of us doing something together again (R39)."	p. 449	Cross and Sproull (2004)	Qualitative/N=40	Time, Communication	Job Expectation, Job Clarity	Role Ambiguity
58	The people issuing the RFP [request for proposal] were ex-consultants themselves and knew the games that we play in making ourselves appear as experts. They gave us an incredibly precise listing of questions that required us to really show whether we knew our stuff. In a sense, this was a blessing because half the time you are shooting in the dark because the client does not know what they really need. But it was also a curse in that it required me to answer the damn things correctly and quickly. So [information source] really came through with the details and specific technical dimensions they were questioning us on. If we had not been incredibly precise in the RFP, we wouldn't have made it (R19).	p. 450	Cross and Sproull (2004)	Qualitative/N=40	Time, Communication	Job Expectation, Job Clarity	Role Ambiguity
59	At [Client X] we had access to background information and, you know, lots of case studies and approaches that were really well written up. We had no experience in the practice though of actually applying it on an engagement. So what was specifically useful to me was to talk with Terry who knew what we were trying to achieve at [Client X] to help me work some of this accessible content into a workable approach. What I needed to know was: How might we apply this, given that we have not done it before? That was my key question. Rather than what do I need to know about this subject matter (R28).	p. 450	Cross and Sproull (2004)	Qualitative/N=40	Communication	Job Clarity	Role Ambiguity
60	It was critical that Laura was also able to bring to bear some work she had done in other projects. You know, she was able to say we could tap into this person who did something just like this over here or I can steal the code he wrote for this client and use it here. She had a lot of ideas of how to pull in her existing network [of information relationships] to much more quickly get our stuff up and running (R34).	p. 450	Cross and Sproull (2004)	Qualitative/N=40	Time, Communication	Job Clarity	Role Ambiguity
61	She can dig into a complex mess of issues and pull out relevant problems. To me I really respect that. We often just try to throw a methodology at client situations and are often only half-heartedly successful and this often reinforces our own ignorance as we do not ever learn the importance of attacking the right organizational issue rather than all of them in whatever methodology we are using. She is not like that at all (R21).	p. 450	Cross and Sproull (2004)	Qualitative/N=40	Communication	Job Clarity	Role Ambiguity
62	Sources were also valued for pointing out consequences of planned actions and for their ability to anticipate issues and concerns likely to appear in the future. In describing how one source suggested that potentially inflammatory findings be presented, an informant summarized:" I often miss the dynamics in a situation that will affect people. I don't know why, but it has bitten me before and so is something I am increasingly cognizant of [that's why] I continue to go back to her for advice (R2).	p. 450	Cross and Sproull (2004)	Qualitative/N=40	Communication	Job Clarity	Role Ambiguity
63	As a result, she relied heavily on one person to validate her plans and ideas prior to proposing them to a particularly difficult client. "the other times I tended to turn to him for help was when I had a problem that I had a solution for and I just wanted him to validate it. You just want someone important to say yeah, you are thinking along the right lines (R17)	p. 451	Cross and Sproull (2004)	Qualitative/N=40	Communication	Job Clarity	Role Ambiguity
64	When asked to describe sources of information important to the successful completion of their project, 85% of the managers immediately and spontaneously named one or more specific people. We had thought managers might frequently report relying upon computerized "knowledge repositories," which the firm was heavily promoting at that time. Because they almost never mentioned these or other impersonal sources, the remainder of this paper focuses only on people as information sources. As one manager said, "I mean the whole game is just being the person that can get the client what they need with [the Firm's] resources behind you. This almost always seems to mean knowing who knows what and figuring out a way to bring them to your client's issue" (R6).	p. 448	Cross and Sproull (2004)	Qualitative/N=40	Communication	Job Clarity	Role Ambiguity
65	We collected relevant organizational (function, hierarchical level, task interdependency, location), and social (influence, trust, friendship, gender) structural data from a group of 34 information scientists within a global pharmaceutical organization. These people supported the research and development function within the organization and so often dealt with complex requests for information that required them to rely on each other's expertise in various domains. Members of this department were highly trained (over 75% held doctorates) and were expected to conduct extensive reviews of ambiguous topics with little or no guidance from the research scientists. Typically, they were also expected to consolidate and package the results of their searches into oral presentations and written documentation for the scientists.	p. 441	Cross, Rice and Parker (2001)	Survey/N=34	Communication	Job Expectation, Job Clarity	Role Ambiguity
66	Task interdependence is the strongest and most consistent predictor of information seeking.	p. 438	Cross, Rice and Parker (2001)	Survey/N=34		Job Interdependence	Role Conflict
67	Related to unit proximity is task interdependency which is especially relevant to the present study for two reasons. First, task interdependence should facilitate knowledge of, and access to, those who might have useful information. Second, interdependent jobs necessarily involve some similar task information, technical processes, and both covert and overt knowledge. For example, Eveland et al. [38] found that IT helper/helpee dyads shared at least five similar information work tasks, and Rice et al. [81] reported a significant effect of task interdependency on an employee's being sought as an information provider.	p. 440	Cross, Rice and Parker (2001)	Survey/N=34	Communication	Job Interdependence	Role Conflict
68	As indicated by the beta coefficients, the structural influence of task interdependence is a consistent and strong predictor of receipt of all five information benefits	p. 444	Cross, Rice and Parker (2001)	Survey/N=34		Job Interdependence	Role Conflict
69	However, often tasks of importance in organizations are not characterized by exploitation so much as by exploration, whose essence "is experimentation with new alternatives" (March [63, p. 85]). Meaning in such equivocal endeavors is likely heavily reliant on expressive social interaction. Thus in exploratory settings characterized by ambiguity or equivocality (as opposed to settings ripe for exploiting available knowledge) we might see a greater weighting on the importance of relationships for the provision of problem reformulation, validation and legitimation.	p. 446	Cross, Rice and Parker (2001)	Survey/N=34	Communication	Job Interdependence	Role Conflict
70	For example, a respondent said, ''if I am looking specifically at a [the company] project, then I will stick with the [company] net. If I am looking for something that is . . . coming from the outside world, I will generally ignore the [company] net and go directly to the outside world. . . .'' That statement was determined to be sufficient indication that the ability to meet the project needs was a reason for choosing a particular information source .	p. 573	Fidel and Green (2004)	Qualitative/N=32	Communication	Job Expectation	Role Ambiguity
71	They conducted two case studies and showed that the nature of information an engineer needed determined whether a human or documentary source was sought. For example, documents were used when an engineer needed information about materials to be used in manufacturing, but human sources were the best sources—and possibly the only ones—when an engineer wanted to understand the priorities of a design project	p. 574	Fidel and Green (2004)	Qualitative/N=32	Communication	Job Expectation	Role Ambiguity
