A MULTILEVEL ANALYSIS OF THE INFLUENCES OF EMPLOYEE EXPERTISE AND QUALITY OF INTERPERSONAL RELATIONSHIPS ON ORGANIZATIONAL KNOWLEDGE CREATION: THE MODERATING ROLE OF TRANSFORMATIONAL LEADERSHIP

A Dissertation

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ABSTRACT

In the era of information and technology, organizations' competitive advantage and sustainability increasingly depend on how they effectively create new knowledge. Drawing on relevant theories, this study examined the associations of organizational knowledge creation (OKC) with employee expertise and the quality of interpersonal relationships. It also investigated the moderating role of transformational leadership in explaining these relationships. Along with multiple preliminary data analyses, hierarchical liner modeling was performed to analyze multilevel data collected from 218 white-collar employees from 44 teams in diverse U.S. organizations.

The study results indicated that employee expertise and the quality of interpersonal relationships are positively associated with OKC. A positive relationship of OKC with transformational leadership was also supported. Unexpectedly, a negative moderating role of transformational leadership was found in explaining the relationship between OKC and the quality of interpersonal relationships. In other words, when transformational leadership is high, the positive association between OKC and the quality of interpersonal relationships is attenuated. However, there was no significant moderating effect of transformational leadership in explaining the relationship between OKC and employee expertise. That is, the impact of employee expertise on OKC is generally positive regardless of the degree to which transformational leadership is exercised.

This study contributes to both the organizational knowledge creation and leadership literature. For the organizational knowledge creation literature, it expands our understanding of how the three essential elements (i.e., *ba*, knowledge assets, and the SECI process) of

organizational knowledge creation influence and interact with each other. The current study has value in providing first empirical evidence of unique combinations of variables influencing organizational knowledge creation process. For the leadership literature, this study sheds light on a contingent or even negative side of transformational leadership. From a practical standpoint, this study contributes to white-collar organizations wanting to increase their capabilities for organizational knowledge creation by informing individual and contextual enablers and understanding the interplay among them. HR practitioners and management should provide their employees with HR interventions that help increase employee expertise and cultivate positive interpersonal relationships in the workplace. As for leadership development, transformational leadership training is recommended, but with some caveats. Research agendas for future scholars are also suggested along with the study limitations.

DEDICATION

To My Heavenly Father

Jesus Christ

To My Husband

Hakun Jang

To My Son

Aaron Yeju Jang

To My Parents

Sukwoo Jeong and Ransook Park

And

To Their Love for Me

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CHAPTER I

INTRODUCTION

In the era of knowledge-based economy and society, knowledge is a key resource for corporations to survive and advance their competitive advantage (Popadiuk & Choo, 2006; Smith, Collins, & Clark, 2005). Intellectual, intangible property is considered a primary asset for corporations, even more than tangible assets such as physical or financial resources (Marquardt, 2011; McFadyen & Cannella, 2004). To better cope with the rapidly changing business environment, it has been emphasized that continuous engagement in knowledge creation activities is critical as it allows for a corporation to lead changes through innovation and to enhance sustainability (Choo & Bontis, 2002; Ichijo & Nonaka, 2007).

Several researchers have provided empirical evidence explaining the positive association of knowledge creation with the number of new products and services (Smith et al., 2005), intellectual capital (Shih, Chang, & Lin, 2010), and firm performance (e.g., sale growth, gross profit margin, and return on assets) (Li, Huang, & Tsai, 2008). Understanding the relevant phenomenon is not only important to for-profit enterprises, but to all organizations, regardless of the organizational or industrial type (e.g., non-profit, educational settings) (Song, Bae, Park, & Kim, 2013) as it has been argued that in this era, different types of knowledge are demanded for every worker or occupation; therefore, it is difficult to compare knowledge intensity (Choo & Bontis, 2002; Von Krogh, Ichijo, & Nonaka, 2000).

Considering the importance and contribution of knowledge creation, there has been a recent upsurge in the recognition of and interest in this domain from both the academy and practice (McFadyen & Cannella, 2004). In particular, a primary issue has been how to improve

organizational knowledge creation capability and how to facilitate the process consistently and systematically (Von Krogh et al., 2000).

Problem Statement

Nonaka and Toyama (2003) conceptualized knowledge creation as "a dialectic process, in which various contradictions are synthesized through dynamic interactions among individuals, the organization, and the environment" (p. 2). Nonaka's (1994) knowledge creation theory describes the process as synthesizing and interactive because various factors at different levels interdependently and interactively play a role in creating knowledge. Nonaka and Toyama (2003) incorporated the structuration theory (Giddens, 1984) to further conceptualize these interactions where individual-level (i.e., agents) factors are influenced by environmental or contextual (i.e., social structure) factors, and vice versa, thus redefining and reproducing knowledge through social interaction.