72	When employees perceive that sharing creative ideas is an in-role behavior, they are likely to make contributions to an EKSDB. Here, if management makes it clear to employees that making contributions is a part of their job requirements, then employees are likely to feel obligated to engage in the behavior since they will ultimately be rewarded with higher performance evaluation scores	p. 3	Flowers, Xia, Burnett, and Shapiro (2010)	Survey/N=173	Communication	Job awards	Locus of control
73	Job security is defined as employees' perceptions about whether they have the power to affect things that they believe are important such as: (1) threats to opportunities for promotion or freedom to schedule work or (2) the occurrence of events that will negatively affect their current job (e.g., being fired, downsizing, company relocation, etc.)...Wiig, de Hoog, and ven der Spek [46] found that employees are not willing to share knowledge if they perceive that it is a threat to their job security. Similarly, Currie and Kerrin [8, .1035] stated that "large-scale cuts in the number of middle managers across the parent company gave rise to feelings of job insecurity and exacerbated any reluctance to share knowledge."	p. 3	Flowers, Xia, Burnett, and Shapiro (2010)	Survey/N=173		Job Control	Locus of control
74	Currie and Kerrin [8, p. 1035] quoted a national accounting manager in their study who stated: "The experience I have built up over the years is knowledge the organization needs. They have to keep me if they want to benefit from my years of experience. They can't replace me with a young kid and I'm certainly not going to help them do so by giving away to a young kid what I have learned through my years of experience."	p. 4	Flowers, Xia, Burnett, and Shapiro (2010)	Survey/N=173		Job Control	Locus of control
75	Hypothesis 4a predicted that the relationship between affective commitment and creative contributions to an EKSDB is moderated by levels of job security...when job security was low there was a significant effect from affective commitment to creative contributions to an EKSDB	p. 9	Flowers, Xia, Burnett, and Shapiro (2010)	Survey/N=173		Job Control	Locus of control
76	Hypothesis 4b predicted that the relationship between employees' perception that creative contributions are an in-role behavior and employees' creative contributions to an EKSDB is moderated by employees' perceive levels of job security...when job security was high there was a significant effect from perceived in-role performance behaviors to creative contributions to an EKSDB (β = .31, p< .05). When job security was low there was a more significant effect (β = .35, p< .001).	p. 10	Flowers, Xia, Burnett, and Shapiro (2010)	Survey/N=173		Job Control	Locus of control
77	Our results also suggest that job security is a critical factor that moderates the relationships between both extrinsic (in-role performance) and intrinsic (affective commitment) motivators and knowledge sharing. As such, managers need to make sure that employees are aware their jobs are not at risk for elimination in order to create an environment that is conducive to increasing employee knowledge sharing.	p.10-11	Fugate, Thomas, and Golicic (2012)	Experiment/N=126		Job Control	Locus of control
78	Higher levels of complexity, interdependence, and nonroutineness will each increase the cognitive load associated with a job, and thus increase its perceived intellectual demands	p. 824	Gray and Meister (2004)	Survey/N=313		Job Interdependence, Job Complexity, Job Clarity	Role Conflict, Role Ambiguity
79	Intellectually demanding jobs consume a greater proportion of individuals' cognitive capacity, which restricts their ability to cope with job demands (Sweller 1988); this, in turn, produces strain (Spector and Jex 1998). Knowledge sourcing could free up cognitive resources; importing the required cognitive structures from other employees generally requires less cognitive effort than developing those structures through direct interaction with the environment. Because individuals facing intellectually demanding work experience greater strain, they are more likely to free up cognitive resources by outsourcing a portion of their cognitive load in this way.	p. 824	Gray and Meister (2004)	Survey/N=313	Communication	Job Complexity	Role Conflict
80	Thus, individuals in demanding jobs who free up cognitive resources through knowledge sourcing are likely to obtain additional learning benefits	p. 825	Gray and Meister (2004)	Survey/N=313		Job Complexity	Role Conflict

Code #	Description	Article Section	Researchers	Study Type	Barrier	Category	Concept
81	Therefore, individuals in jobs that were more intellectually demanding reported a stronger association between knowledge sourcing and learning outcomes than did those whose jobs were less intellectually demanding	p. 829	Gray and Meister (2004)	Survey/N=313		Job Complexity	Role Conflict
82	For example, annual performance reviews that highlight evaluations of the extent to which employees reuse others' knowledge (e.g., Hansen et al. 1999) may produce heightened levels of knowledge sourcing even amongst those who are unlikely to benefit.	p. 832	Gray and Meister (2004)	Survey/N=313	Communication	Job awards	Locus of control
83	Individuals may not source knowledge in response to every demanding problem or task they face, but over time individuals who perceive their work to be more demanding will engage in more knowledge sourcing.	p. 824	Gray and Meister (2004)	Survey/N=313		Job Complexity	Role Conflict
84	job's intellectual demands, defined as the normal cognitive load perceived by individuals in performing their work. Consistent with Knowles' (1980) ideas, highly demanding work produces a greater need for knowledge and triggers learning behaviors. Although many aspects of work may make it intellectually demanding, we selected three generic work characteristics that provide maximal generalizability. First, the extent to which work features many courses of action leading to multiple, possibly conflicting, outcomes determines how complex (Campbell 1988) it is. Second, the amount of required interaction with coworkers establishes how interdependent (Campion et al. 1993) the work is. Finally, the degree to which an individual's work is free from stable, repetitive processes determines the degree to which it is nonroutine (Lawrence and Lorsch 1967). Higher levels of complexity, interdependence, and nonroutineness will each increase the cognitive load associated with a job, and thus increase its perceived intellectual demands.	p. 824	Gray and Meister (2004)	Survey/N=313	Communication	Job Complexity, Job Interdependence, Job Clarity	Role Conflict, Role Ambiguity
85	The intellectual demands construct was strongly influenced by both interdependence and nonroutineness items.	p. 829	Gray and Meister (2004)	Survey/N=313		Job Interdependence, Job Clarity	Role Conflict, Role Ambiguity
86	different kinds of employees, such as stock traders or insurance adjusters, whose work is much less interdependent may have their intellectual demands more strongly predicted by complexity or nonroutineness.	p. 829	Gray and Meister (2004)	Survey/N=313		Job Interdependence, Job Clarity	Role Conflict, Role Ambiguity
87	Recent research into knowledge sourcing [47] has been conducted in the context of ad hoc. voluntary knowledge sourcing; that is, subjects sometimes sourced knowledge to help them deal with tasks, problems, or issues, but this was a small part of their daily activities	p. 167	Gray and Durcikova 2005	Survey/N=110		Job Clarity, Job Complexity	Role Conflict, Role Ambiguity
88	most technical support analysts, who must engage in high levels of deliberate biowledge sourcing to perform their jobs well. Analysts face a constant barrage of questions, many of which will require them to source knowledge from colleagues, documents, or knowledge repositories	p. 167	Gray and Durcikova 2005	Survey/N=110		Job Expectation	Role Ambiguity
89	analysts are generally expected to source knowledge whenever they do not know the solution to a problem to avoid wasteful duplication of effort and ensure consistent responses to customers	p. 167	Gray and Durcikova 2005	Survey/N=110		Job Clarity	Role Ambiguity
90	A second antecedent of knowledge sourcing is the level of intellectual demands experienced by an individual in his or ber job. Work that is highly demanding produces psycbological strains that cause individuals to pursue coping strategies (e.g., 1621) designed to reduce strain (e.g., by changing work methods or upgrading skills). Intellectually demanding jobs consume a greater proportion of individuals' cognitive capacity, which restricts their ability to cope witb their tasks and responsibilities [91]. Knowledge sourcing frees up cognitive resources, as importing the required knowledge from other employees generally requires less cognitive effort than developing it by learning through direct interaction (e.g., though experimentation or learning by doing) with the environment |47|. When individuals believe their jobs are more intellectually demanding, they will decrease tbe level of strain placed on them by outsourcing some portion of their cognitive load-that is, they will engage in more knowledge sourcing behaviors.	p. 168	Gray and Durcikova 2005	Survey/N=110		Job Complexity, Job Clarity	Role Conflict, Role Ambiguity
91	A recent study [47] has found that individuals' job tenure significantly—and negatively—predicted tbeir level of overall knowledge sourcing. Tbis was ascribed to the idea that experienced employees might source less knowledge because they already knew mucb of what they needed to know to perform well [92].	p. 172	Gray and Durcikova 2005	Survey/N=110		Job Clarity	Role Ambiguity
92	For example, technical support analysts described by Pentland |81, pp. 536-538| obtained knowledge from other analysts by asking for help either in the form of a "quick question" or through more involved requests to "take a look." Such kinds of direct interaction witb colleagues allow for dialogue about the nature of the problem being faced and support tbe matching of knowledge to context, wbich creates tbe possibility of interactive sense making [20].	p. 163	Gray and Durcikova 2005	Survey/N=110		Job Clarity	Role Ambiguity
93	Under time pressure, decision makers may speed up their information processing and be more selective in choosing which information to process. In emergency situations task complexity can be regarded as a function of time, risk, available resources and changing goals. Increases in task compelxity lead to increases in information load and the rate of search.	p. 1	Gu and Mendonça (2009)	Experiment/N=11	Time	Job Complexity, Resource Conflict	Role Conflict
94	As depicted in Figure 1, when decision makers at some time t are faced with a future deadline at some future time T, every minute spent on planning is one less minute available for plan implementation. Simultaneously, material and personnel resources available for responding to the event decrease, which increases risk as appropriate resources go out of range. On the other hand, the reduction in the size of the search space (i.e., the set of feasible plans involving these resources) means that a larger extent of it can be searched over time. The passage of time therefore leads to increasing complexity and risk, forcing response personnel to "make do" with diminishing resources. Task difficulty is inversely related to the number of available resources and the number of potential solutions. The hypotheses that follow from this discussion are as follows: H1.1: As time to implement decreases, extent of search increases. H1.2: The search extent of novice groups will be greater than that of expert groups. H2.1: As time to implement decreases, less information will be sought. H2.2: As time to implement decreases, search for information that is common to all members of the group increases. H2.3: As time to implement decreases, search for information that is unique to	p. 1	Gu and Mendonça (2009)	Experiment/N=11	Time	Job Complexity	Role Conflict
95	The participants' discussion of the spec and drawing is in itself interesting for at least two reasons. First, the discussion somewhat typically reveals various kinds of ambiguity, complicating a concept deemed initially to be relatively simple. Second, the participants' difficulties (as reflected in the amount of overtalk, the quick uptake of conversational turn, the rich participation of five of the seven men present, and the eventual bracketing or deferral of some parts of the spec) in dealing with the ambiguity renders the discussion a particularly interesting site for seeing literacy in action.	p. 423	Haas and Witte (2001)	Observation	Communication	Job Clarity	Role Ambiguity
96	In the context of KMS, perceived usefulness refers to the degree to which a knowledge seeker believes that using the KMS to seek knowledge can have a positive impact on one's own task performance.	p. 527	He, Fang, and Wei (2009)	Survey/N=201		Job Advancement	Locus of control
97	Employees had tough business goals to meet, and the norms of cooperation and help for each other sometimes proved difficult to achieve. Our interviewees would complain about the burden of packing and disseminating knowledge even though they wanted to make knowledge contributions. This indicated thatmore careful attention should have been paid to the design of task allocation and time pressures on employees	p. 178	He and Wei (2009)	Survey/N=186	Time, Communication	Job Complexity	Role Conflict
98	salespeople heavily depended on others to help in accomplishing their organizational and personal goals. They needed brainstorming and collaboration with others in the telephone as well as online. This interdependence encouraged further promoted participation in KMS.	p. 178	He and Wei (2009)	Survey/N=186	Communication	Job Interdependence	Role Conflict
99	the scattered working conditions (employees working in distant locations) forced people to use electronic media for sharing information and knowledge.	p. 179	He and Wei (2009)	Survey/N=186	Communication	Job Interdependence	Role Conflict
100	However most engineers can be characterised as subject specialists who perform rather complex tasks. As task complexity increases so does the complexity of the information needed by the engineers, while the number of useful information sources decreases (Byström & Järvelin, 1995).	p. 761	Hertzum and Pejtersen (2000)	Case-Based		Job Complexity	Role Conflict
101	Apart from the specifics of the task at hand the choices made by engineers depend to a large extent on their understanding of the context of the task and, consequently, on their success in obtaining information about this context. In design documentation, the technical solutions and the result of the design are usually well documented, while information about the context of the design process is typically not available or not indexed in a way that makes it easily accessible. These conditions explain several features of the information-seeking behaviour of engineers	p. 761-762	Hertzum and Pejtersen (2000)	Case-Based		Job Clarity	Role Ambiguity
102	Based on case studies in two product-development organisations we find that engineers search for documents to find people, search for people to get documents, and interact socially to get information without engaging in explicit searches. This intricate interplay between document and people sources can be explained by the nature of the design task. Many possible solutions are normally available to the designer and in choosing one over the others the designer must take into account a complex set of issues involving both the product as such and its context.	p. 761	Hertzum and Pejtersen (2000)	Case-Based		Job Complexity	Role Conflict
103	As a consequence, engineering designers tend to seek information by identifying a colleague, who is able to elaborate on the work context and the available written sources. This way designers use their colleagues as entry points to the written documentation in order to get the background understanding necessary to read the documentation competently. I	p. 772	Hertzum and Pejtersen (2000)	Case-Based	Communication	Job Clarity	Role Ambiguity
104	design documentation is strongly biased toward technical descriptions of the resulting product (i.e., the lower abstraction levels of the manufacturing domain). This leaves it largely undocumented how the various goals and constraints involved in the design were transformed into a product and thus makes it necessary to get into contact with a person who was involved in the project to subsequently understand and learn from the design process.	p. 774	Hertzum and Pejtersen (2000)	Case-Based	Communication	Job Clarity	Role Ambiguity
105	Future research could also explore how the impetus for a specific knowledge exchange opportunity affects a person's willingness to engage in such exchange. For example, an individual may be willing to respond to a request from another for knowledge of how a task should be done. Yet, that same individual might be less willing to take the initiative to share the knowledge independent of such a request	p. 137	Holste and Fields (2010)	Survey/N=202	Communication	Job Clarity	Role Ambiguity