Despite the increased interest in knowledge creation, researchers have provided little empirical evidence to help in the understanding of these factors and their interactions even though the literature acknowledges and theoretically discusses the importance of understanding influential factors and the interplay between entities (e.g., individuals or groups) and their environments in the knowledge creation process (McFadyen & Cannella, 2004; Nonaka & Toyama, 2003; Song & Kolb, 2009). In particular, relatively few researchers have empirically examined how the relevant factors at different levels within the organization interact to promote or inhibit knowledge creation. In fact, the leverage point between individual factors and organizational factors, the interactionist approach, is the most under-explored and neglected in the science of organizational creativity (Oppong, 2014; Woodman, Sawyer & Griffin, 1993). For this reason, despite the animated discussion on knowledge itself as an invaluable resource, it has

been argued that we are still far behind in understanding the organizational knowledge creation process that occurs through "dynamic and inter-linked interactions from an individual-to-societal level" (Nonaka & Toyama, 2003, p. 3).

Leadership is one of the most frequently discussed factors, theoretically and empirically, influencing the knowledge creation process (von Krogh, Nanaka, & Rechsteiner, 2012). Leadership has long been considered a key determinant of individual, group, and organizational performance, innovation, and creativity (Gumusluoğlu & Ilsev, 2009; Hu, Gu, & Chen, 2013; Ilies, Nahrgang, & Morgeson, 2007). The effectiveness of leadership depends on the characteristics of the followers and the contextual factors since leadership is a social process between the leaders and followers (Morgeson, 2005; Zhu, Avolio & Walumbwa, 2009). Considering the nature of leadership, scholars have stressed that "the study of leadership is inherently multilevel in nature" (Bliese, Halverson, & Schriesheim, 2002, p. 4). However, the literature has largely ignored the context in which leadership occurs and is influenced (Braun, Peus, Weisweler, & Frey, 2013; Liden & Antonakis, 2009). In other words, most researchers have simply investigated the main effects of leadership influencing followers' organizational behaviors, rather than its interactions with other factors such as personal attributes or the work climate (Gumusluoğlu & Ilsev, 2009; von Krogh et al., 2012). In the same vein, von Korogh and his colleagues (2012) pointed out that leadership has long been discussed in the domain of organizational knowledge creation without considering organizational contexts and knowledge assets.

Despite its importance, surprisingly, it has been only recently that researchers actively engaged in investigating leadership and its effectiveness with an interactionist approach (Liden & Antonakis, 2009). The rapid increase in the use of multilevel analyses has begun to shed light

on understanding the role of context such as the interplay between micro- and macro-organizational variables that influences a phenomenon of interest (Turner, 2015; Liden & Antonakis, 2009)

Another important problem that must be addressed is that the extant body of literature utilizing the interactionist approach across different levels has simply treated factors with a single-level data framework and has ignored their nested structures (Torraco, 2005; Turner, 2015). To appropriately and rigorously test theories driven by the interactionist approach, hierarchical linear modeling is an optimal choice since it effectively works with multilevel data (Turner, 2015) and allows the researcher to accurately capture the interplay between factors across different levels (e.g., individual, group, and organization). Hox (2010) described the motivation for the use of multilevel research as follows: "The general concept is that individuals interact with the social contexts to which they belong, that individual persons are influenced by the social groups or contexts to which they belong, and that those groups are in turn influenced by the individuals who make up that group" (p. 1).

Purpose of the Study

This study examines the relationships of knowledge creation practice with employee expertise, quality of interpersonal relationships, and supervisor's transformational leadership and investigates the moderating role of transformational leadership in explaining these relationships (i.e., knowledge creation-employee expertise, knowledge creation-quality of interpersonal relationships). In other words, the purpose of this study is twofold. First, it aims to examine the effects of employee expertise, quality of interpersonal relationships, and transformational leadership, respectively, on knowledge creation practice. Second, it investigates the interaction effects of transformational leadership in explaining the relationships between employee

knowledge creation practice and employee expertise and the quality of interpersonal relationships.

Theoretical Framework

Organizational knowledge creation is a complex phenomenon influenced by various factors at different levels, and therefore, can hardly be explained by a single theory. Three theories guided this study: 1) Nonaka's (1994) organizational knowledge creation theory, 2) Amabile's (1988) componential theory of creativity, and 3) Giddens's (1984) structuration theory. The organizational knowledge creation theory and the componential theory of creativity identify the antecedents at different levels influencing knowledge creation. The structuration theory serves as a framework to postulate the interaction effects of those factors across levels.

First, the organizational knowledge creation theory (Nonaka, 1994) provides a well-established framework for understanding how organizations can effectively create new knowledge. According to the theory, organizational knowledge is generated through a continuous interaction process between tacit and explicit knowledge, and such interaction operates with multiple modes of knowledge conversion: 1) socialization, 2) externalization, 3) combination, and 4) internalization. Although the theory discusses organizational knowledge creation rather than individual knowledge creation, it emphasizes the role of individuals because knowledge is fundamentally contained in and created by each individual (Nonaka et al., 1996). A critical assumption of the theory is that "human knowledge is created and expanded through social interaction between tacit knowledge and explicit knowledge" (p. 835). Thus, organizational knowledge creation is largely influenced by knowledge assets, such as individuals' skills, experiences, knowledge, and trust among organizational members (von Krogh et al., 2012). Furthermore, organizations should provide contexts or climates to help individuals

create knowledge (Bryant, 2003; Song, Kolb, Lee & Kim, 2012). More importantly, leaders play a critical role in bridging the gaps between organizational and individual intentions for knowledge-generating activities (Nonaka, 1994; Song et al., 2013).