106	These previous studies suggest that willingness to share tacit organizational knowledge with another co-worker is likely to be heavily influenced by affect-based connections. People often learn tacit knowledge through close observation and interaction with someone who already possesses that knowledge, as an apprentice learns his trade from a master craftsman.	p. 131	Holste and Fields (2010)	Survey/N=202	Communication	Job Clarity	Role Ambiguity
107	If relevant to my work, I would welcome the opportunity to spend significant time observing and collaborating with this individual in order for me to better understand and learn from his/her work	p. 132	Holste and Fields (2010)	Survey/N=202	Time, Communication	Job Clarity	Role Ambiguity
108	A VC [virtual community]is a cyberspace supported by information technology. It is centered upon the communications and interactions of participants to generate specific domain knowledge that enables the participants to perform common functions and to learn from, contribute to, and collectively build upon that knowledge	p. 153	Hsu, Ju, Yen and Chang (2007)	Survey/N=274	Communication	Job Clarity	Role Ambiguity

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109	Members in the VCs **expect to share the knowledge t**hey are interested **to reach their personal goals (e.g., praise, promotions**, image, social status). Hence, members are **likely to share their knowledge when positive personal outcome expectations can be realized.**	p. 166	Hsu, Ju, Yen and Chang (2007)	Survey/N=274	Communication	Job awards	Locus of control
110	The words information and knowledge will be used interchangeably in this paper. I have, however, tried to **use information when referring to data that give meaning by reducing ambiguity, equivocality, or uncertainty,** or when referring to data which indicate that conditions are not as presupposed, and have tried to u**se knowledge when referring to more complex products of learning, such as interpretations of information, beliefs about cause-effect relationships, or, more generally, "know-how."**	p. 89	Huber (1991)	Exploratory		Job Clarity	Role Ambiguity
111	What about "soft" information? Much of **what an organization learns is stored in the minds of its members.** In many cases organizations **grow their own experts**. These people are expert not in a whole discipline or broad category of problems, but rather have **had organizational experiences that made them expert** with respect to s**pecific intellectual task**s such as (1) **diagnosing quality problems or equipment malfunction**s, (2) learning the identities of extra-organizational experts, influence peddlers, resource providers, or other nonmembers who may be useful to the organization, and (3) locating information or other resources not locatable using official, standard sources.	p. 106	Huber (1991)	Exploratory		Job Clarity	Role Ambiguity
112	A. The probability that **organizational member or** unit A **will rout information to member** or unit B is: 1. positively related to A's view of the **information's relevance** to B, 4. negatively related to A's **workload,** 5. positively related to the **rewards** and negatively related to the penalties that A expects to result from the routing, and B. The probability or extent of delay in the routing of information by A to B is: 1. positively related to th**e workload** of A, 3. negatively related to A's view of the **timeliness of the information** for B C. The probability or extent of information distortion by A when communicating to B is: 2. negatively related to the **penalty that A expects to incur** as a result of introducing the distortion, 5. positively related to A's **work overload,** and	p. 101	Huber (1991)	Exploratory	Time, Communication	Job Clarity, Job Load, Job Awards	Role Conflict, Role Ambiguity, Locus of control
113	Several consulting companies have made **knowledge sharing** a basic **criterion for employee performance evaluation** (Davenport and Prusak 1998). There are also instances where **employees enjoy better job security as a result of contributing knowledge** (Hall 2001).	p. 121	Kankanhalli, Tan and Wei (2005)	Survey/N=150		Job awards	Locus of control
114	**organizational reward** (such as better work assignment**, promotion incentive, salary incentive**, bonus incentive, o**r job security**) seems to be effective for e**ncouraging EKR usage by knowledge contributor**s.	p. 133	Kankanhalli, Tan and Wei (2005)	Survey/N=150		Job awards	Locus of control
115	Knowledge self-efficacy is typically manifested in the form of **people believing that their knowledge can help to solve job-related problems**	p. 122	Kankanhalli, Tan and Wei (2005)	Survey/N=150		Self-belief	Locus of control
116	Economic incentives for **knowledge sharing that employees may value include increased salary**, larger bonuses, greater job security, and career advancement prospects (Ba et al., 2001; Beer & Nohria, 2000; Hall, 2001). Such incentives may be needed to encourage knowledge reuse in order to counteract the inertia to search for knowledge and the propensity of employees to **"reinvent the wheel" i.e., come up with their own solutions to tasks**	p. 1159	Kankanhalli, Tan and Wei (2005)	Survey/N=160		Job awards	Locus of control
117	**When task interdependence is hig**h, **more knowledge and expertise are required from others to accomplish the task.**	p. 1159	Kankanhalli, Tan and Wei (2005)	Survey/N=160		Job Complexity	Role Conflict
118	when **employees are given time** and opportunities to access EKR, they are likely to **use the knowledge** in EKR for more **interdependent tasks**. Therefore, the **impact of resource availability** on EKR usage for **knowledge seeking** may be amplified when task interdependence is high. Hence, we hypothesize, Hypothesis 4b: R**esource availability is positively related to EKR usage for knowledge seeking**, particularly **under conditions of high task interdependence.**	p. 1159	Kankanhalli, Tan and Wei (2005)	Survey/N=160	Time	Job Complexity, Resource Conflict	Role Conflict
119	When t**ask interdependence is high**, employees may r**ely on the knowledge of others** stored in EKR to accomplish their task. When **incentives** are available **for knowledge reuse**, it becomes even more compelling for them to search EKR in the course of their work. Therefore, the impact of **incentive availability on EKR usage for knowledge seeking may be amplified when task interdependence is high**. Hypothesis 5b: Incentive availability is positively related to EKR usage for knowledge seeking, particularly under conditions of high task interdependence.	p. 1159	Kankanhalli, Tan and Wei (2005)	Survey/N=160		Job awards, Job Complexity	Role Conflict, Locus of Control
120	When **task interdependence is hi**gh, **incentive availability has a significant positive relationship with EKR usage for knowledge seeking.** With valued incentives, employees may seek knowledge from EKR for performing highly interdependent tasks.	p. 1164	Kankanhalli, Tan and Wei (2005)	Survey/N=160		Job awards, Job Complexity	Role Conflict, Locus of Control
121	All of our work is by analogy, so you need to get your arms and legs around the **closest knowledge you can as quickly as you can**...if you're gonna do **consulting** and people are always asking some **bizarre question** that has to be mapped to your stock of information, I need to be able to **do that quickly** and with some degree of confidence that I can **get to the information rapidly**."	p. 3546	Lee and Thomas (2008)	Qualitative/N=16	Time, Communication	Job Clarity	Role Ambiguity
122	**Consultants are constantly looking for information within the context of addressing client questions and needs**. Moreover, due to client **expectations** of consultants' expertise, to not find information was viewed as unacceptable.	p. 3546	Lee and Thomas (2008)	Qualitative/N=16		Job Clarity	Role Ambiguity
123	They **weighed the time it might tak**e to find information that they could adapt to their own needs against the time it might take to create a client deliverable from scratch. Second, consultants' **information-seeking practices** were aimed at **addressing specific problems within the immediate context of a client engagement.** They sought information that they could easily adapt to their **current problem**, and they **interacted with the "knowledge" repository** with very instrumental ends in mind, looking for things that resembled more templates and tidbits than knowledge.	p. 3547	Lee and Thomas (2008)	Qualitative/N=16	Time, Communication	Job Clarity	Role Ambiguity