Drawing on this theory, three influential factors hypothetically emerge: employee expertise, quality of interpersonal relationships, and transformational leadership. By definition, employee expertise represents the deeper level of knowledge and skills each individual possesses, which can possibly be shared with others and converted into explicit knowledge. Moreover, high quality interpersonal relationships would increase opportunities to learn from each other and share individual knowledge. Lastly, a leader's transformational leadership style would foster an atmosphere that shares a common vision to achieve organizational goals and supports organizational members in generating knowledge.

Second, Amabile (1988) developed the componential theory of creativity and identified three major components for individual creativity: domain-relevant skills, creativity-relevant skills, and intrinsic task motivation. Individual creativity is a necessary condition for organizational creativity and innovation (Amabile, Conti, Coon, Lazenby, & Herron, 1996). Domain-relevant skills and knowledge are necessary resources for an individual to generate new ideas or recombine old methods into a new one (Taggar, 2002) as pre-knowledge and skills play a role as a baseline for new methods. Moreover, an individual should possess creativity-relevant techniques to "operate on resources" (Amabile, 1998, p. 156). Expertise is particularly relevant in this regard as it represents deeper knowledge and knowledge-processing capabilities (Smith et al., 2005). The third component, motivation, becomes an agent for transforming these capabilities into action. The degree of motivation largely depends on the qualities of the environment in organizations, which significantly change individual creativity by either

promoting or undermining it (Amabile, Schatzel, Moneta, & Kramer, 2004). Work group support and supervisory encouragement have been suggested as important environmental determinants to encourage employees' creativity. In this regard, the quality of interpersonal relationships and transformational leadership have been chosen as the factors of interest for this study. Thus, the componential theory of creativity further serves to support the emergence of the three factors (i.e., expertise, quality of interpersonal relationships, and transformational leadership) and their associations with organizational knowledge creation.

Lastly, Giddens's (1984) structuration theory elucidates social phenomena as a result of dynamic, constant interactions among human agents of society and between human agents and the social structure in which they are nested. Gidden (1984) emphasized the active actions of human agents that constitute or reproduce their social structure. These actions are equally influential as much as the social structure impacts the human agents' behaviors (Jones & Karsten, 2008). In other words, human agents are capable of producing or reproducing the structure recursively (Oppong, 2014). Social structure refers to the rules and resources human agents use. Rules are widely embedded within daily routines and conversations, which are tacitly known, such as norms and procedures. Resources include "material equipment and organizational capacities" (Turner, 1986, p. 972).

Leaders are often in a primary position to mobilize organizational resources and rules and transform individual and organizational behaviors (Rondinelli & Heffron, 2009). In this sense, leadership is considered a subsystem of a larger, broader organizational structure (Amichai-Hamburger, 2013; Avolio, Kahai, & Dodge, 2001). Avolio and his colleagues (2001) further argued that leadership, as an internal system, is highly influential and interconnected with members' expertise and quality of interaction among members.

The structuration theory is often regarded as a useful analytic tool for understanding organizational interactions (Oppong, 2014). Drawing on the structuration theory (Giddens, 1984), the current study elaborates on the cross-level interaction effects of transformational leadership on the association of organizational members' expertise and their perceived interpersonal relationships quality with organizational knowledge creation practice.

In summary, grounded in Nonaka's (1994) organizational knowledge creation theory and Amabile's (1988) componential theory of creativity, the current study proposes that three factors (i.e., employee expertise, the quality of interpersonal relationships, and transformational leadership) are associated with organizational knowledge creation. Furthermore, Giddens's (1984) structuration theory suggests the moderating effects of transformational leadership with the main effects. A graphic representation of the conceptual framework for this study, grounded in the three theories, is portrayed in Figure 1. Each theory is elaborated more on in the next chapter.