124	Preliminary interviews revealed that all three groups were midlevel **professionals** engaged in knowledge-intensive work (research and development, financial modeling, and oil exploration) who **relied heavily on colleagues for information to solve problems and coordinate work**.	p. 1481	Levin and Cross (2004)	Survey/N=127	Communication	Job Clarity	Role Ambiguity
125	**Knowledge-sharing behavi**or is regarded as the degree to which **employees actually share their knowledge** with **their colleagues for professional tasks.**	p. 231	Liao (2006)	Survey/N=254	Communication	Job Clarity	Role Ambiguity
126	Currently, **knowledge sharing** efforts **do not influence a doctor's compensation and performance**. **It lacks a reward system to encourage knowledge sharing**	p. 334	Lin, Tan, and Chang (2008)	Mix method/N=174		Job awards	Locus of control
127	We theorize that the **perception of conflicting opinions on task issues** may create cognitive dissonance and **spur an employee to seek out more information about these issues and increase his/her understanding of the task at hand** (Olson et al., 2007), resulting in more innovative behavior. We therefore posit that an individual's perception of conflict with other coworkers over task issues should increase his/her contribution of novel ideas.	p. 134	Lu, Zhou and Leung (2011)	Survey/N=166		Job Conflict, Job Clarity	Role Conflict, Role Ambiguity
128	Because perceived **task conflict** can stimulate task-related interpersonal interaction (Amason, 1996), we argue that the disagreements associated with **task conflict should promote the sharing of expertise and knowledg**e to justify one's views and opinions. Hence, the **perception of disagreements with coworkers over task issues should increase knowledge sharing behaviors**: H3a. Task conflict will be positively related to knowledge sharing behaviors.	p. 135	Lu, Zhou and Leung (2011)	Survey/N=166		Job Conflict	Role Conflict
129	**Knowledge sharing behavior**, which i**s both task-oriented** and relationship-based, is **influenced by both task conflict** and relationship conflict.	p. 145	Lu, Zhou and Leung (2011)	Survey/N=166		Job Conflict	Role Conflict
130	Our findings suggest that **task conflict can spur employees** to be innovative and **share their knowledge** with others, which is pivotal to organizational learning and peak performance.	p. 146	Lu, Zhou and Leung (2011)	Survey/N=166		Job Conflict	Role Conflict
131	**task-related conflict** may enhance performance because it **stimulates open expression** and evaluation of assumptions and alternatives, thus increasing the possibility of generating better solutions	p. 132	Lu, Zhou and Leung (2011)	Survey/N=166		Job Conflict	Role Conflict
132	**Technical information seeking** encompasses questions on certain aspects of a job/task. Some major reasons for search of technical information are: d**efining a problem/task**; learning techniques applicable to **dealing with the problem/task; finding solutions; or identifying a piece of missing data** (Kaufman, 1983	p. 222	Madzar (2001)	Survey/N=75		Job Clarity	Role Ambiguity
133	Her work suggests that **repositories are successfully used** only **when** the recipient is not the source of knowledge, **when the task is routine**, and the knowledge is explicit	p. 60	Markus (2001)	Exploratory		Job Clarity	Role Ambiguity
134	The job of persuasion is made easier by the firm's **reward structure.** Some practices offer **awards for excellent contributions**. These range from tombstones for the consultant's desk to the CMT practice's award of $50,000 to a winning team for them to spend on learning-related activities of their own choice. The only restriction is that they must report back their learning to the practice as a whole. But more significantly, **developing intellectual capital has become one of the four criteria used when determining promotion and bonuses.**	p. 82	Markus (2001)	Exploratory		Job awards	Locus of control
135	Examples of **knowledge reuse** in homogeneous work groups include s**oftware support workers accessing the history of prior diagnostic and repair details** [24, 61], **software development and ERP system implementation team members revisiting design decisions later in the project** [9,] 6], and p**hysicians reviewing prior entries in patients medical records** [35]. Examples of reuse in cross-functional work teams include members of a high tech product d**esign team evaluating proposed design solutions** [42,44], members of an invention a**ssessment team providing feedback to the inventors following an assessment panel meeting** [57], and m**embers of a consulting team modifying other teams' work products when preparing a proposal for a new client.**	p. 63	Markus (2001)	Exploratory		Job Clarity	Role Ambiguity
136	the **technical support personnel** at Zeta 161] were anxious to **elaborate the details of a support encounter** so that their peers could **quickly understand the situation** and **not have to create their own extensive documentation**	p. 74	Markus (2001)	Exploratory	Time	Job Clarity	Role Ambiguity
137	For an organization, **knowledge is shared for the purpose of improving work efficiency** and financial benefits	p. 9456	Masrek and Edang, 2012	Survey/N=265		Job Clarity	Role Ambiguity
138	Upon entering a **new job** and organization, **newcomers** typically experience some degree of surprise (Louis, 1980) or role shock (Van Maanen, 1975). Faced with l**earning the formal and informal requirements of a new role and "the ropes" of the organization,** this boundary passage event is often associated with **high levels of uncertainty**. Information transmitted from various organizational sources during the entry or encounter stage (Van Maanen, 1975) of organizational assimilation is intended to help newcomers **cope with the surprise** or role shock and the uncertainty they may experience.	p. 92	Miller and Jablin (1991)	Exploratory		Job Role	Role Conflict
139	messages from management, supervisors, and co-workers during the encounter period are usually designed to **clarify newcomers' roles**, to **indoctrinate** newcomers to organizational practices, to ease newcomers into membership in their work groups, and to help newcomers begin to develop new self-images in keeping with **their new roles** and organizations (Iablin, 1987). Taken together, these messages to newcomers constitute efforts to engender (1) a sense of **competence in the task rol**e and (2) a sense of acceptance into the work group/organization (Feldman, 1976; Katz, 1980).	p. 92	Miller and Jablin (1991)	Exploratory		Job Role	Role Conflict

Code #	Description	Article Section	Researchers	Study Type	Barrier	Category	Concept
140	In brief, during the encounter phase of organizational assimilation **newcomers depend upon information** from others for developing **role clarity**. Although **newcomers receive role-related information**, the information they receive is frequently perceived as inadequate; hence, they usually experience fairly **high levels of uncertainty** (Io blin, 1982; Louis, 1980; Salancik & Pfeffer, 1978). This uncertainty is reflected in the levels of **role ambiguity and role conflict** which newcomers experience and is of importance because it may have an impact on employees' job satisfaction, productivity, and, ultimately, job tenure (Ashford 8: Cummings, 1985; Jackson & Schuler, 1985). Thus, it is of no surprise that **newcomers** are often advised to **reduce their uncertainty by "seeking out the help and information** they need to do their work effectively instead of waiting or wishing their bosses to provide it" (Katz, 1985: 122).	p. 93	Miller and Jablin (1991)	Exploratory		Role Conflict, Role Ambiguity	Role Conflict, Role Ambiguity
141	At the same time, new hires (especially those just entering their chosen profession) are likely to experience considerably **higher levels of role-related and career uncertainty when entering a new environment** than at any other time during their organizational tenure. In addition, newcomers in comparison to oldtimers are likely to **seek information** in relatively more "mindful" as opposed to "mindless" ways (Langer, 1978: 36-38). In other words, their heightened sense of uncertainty leads newcomers (1) to be conscious of values and behaviors to be learned and (2) to often think about what they do not know and how to obtain the information they desire.	p. 94	Miller and Jablin (1991)	Exploratory		Role Conflict, Role Ambiguity	Role Conflict, Role Ambiguity