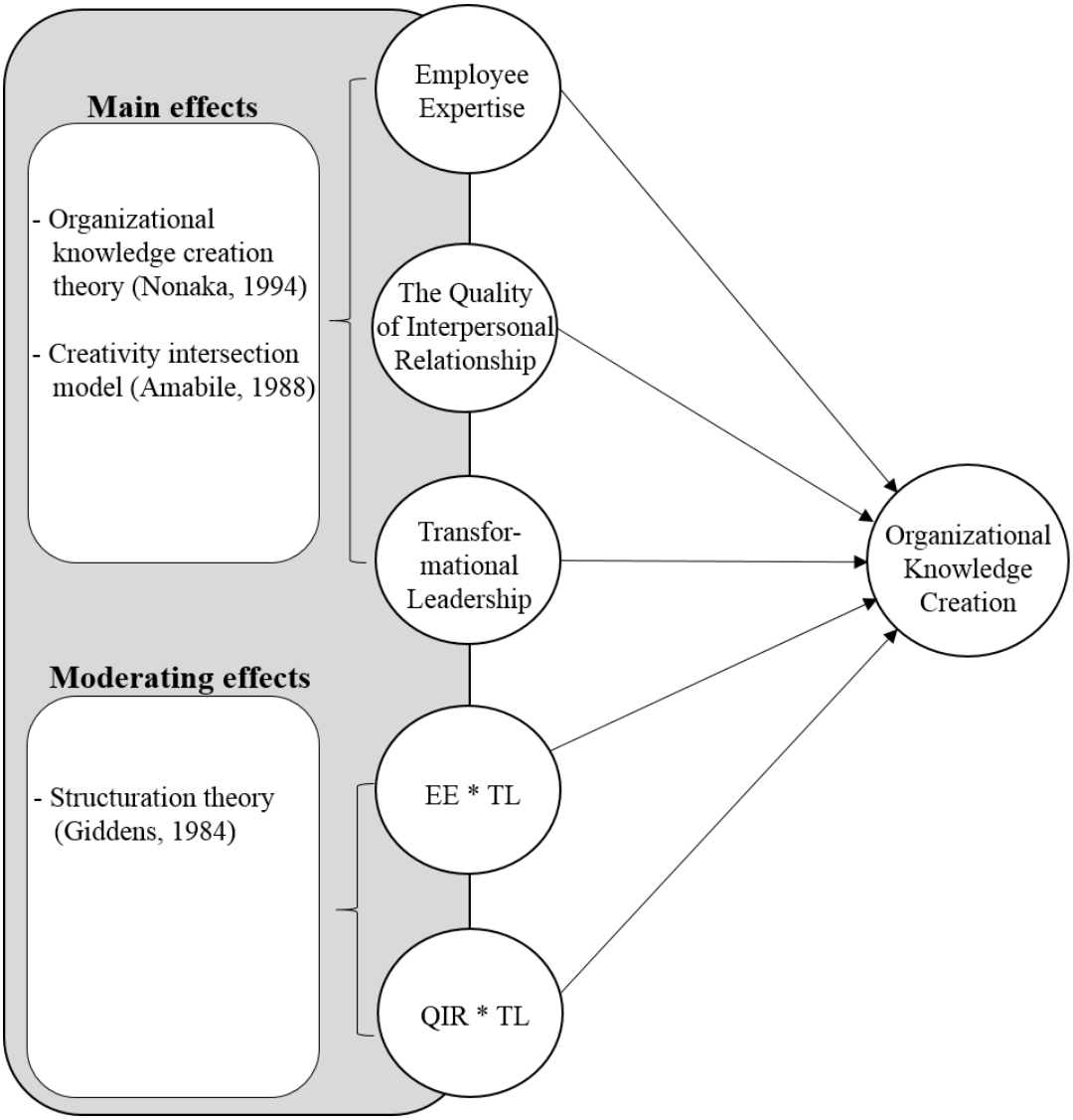

Figure 1. **Theoretical Framework for Organizational Knowledge Creation and Its Antecedents for the Study.**
Note. EE = Employee Expertise; QIR = Quality of Interpersonal relationships; TL = Transformational Leadership; OKC = Organizational Knowledge Creation.

Research Questions and Hypotheses

Based on the theoretical framework, two research questions emerge. First, what are the main effects of employee expertise, quality of interpersonal relationships, and transformational leadership on organizational knowledge creation practice? Second, what are the interaction

effects of transformational leadership on employee expertise and quality of interpersonal relationships in explaining organizational knowledge creation? To answer the research questions, five hypotheses were developed as follows (see Figure 2):

Hypothesis 1: Employee expertise will be positively associated with organizational knowledge creation.

Hypothesis 2: The quality of interpersonal relationships will be positively associated with organizational knowledge creation.

Hypothesis 3: Transformational leadership will be positively associated with organizational knowledge creation.

Hypothesis 4: The relationship between employee expertise and organizational knowledge creation will be positively moderated by transformational leadership. In other words, transformational leadership will positively moderate the extent to which employee expertise is associated with knowledge creation.

Hypothesis 5: The relationship between the quality of interpersonal relationships and organizational knowledge creation will be positively moderated by transformational leadership. In other words, transformational leadership will positively moderate the extent to which the quality of interpersonal relationships is associated with knowledge creation.