142	Organizational entry is usually considered to be a form of boundary passage. Newcomers leave membership in one work group and organization to join another, set aside portions of their old identities for **new identities** commensurate with their new employer, and abandon an **accustomed role** in order to **learn a new role** and new set of expectations. As such, new hires must cope with the **uncertainty** that is associated with a **complex configuration of expectations and relationships** (Katz 1980).	p. 94	Miller and Jablin (1991)	Exploratory		Job Role	Role Conflict
143	With respect to individual differences, newcomers' levels of self-esteem and tolerance for **ambiguity** may affect their **information-seeking behaviors**, such that persons with low self-esteem are less likely to **search for information** and engage in risk-taking behavior than persons with high self-esteem (e.g., Hall, 1971; Louis, 1990; Weiss, 1977), and individuals with a **low tolerance for ambiguity use more direct information-seeking tactics than persons with a high tolerance for ambiguity**	p. 100	Miller and Jablin (1991)	Exploratory		Job Ambiguity	Role Ambibuity
144	One of the primary purposes of messages sent by the organization, supervisors, and co-workers in the encounter period is to **provide newcomers with information leading to role clarity**. However, instead of developing role clarity, newcomers frequently **experience role ambiguity and role conflict** (Feldman, 1976; Graen, 1976; Iablin, 1987). Newcomers may experience role ambiguity and/or conflict **as a result of** (I) a **lack of clarity and unanimity in others' expectations concerning newcomers' roles**, (2) mixed feedback about their job performance, (3) not being able to negotiate informal **agreements** regarding others' influence in defining **their roles**, and (4) others' breaking or neglecting to fulfill contracts or negotiated functions (Katz Kahn, 1978).	p. 100	Miller and Jablin (1991)	Exploratory		Role Conflict, Role Ambiguity	Role Conflict, Role Ambiguity
145	Therefore, **role ambiguity and role conflict** may pose serious problems for organizational newcomers. However, the **levels of role ambiguity/conflict experienced by newcomers may depend on their information-seeking behaviors.**	p. 101	Miller and Jablin (1991)	Exploratory		Role Conflict, Role Ambiguity	Role Conflict, Role Ambiguity
146	In summary, as a result of entering a new organization and beginning a **new job**, newcomers are **likely to seek information** with a heightened sense of awareness or mindfulness. In an effort to **reduce uncertainty** (about the full **meaning of their roles**, organizational events, others' expectations, etc.), newcomers often seek information from their supervisors and coworkers. Information-seeking activities are also likely to be stimulated by the reception of role-related information from supervisors, co-workers, and/or others, which may not provide sufficient clarity about newcomers' roles.	p. 101	Miller and Jablin (1991)	Exploratory		Role Ambiguity	Role Ambiguity
147	In contrast, **newcomers who do not seek information** as readily and who do not utilize a variety of tactics may **experience higher levels of role ambiguity/conflict. Experiences of role ambiguity/conflict** may, in turn, **stimulate more information-seeking activity**. Thus, it is expected that the **levels of role ambiguity/conflict experienced by newcomers during the organizational encounter period may depend upon their information-seeking behaviors.**	p. 102	Miller and Jablin (1991)	Exploratory		Role Conflict, Role Ambiguity	Role Conflict, Role Ambiguity
148	Proposition 8.1: Newcomers who rely on overt questions often stimulated by observations and surveillance) in the majority of their **information-seeking** attempts are more likely to experience (1) **less role ambiguity** and (2) lower levels of role conflict than those who use overt questions with less frequency. Proposition 8.2: Over time, newcomers who rely on **thirdparty sources** to the exclusion of their supervisors are more likely to encounter (1) **higher levels of role ambiguity** and (2) h**igher levels of role conflict** than those newcomers Who rely on both their supervisors and third-party sources for information. Proposition 8.3: Newcomers who often employ less direct tactics (i.e., indirect questions, disguising conversations) are more likely to encounter **higher levels of role ambiguity and role conflict** than those who use such tactics with less frequency. Proposition 8.4: Newcomers who often employ testing tactics are more likely to experience (1) h**igher levels of role ambiguity and (2) higher levels of role conflict** than newcomers who engage in such tactics with less frequency.	p. 113	Miller and Jablin (1991)	Exploratory		Role Conflict, Role Ambiguity	Role Conflict, Role Ambiguity
149	I watch [to see] if he is already able to cover for [an operative who is on] vacation [. . .] **he should come to me when he has a problem, and I [will] explain everything** [. . .] after some time, in two or three months, I don't want to tell him what to do any more.	p. 299	Nakano, Muniz Jr, and Batista Jr (2013)	Qualitative/N=14	Communication	Job Clarity	Role Ambiguity
150	I'm working on my machine, and **my fellow calls me to solve a problem on his machine** and vice versa; in these situations, **we exchange what we know to overcome the problem**	p. 299	Nakano, Muniz Jr, and Batista Jr (2013)	Qualitative/N=14	Communication	Job Clarity	Role Ambiguity
151	These studies show that t**asks or technologies that are less certain or more complex** may **require more information use for decision making** than will simpler, more routine jobs	p. 759	O'Reilly (1982)	Survey/N=163		Job Complexity, Job Clarity	Role Conflict, Role Ambiguity
152	Although these studies examined the effects of uncertainty and complexity across jobs, the same logic also may apply within a given job category. **Perceptions by job incumbents of task uncertainty or complexity** may be related to the **use of different information sourc**es. As demonstrated previously, it is likely that perceived environmental **uncertainty and complexity may underlie the felt need for information**	p. 759	O'Reilly (1982)	Survey/N=163		Job Complexity, Job Clarity	Role Conflict, Role Ambiguity
153	**Workers who have been in a job longer** may learn which sources are more useful or m**ay develop habitual preferences for certain information sources**	p. 759	O'Reilly (1982)	Survey/N=163		Job Clarity	Role Ambiguity
154	Hypthesis 3: **Tasks perceived as more complex will be associated with more frequent use of information sources**. Hypothesis 4: T**asks perceived as more uncertain will be associated with more frequent use of information sources**,. . .Hypothesis 6: **Individuals with longer job tenure** will report themselves as **using sources with a frequency** different from that of those with shorter tenure.	p. 759	O'Reilly (1982)	Survey/N=163		Job Complexity, Job Clarity	Role Conflict, Role Ambiguity
155	**Respondents** who have **held the job for a longer time** report **less reliance on the group for information**.	p. 765	O'Reilly (1982)	Survey/N=163		Job Clarity	Role Ambiguity
156	It also is understandable that **workers who have been in the job longer** will be **less likely to rely on other group members as information sources**. **Experience**, it seems, leads to the possession of information such that **one does not need to ask others for help.**	p. 768-769	O'Reilly (1982)	Survey/N=163		Job Clarity	Role Ambiguity
157	**Perceived task uncertainty** is significantly **related only to the use of files as an information source.**	p. 765	O'Reilly (1982)	Survey/N=163		Job Clarity	Role Ambiguity
158	they felt the new system should result from the best ideas of those who **used the system to access the information** and functionality **necessary to do their jobs**.	p. 303	Pardo, Cresswell, Thompson, and Zhang (2006)	Case-based		Job Clarity	Role Ambiguity
159	Simply identifying the formal knowledge about **work procedures and policies will not capture the necessary depth and nuance of knowledge embedded in practice** [32]. The cases presented illustrate this point; sharing deep knowledge of practice grounded in multiple communities or in a new collaborative practice community is needed to understand **information requirements** and eventually develop effective crossboundary information systems to **respond to those requirements**.	p. 295	Pardo, Cresswell, Thompson, and Zhang (2006)	Case-based		Job Clarity	Role Ambiguity
160	Decisions by individuals or organizations to **share knowledge** can thus be seen as based on **calculations of risk and reward. Knowledge sharing will occur if the reward is sufficient** and the risk of exploitation is sufficiently low. Therefore, incentives for knowledge sharing or acquisition become important factors, as well as mechanisms for controlling risk	p. 296	Pardo, Cresswell, Thompson, and Zhang (2006)	Case-based		Job reward	Locus of control
161	Having the **opportunity to shape decisions** about the new system **provided incentive for participation in the knowledge sharing activities.**	p. 300	Pardo, Cresswell, Thompson, and Zhang (2006)	Case-based	Communication	Job reward	Locus of control
162	**rewards** in the form of recognition are **critical for encouraging knowledge sharing** in Web 2.0 platforms	p. 61	Paroutis and Saleh (2009)	Case-Based		Job reward	Locus of control
163	When a customer calls a hot line with a **question or a problem,** the support specialist who takes the call is responsible for **providing some kind of answer or solution.** I**ndividual support specialists,** however, often **lack the personal resources necessary to respond to a given call.**	p. 528	Pentland (1992)	Ethnography		Resource conflict	Role Conflict
164	I think an **engineer with fifteen things backlogged shouldn't have to answer every customer question**	p. 539	Pentland (1992)	Ethnography	Time	Resource conflict	Role Conflict
165	**"If you can't read the code, how am I supposed to talk to you**? You don't know anything. **Come back when you can understand the code and I'll talk to you the**n	p. 539	Pentland (1992)	Ethnography	Communication	Job Clarity	Role Ambiguity
166	Firms have been introducing **interdisciplinary work groups** in which **people share their knowledge and expertise** in order **to cope with complex tasks in the workplace**	p. 208	Renzl (2008)	Survey/N=201		Job Complexity	Role Conflict
167	**interdependent jobs** necessarily involve some similar task information, technical processes, and both covert and overt knowledge. For example, Eveland, Blanchard, Brown and Mattocks (1995) found that IT helper/helpee dyads shared at least five similar information work tasks in common. Thus, people who need to **share or obtain information** on h**ow to solve problems,** or find new ways of accomplishing tasks, would also be considered to have **higher levels of task interdependency ..People who have jobs with higher task interdependency are more likely to be sought as IT help providers**	p. 291	Rice, Collins-Jarvis, and Zydney-Walker (1999)	Surveys/N=292	Communication	Job Complexity	Role Conflict
168	Perhaps people with **less general and application-specific expertise** preferred known individuals who may **better understand the user's context**, and **provide a less uncertain communication context**, rather than the more impersonal and formal positions, which may seem to require or represent more technical knowledge.	p. 301	Rice, Collins-Jarvis, and Zydney-Walker (1999)	Surveys/N=292		Job Clarity	Role Ambiguity
169	Respondents provided a variety of solutions for coping with the e**xcessive time pressures** and local demands **that frequently block knowledge sharing** in virtual teams...approach to coping with time constraints and local demands focused on virtual team leaders negotiating with on-site managers over the level of time commitment each virtual team member could devote to the virtual team assignment. The goal here was to **reduce potential role conflicts** experienced by members **over their multiple responsibilities.**	p. 268	Rosen, Furst, and Blackburn, 2007	Survey/N=200	Time	Job Complexity	Role Conflict
170	In an organization, **knowledge is transferred** and shared through the interactions of the employees. Often, this **knowledge has been acquired in past experiences**. Within **multi-organizational projects, knowledge sharing faces difficulties as workers from different organizations are involved**. Moreover,when the project is being developed in a geographically dispersed setting, opportunities for interaction among workers belonging to different organizations with immediate feedback and using more than just verbal language are rare.	p. 29	Santos, Soares and Carvalho (2012)	Qualitative/N=24	Communication	Job Complexity	Role Conflict

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171	Furthermore, the research of Ratcheva (2009) on **multidisciplinary teams** and how they interact to overcome barriers and take advantage of their knowledge diversity argues that findings indicate that **teams often lack common background knowledge** at the beginning of the projects and members are accustomed to different working practices. "Like other projects, t**ransnational projects** experience the challenge of getting a diverse group of in**dividuals from different functional areas to work together** for a finite period of time to accomplish a specific project objective.	p. 29	Santos, Soares and Carvalho (2012)	Qualitative/N=24		Job Complexity	Role Conflict
172	Most of the times **projects are multi-disciplinary**, what I mean with this, I can be **working in several domains,** despite our flexibility there are **specializations.** I am the most generic element, so **I have to know a little from everything,** but on my team there are persons specialized in certain domains. When a project has a certain dimension, what is usual, it is necessary more than one specialist, but **there is information that is necessary to exchange**.	p. 34	Santos, Soares and Carvalho (2012)	Qualitative/N=24		Job Complexity, Job Clarity	Role Conflict, Role Ambiguity
173	Schematically**, information seeking** can be described by means of a chronological sequence as illustrated in Fig. 1. The figure suggests that the in**formation-seeking process is triggered by information need(s), possibly caused by a work task at hand or a problem to be solved**	p. 119	Savolainen (2006)	Exploratory		Job Clarity	Role Ambiguity
174	Nearly all the interviewees mentioned that the dynamic of work and work pressure meant that time is very short for enhancing **knowledge sharing** in their organization: Due to the **pressure of work** we don't have time to think about how we can develop and encourage our employees to share knowledge (R10, B). It is difficult to gather together all the employees of my department to speak about the concept of k**nowledge sharing due to the pressure of their daily duties** (R5, A).	p. 120	Seba, Rowley, and Delbridge (2012)	Qualitative/N=15	Time	Job Complexity	Role Conflict
175	**Virtual teams** are often created to b**ring together diversity of expertise and knowledge**. With the increasing needs for technical knowledge bases and the **requirements to integrate different technical and professional knowledge**, **individuals rarely can absorb and/or hold all the requisite knowledge domains needed for their teams' tasks**	p. 621	Staples and Webster (2008)	Survey/N=824		Job Complexity	Role Conflict
176	**Task interdependence facilitates** team processes such as **knowledge sharing** because team members will interact more if they rely on and need each other. Specifically, if the task is one where they need to learn from each other, share knowledge and interact (i.e. high interdependence), then the relationship between knowledge sharing and team performance should be strong.	p. 622	Staples and Webster (2008)	Survey/N=824		Job Complexity	Role Conflict
177	**Task dependence** refers to the extent to which a **work unit needs information and support from others to accomplish its work** [40]. Task dependence is closely **related to levels of information exchange** [36]. When the units hold **high degree of task dependence, their members are more likely to accomplish their tasks or achieve the desired performance by sharing materials**, information, or expertise with other colleagues [12]. Thus, members in such units are e**xpected to engage in extensive interaction**:H1a: Degree of work unit task dependence is positively associated with the intensity of their voluntary sharing behaviors. H1a: **Degree of work unit task dependence is positively associated with the intensity of their solicited sharing behaviors.**	p. 3	Song and Teng (2008)	Survey/N=149		Job Dependency	Role Conflict
178	Researchers have demonstrated a positive relationship between **task rountineness and the amount of information processing** [13]. On the other hand, previous studies have found that l**ower task routineness is related to more pro-social behaviors** [33], such as voluntary KS. Thus, **task routineness can be expected to promote solicited sharing activities in work unit,** where as it may discourage voluntary sharing activities: H2a: Degree of work unit task routineness is negatively associated with the intensity of their voluntary sharing behaviors. H2b: Degree of work unit task routineness is positively associated with the intensity of their solicited sharing behaviors.	p. 3	Song and Teng (2008)	Survey/N=149		Job Clarity	Role Ambiguity