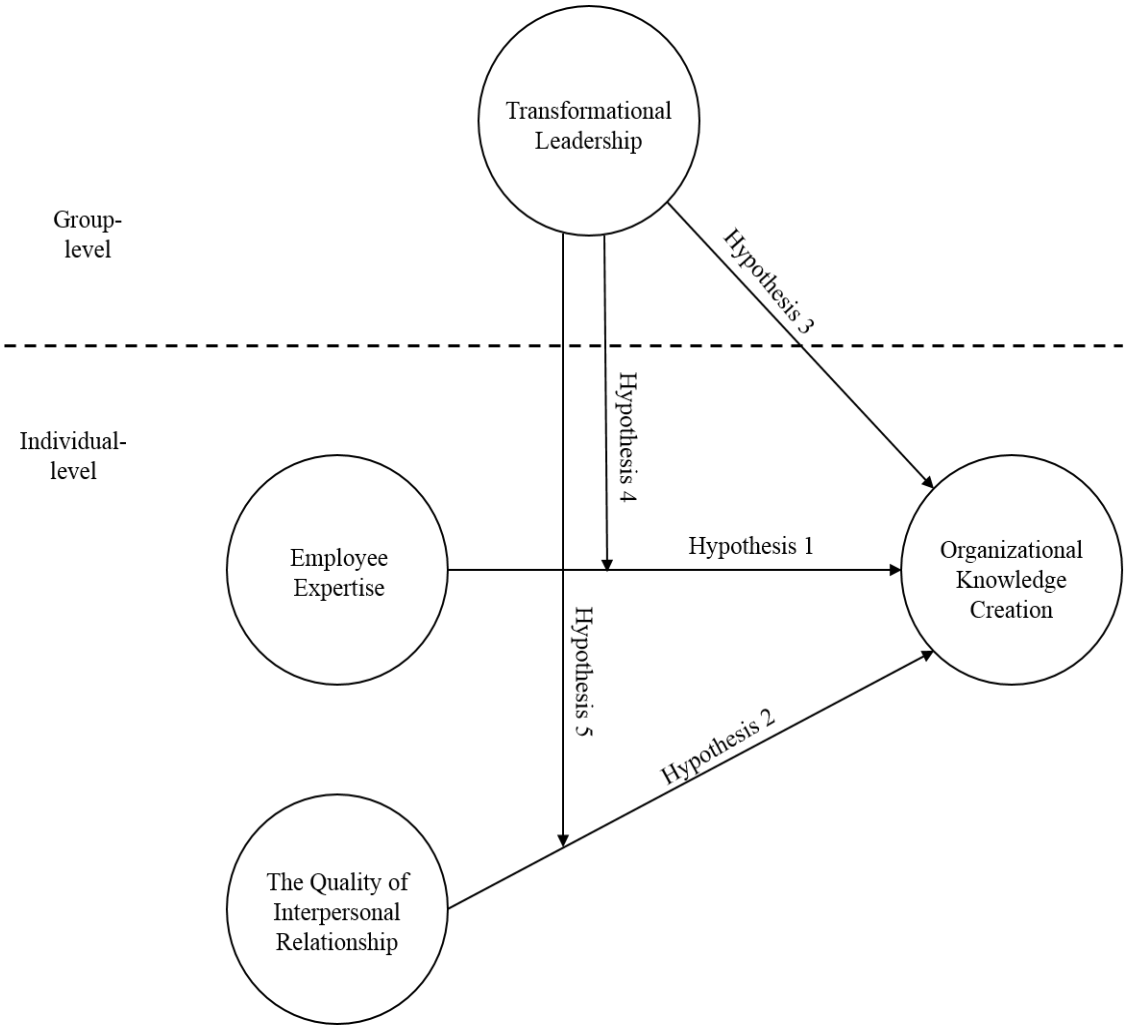

Figure 2. **Hypothesized Model.**

Significance of the Study

Organizational knowledge creation has recently received far greater emphasis than ever before as a way to enhance and sustain corporate competitiveness, so it is crucial to understand the relevant factors influencing the dynamic, complex process of organizational knowledge creation (Nonaka & Konno, 1998; Smith et al., 2005). This study contributes to expanding our understanding of organizational knowledge creation and enabling conditions or factors to provide empirical evidence of the rarely examined antecedents such as employee expertise at the

individual level and the quality of interpersonal relationships and transformational learning at the organizational level. Moreover, this study is particularly meaningful and adds knowledge to the literature in that it investigates a leverage point between employee expertise and the quality of interpersonal relationships and transformational leadership. Despite the nature of the knowledge creation process, characterized as dynamic and interactive across different levels, understanding the interactions between a person and his/her environment is the least explored area. This study is expected to stimulate other researchers' interests in cross-level influences in the science of organizational behavior.

Employee intelligence, skills, and abilities, which are highly tacit and unarticulated, are considered a repository of human capital and knowledge stock for an organization (Argote, 1999). To gauge and reflect on the amount of knowledge and expertise, researchers have suggested that formal educational level and length of service may be indicators of that stock (e.g., Eraut, 1985; Galston, 2001) and have demonstrated the positive associations with organizational knowledge creation capabilities (e.g. Smith et al., 2005). Even though previous studies have contributed to the theory of organizational knowledge creation practice, the practical application is limited since few HR interventions such as recruitment have been discussed. The current study is unique and significant in that it attempts to assess employee expertise and investigate its relationship with organizational knowledge creation. The results of the study will enrich the discussion of practical implications from the training and development perspective. Furthermore, this study will provide guidance for making decisions on corporate efforts and investments to expand individual abilities to generate new knowledge.

Active communication has been discussed as a key for organizational knowledge creation, and therefore, social climate is a critical condition to determine the extent of knowledge

exchange (Collins & Smith, 2006; Hansen, 2002). Furthermore, since tasks in the workplace have become more complex and require more cooperation within and between teams, relationship-related factors among organizational members are increasingly important. However, the current body of literature has paid little attention to the nature of workplace relationships as a learning facilitator (Carmeli, Brueller, & Dutton, 2009). To the best of my knowledge, no scholarly attempt has been made to explore the quality of interpersonal relationships in conjunction with organizational knowledge creation. Thus, the current study is meaningful in that it captures how features of interpersonal relationships are tied to organizational knowledge creation. Moreover, the study will shed light on the relational mechanisms that cultivate organizational knowledge creation and undergird the importance of fostering such interpersonal relationships. The results of this study are also beneficial to practice in that it will help corporations as they attempt to facilitate and support the process of knowledge creation by encouraging structures and processes that foster high-quality interpersonal relationships (Baker & Dutton, 2007).

This study also provides significant implications for the theory of transformational leadership, as well as the organizational knowledge creation theory. Considering the dearth of theoretical and empirical discussion on leadership interactions within a particluar context, several authors have argued that it is important to understand the personal traits or characteristics that followers carry into the leadership process (Ayman, Korabik, & Morris, 2009; Clements & Washbush, 1999). Conger (1999) suggested that transformational leadership could be more effective for a specific type of follower. Namely, the effectiveness of transformational leaders may differ depending on the followers' attributes such as self-esteem, self-identity, intellect, general mental ability, and level of professionalism (Bono & Judge, 2003). However, the current

body of literature has done a relatively poor job of identifying such interactions (Braun et al., 2013; Yukl, 1999; Zhu et al., 2009). Considering the dearth of theoretical and empirical discussions on leadership interactions within certain contexts, this study may contribute to the development of theories in this area. In practice, the study results will provide leaders with invaluable information about what and how to encourage members and cultivate an environment that is conducive to knowledge creation in terms of effective leadership behaviors.

Operational Definitions of Terms

Organizational knowledge creation: "The process of making available and amplifying knowledge created by individuals, as well as crystallizing and connecting it with an organization's knowledge system" (Von Krogh et al., 2012, p. 241).

Employee expertise: "Displayed behavior within a specialized domain and/or related domain in the form of consistently demonstrated actions of an individual that are both optimally efficient in their execution and effective in their results" (Herling, 2000, p. 20).

Quality of interpersonal relationships: The dynamic, living connection that exists between two people at work, embedded in larger groups, characterized by three structural features of emotional carrying capacity, tensility, and the degree of connectivity (Stephens, 2011)

Transformational leadership: "Behaviors of leaders who motivate the follower beyond immediate self-interests through idealized influence (charisma), inspiration, intellectual stimulation, or individualized consideration" (Bass, 1999, p. 11).

CHAPTER II

LITERATURE REVIEW

This study focuses on investigating organizational knowledge creation enablers and the interactions among enablers. In the following sections, the theoretical framework underlying the current study, literature review on the three enablers of interest, and conceptual representations of their relationship with knowledge creation and moderation effects are presented.

Theoretical Framework

The current study was guided by the underlying theoretical framework built upon the organizational knowledge creation theory (Nonaka & Toyama, 2003; Nonaka & von Krogh, 2009), the componential theory of creativity (Amabile, 1988), and the structuration theory (Gidden, 1984). The first two theories were utilized to identify influential determinants of organizational knowledge creation, and the last one served to illuminate the interaction effects among the factors associated with the outcome variable. The rationales to use these theories as well as their roles in developing the research questions and hypotheses are discussed in this section.

Organizational Knowledge Creation Theory

Nonaka's (1994) organizational knowledge creation theory explains a dynamic, constant conversion process between individuals' tacit knowledge and organizationally shared, explicit knowledge. The basic tenet of the theory is that continual, consistent interactions between individuals exchanging their tacit and explicit knowledge are powerful driving forces to develop new ideas and concepts organization-wide (Nonaka, Takeuchi, & Umemoto, 1996). The organizational knowledge creation theory has evolved over time.

Nonaka's theory articulates and stresses the knowledge conversion process between tacit and explicit knowledge. The theory proposes four patterns of knowledge conversion between tacit and explicit knowledge, known by the acronym SECI: a) socialization— sharing tacit knowledge, b) externalization—converting tacit knowledge into explicit knowledge, c) combination—exchanging explicit knowledge, and d) internalization—converting explicit knowledge into tacit knowledge.

Socialization refers to "a process of sharing experiences and thereby creating tacit knowledge such as shared mental models and technical skills" (Nonaka et al., 1996, p. 836). Tacit knowledge is often hard to codify, express, or transfer into a stated form and is largely obtained through on-the-job experiences, observation, and practice (Asheim, Coenen, & Vang, 2007). This makes it difficult to transmit knowledge formally and systematically between individuals (Nonaka & Konno, 1998). Because of this challenge, Polanyi (2009) described tacit knowledge as "we can know more than we can tell" (p. 4). Like a traditional apprenticeship, tacit knowledge can be accumulated and shared by a close interaction over time, such as spending time together and enhancing mutual trust among organizational members. Delineating socialization, Nonaka and Toyama (2003) stated that socialization "enables actors to absorb knowledge in their social environment through action and perception" (p. 5).

Externalization is a process in which tacit knowledge is converted into explicit knowledge that is in a codified and transmittable format such as written documents, theories, metaphors, concepts, or images (Nonaka et al., 1996; Nonaka & Toyama, 2006). Thus, it requires efforts to express and articulate tacit knowledge in language or with any comprehensible form. Dialogues among individuals are the primary method to create and share explicit knowledge. Throughout the interactions, individuals often detect inconsistencies or

contradictions between their knowledge, reflect on and discuss through, and then synthesize the information.