179	As hypothesized, t**ask structure (i.e. task dependence and task routineness) has significant influence on solicited KS**	p. 8	Song and Teng (2008)	Survey/N=149		Job Dependency, Job Clarity	Role Conflict, Role Ambiguity
180	When a **work task** requires knowledge **beyond their areas of expertise**, group **members tend to seek information from perceived experts in that area without learning verything from scratch** (Brandon & Hollingshead, 2004; Hollingshead, 1998b).	p. 1260	Su and Contractor (2011)	Survey/N=110		Job Clarity	Role Ambiguity
181	First, our findings show that **job involvement has a direct and positive effect on employees' knowledge sharing** behaviours. In addition, OCB is not a significant mediator for job involvement and knowledge sharing behaviours. One possible explanation is that the **IS employees with higher levels of job involvement are in a stronger position to understand their job task.** As a result, these highly involved employees in our survey are **more confident and willing to engage in knowledge sharing behaviours.**	p. 74	Teh and Sun (2012)	Survey/N=116		Job Clarity	Role Ambiguity
182	Weiss explained that the **billable hour system** used for many professional jobs such as consultants or lawyers is a **disincentive for knowledge sharing**. **Consultants or lawyers o not bill clients for time devoted to knowledge sharing** because clients are unwilling to pay for services from which they do not receive an exclusive benefit. Therefore, the incentives support serving clients and not sharing knowledge	p. 119	Wang and Noe (2010)	Exploratory		Job awards	Locus of control
183	**Specialization** is the extent to which the **organizational tasks are divided into subtasks**, and people are allocated to execute only one of these subtasks (Mintzberg, 1989). **Specialization causes the development of specific knowledge uniquely held by an individual or group** (Grant, 1996).	p. 153	Willem and Buelens (2009)	Case-Based		Job Clarity	Role Ambiguity
184	Another dimension of technology refers to **interdependency;** i.e. the **extent to which different units are dependent on each other to perform their task**s (Thompson, 1967). Task interdependency is a major determinant in choosing coordination mechanisms (Grandori, 1997b; Heugens, 2005; Thompson, 1967). The **higher the interdependency**, the more **horizontal coordination is required** (Galbraith, 1973). Technology interdependency parallels knowledge complexity in terms of **dependent knowledge** because (technology) **interdependency involves knowledge dependency**. Furthermore, organization theory literature teaches us that the need for **sharing information between units is a function of the interdependency between the units** (Argyres, 1995;Heugens, 2005; Thompson, 1967). This can be extended to knowledge sharing; i.e. a higher need for knowledge sharing between units exists when these units are interdependent.	p. 153	Willem and Buelens (2009)	Case-Based		Job Inderdependency	Role Conflict
185	possible strategy for building organizations that are capable of **solving complex problem**s is to train individuals to **react to ambiguity by searching through their social networks,** rather than forcing them to build and contribute to centrally designed problem-solving tools and databases.	p. 238	Xu, Kim and Kankanhalli (2011)	Survey/N=425		Job Clarity	Role Ambiguity
186	In modern organizations, for example, employees' effective i**nformation seeking behavior** is found to affect their job performance, their ability to cope with **uncertainty in tasks,** their knowledge acquisition, and their maintenance of comfortable social relationships with colleagues	p. 1666	Xu, Tan and Yang (2006)	Survey/N=154		Job Clarity	Role Ambiguity
187	**Information seeking** appears particularly important to **newcomers** who **need new task skills** as well as social information to adapt to a new environment	p. 1666	Xu, Tan and Yang (2006)	Survey/N=154		Job Clarity	Role Ambiguity
188	In contrast, studies in information science focus on the **impact of task complexity** and **uncertainty** on amount of **information seeking**	p. 1667	Xu, Tan and Yang (2006)	Survey/N=154		Job Complexity, Job Clarity	Role Conflict, Role Ambiguity
189	For example, **information seeking** is regarded as a staged process starting with the awareness of a gap between the **task demand** and one's own deficient knowledge (Belkin, 1980), which leads to selection and exploration of a topic area, followed by focused search and **collection of relevant information**	p. 1667	Xu, Tan and Yang (2006)	Survey/N=154		Job Clarity	Role Ambiguity
190	One key aspect of **context** is the seeker's information need. In organizational settings, based on the nature of the content, i**nformation needs** may be classified into: (a) **task mastery** information needs, (b) **role clarification** information needs, (c) acculturation information needs (e.g., knowledge of the norms), and (d) social integration information needs (Morrison, 1993).	p. 1668	Xu, Tan and Yang (2006)	Survey/N=154		Job Role, Job Clarity	Role Conflict, Role Ambiguity
191	Because **task problem solving** is the most **common information need** (e.g., Gerstberger & Allen, 1968; O'Reilly, 1982; Yitzhaki & Hammershlag, 2004), our empirical study focuses on this aspect, i.e., search for **task mastery information.**	p. 1668	Xu, Tan and Yang (2006)	Survey/N=154		Job Clarity	Role Ambiguity
192	**Task complexity** has been referred to as the n**umber of sources needed** (O'Reilly, 1982), coordination and joint **problem solving needed**...It has also been defined as multiplicity of paths to problem solving, **multiplicity** of **outcome**s, **conflicting interdependencies**, and **uncertain linkage** between path and outcome	p. 1670	Xu, Tan and Yang (2006)	Survey/N=154		Job Complexity	Role Conflict
193	**Task uncertainty** refers to routines or standardization of the task (O'Reilly, 1982), amount of information the seeker has (Ashford, 1986), **anxiety and feeling of being overwhelmed** (Kuhlthau, 1999), **lack of predictability, lack of information, and uncertain source**s	p. 1670	Xu, Tan and Yang (2006)	Survey/N=154		Job Clarity	Role Ambiguity
194	Particularly, **job interdependence**, competition, and supervisory relationships are hypothesized to **affect information-sourcing frequency.**	p. 370	Xu, Zhang and Zhang (2010)	Survey/N=35		Job Interdependence	Role Conflict
195	**Job interdependence** refers to the interdependence between a seeker and a source in accomplishing his or her job assignments. It reflects the horizontal cooperation between two individuals in a business process and is expected to **facilitate information seeking.**	p. 372	Xu, Zhang and Zhang (2010)	Survey/N=35		Job Interdependence	Role Conflict
196	Without **job interdependence,** there will be less communication among team members and, consequently, **less knowledge transfer and creation.**	p. 378	Xu, Zhang and Zhang (2010)	Survey/N=35		Job Interdependence	Role Conflict
197	They might **compete for a limited pool of resource**s, such as pay raises and performance bonuses. In the context of an IS project, Yetton, Sharma, and Johnston reported that **team conflict** leads to significant budget overrun [46]. Barki and Hartwick found that IS **team conflict** is reflected in disagreement, interference, and negative emotions among members [47]. **These consequences would thwart information seeking**	p. 373	Xu, Zhang and Zhang (2010)	Survey/N=35		Job Conflict	Role Conflict
198	**Engineers** need and **consume information to make decisions,** primarily aiming to create and **produce new products** based upon designs and programs and using various tools and techniques, rather than to contribute original research to professional literature. They are less interested in theories, and more in **obtaining concrete answers and practical solutions to specific problems**. Their main goal in producing information is to guide others in their organization, who may encounter the same problem when developing another product.	p. 841	Yitzhaki and Hammershlag (2004)	Survey/N=233		Job Clarity	Role Ambiguity
199	Other models, like Kuhlthau's (1987, 1989), present stages of activity, assuming **problem solving as the overall framework for the activity of information seeking**	p. 833	Yuan, Rickard, Xia, and Scherer (2011)	Mix methods/N=49		Job Clarity	Role Ambiguity

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