Through the combination process, different bodies of explicit knowledge collected from the interactions among individuals are captured and integrated, which eventually leads to generating new knowledge that is more complex and systematic (Nonaka, Byosiere, Borucki, & Konno, 1994). Knowledge is reconfigured through editing, sorting, or categorizing, according to the organizational needs or relevancy. At this stage, dissemination of new explicit knowledge is another important task, and the use of internet-based communication technology can accelerate the combination process (Nonaka & Toyama, 2003).

Internalization refers to a process in which the explicit knowledge that is disseminated throughout an organization is converted into organizational tacit knowledge (Nonaka, 1994). This type of conversion occurs when an individual identifies the learning needs and actually applies knowledge to his or her actions, often based on trial-and-error and experimentation. Developing manuals or texts is also helpful for individuals to reflect on the knowledge, learn it, and internalize it (Nonaka & Toyama, 2003).

It is important to note that a dynamic interaction between tacit and explicit knowledge throughout the SECI process is viewed as an upward spiral process. It becomes amplified in scale, starting from the individual level, to the group level, the organizational level, and sometimes moving up to the inter-organizational level (Nonaka, 1994; Nonaka et al., 1996, Nonaka & Toyama, 2003). In this sense, Nonaka (1994) argued that knowledge creation is a self-transcending process.

Later, Nonaka and his colleagues attempted to extend the theory as they introduced the concept of “Ba” which refers to “a shared space for emerging relationships” (Nonaka & Konno,

1998, p. 40). Ba is where knowledge is embedded and where information is interpreted to become knowledge acquired through one's interaction with others, experience, and reflection (Nonaka & Konno, 1998). Ba is not limited to a physical space, but includes mental and virtual spaces, or combinations of them (Nonaka & Konno, 1998). There are four types of Ba which correspond to each conversion mode of the SECI process, which support and speed up the knowledge creation process: 1) originating Ba for socialization, 2) dialoguing Ba for externalization, 3) systemizing Ba for combination, and 4) exercising Ba for internalization (Nonaka, Toyama, Konno, 2000).

Originating Ba is an individual, face-to-face place where individuals share their feelings, experiences, and mental models, offering a context for socialization. Dialoguing Ba is a collective, face-to-face place where individual tacit knowledge is converted into explicit knowledge, mainly through dialogue. Systemizing Ba is a collective, virtual place where different explicate knowledge is combined and disseminated through media. Exercising Ba is an individual, virtual place where new explicit knowledge is reconverted into tacit knowledge as individuals apply, experiment, and reflect on it through actions.

More recently, Nonaka and his colleagues further incorporated the concept of knowledge assets to describe the inputs, outputs, and moderators of the knowledge-creating process (Nonaka, Toyama, Konno, 2000; Nonaka & Von krogh, 2009). They defined assets as "firm-specific resources that are indispensable to create values for the firm" (p. 20), which are often invisible, tacit, and dynamic (Nonaka et al., 2000). New knowledge assets evolve and are built upon the existing knowledge assets. Such assets include individual skills, knowledge, trust or security among organizational members, and organizational routines or culture. The corporate knowledge assets are shared in Ba, where individual tacit knowledge is converted and enlarged

by the SECI process. Combining the three key interactive components (i.e., SECI process, Ba, and knowledge asset), the current study conceptualizes the organizational knowledge creation process portrayed as Figure 3.

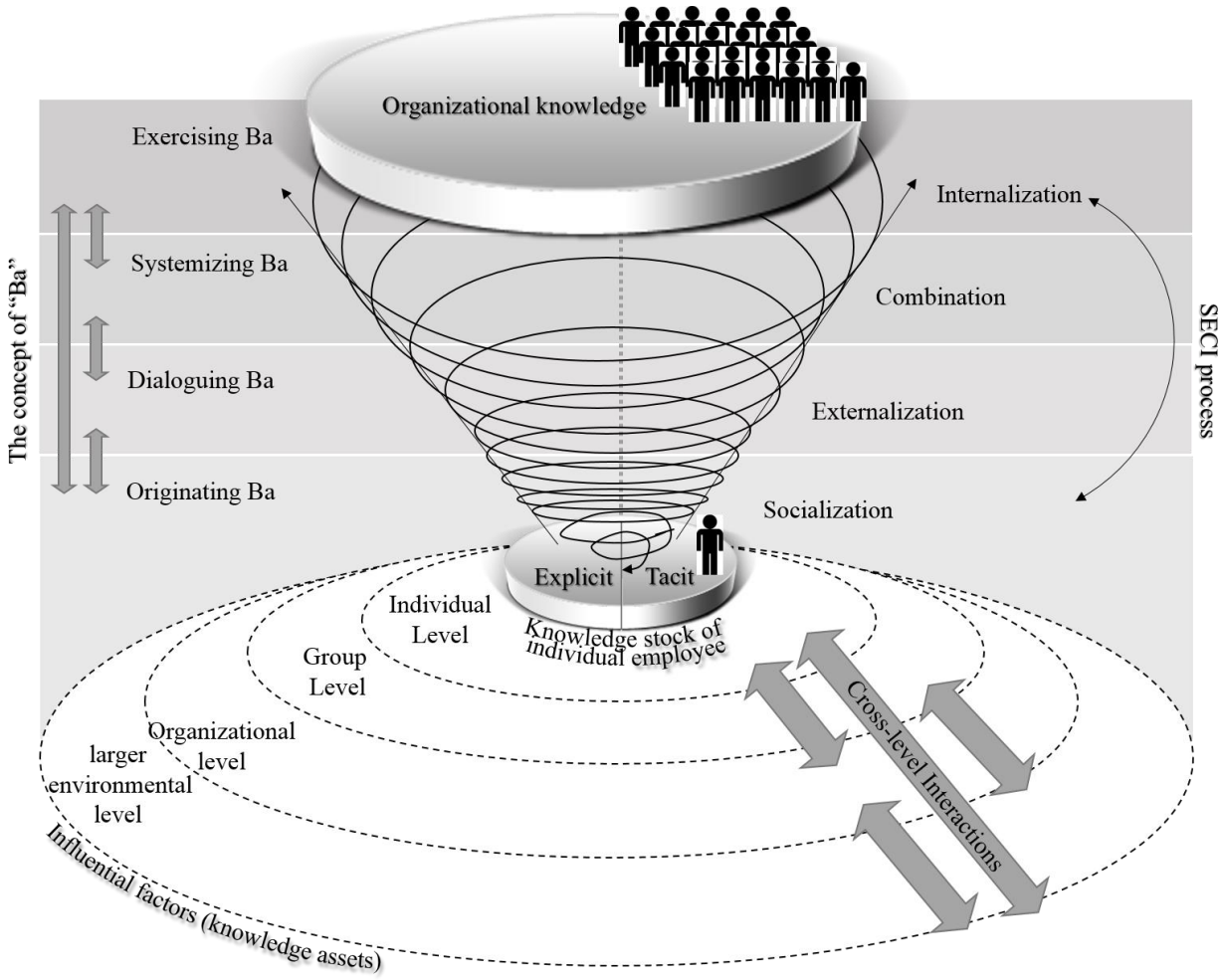

Figure 3. **Conceptual Representation of the Organizational Knowledge Creation Based on Nonaka and His Colleagues (1994, 2003, 2006, and 2009).**

Inspired by the theory, the current study focuses on investigating employee expertise, the quality of interpersonal relationships, and transformational leadership. Employee expertise is an

indicator representing the depth and amount of knowledge and skills each employee possesses (i.e., individual knowledge stock), a baseline source for organizational knowledge creation. The current study also chooses the quality of interpersonal relationships as another independent variable of interest as the theory accentuates the importance of close, continual interactions and mutual trust among individuals throughout the SECI process and acknowledges interpersonal relationships as an invaluable knowledge asset. Motivating, supporting leadership is also required as it shapes and influences all three major elements (i.e., Ba, SECI process, and knowledge assets) of organizational knowledge creation; thus, transformational leadership is another area of interest in the current study.

More importantly, an essential insight from the theory is that each individual interacts and is bounded in his/her own situational context, and "such contexts give the basis for one to interpret information to create meanings" (Nonaka & Toyama, 2003, p. 3). Thus, the theory itself makes a strong argument that there should be dynamic interactions among factors across multiple levels. However, researchers have paid little attention to the interactions influencing the organizational knowledge creation process and have been identified as the most neglected area of study (McFadyen & Cannella, 2004; Nonaka & Toyama, 2003; Oppong, 2014). Therefore, the current study also investigates the cross-level interaction effects between transformational leadership and the other independent variables (i.e., expertise, quality of interpersonal relationships) to influence organizational knowledge creation.

Componential Theory of Creativity

Creativity is defined as "the production of novel and useful ideas by an individual or small group of individuals working together (Amabile, 1988, p. 126)." More recently, the concept of creativity in the workplace is defined as "employees' generation of novel and useful

ideas concerning products, procedures, and processes at work" (Hirst, Knippenber, & Zhou, 2009, p. 281). In fact, the concept of organizational knowledge creation embraces the concept of individual creativity as it involves newly created knowledge embodied in organizational products or services (Nonaka & Takeuchi, 1995). In this sense, even though these two constructs have different focuses, they share some conceptual commonalities. "Creativity also concerns the process of creating and applying new knowledge" (Gurteen, 1998, p. 5), so has been claimed to be at the very heart of knowledge management (Gurteen, 1998; Ragsdell, 2009). Thus, the individual-creativity related theories can provide useful insights to maximize organizational knowledge creation. Individual creativity might not be sufficient, but may be a necessary condition for organizational creativity or innovation (Amabile et al., 1996; Duxbury, 2012).

Grounded in an interview study, by Amabile (1988) who provided a comprehensive theoretical framework understanding the psychology of creativity, the theory suggests three necessary components for individual creativity: domain-relevant skills, creativity-relevant skills, and intrinsic task motivation (see Figure 4). Domain-relevant skills involve factual knowledge and technical skills related to a specific domain. The first component refers to a cognitive pathway to solve a problem or complete a task by combining old knowledge with a new way or generating new knowledge (Amabile, 1988). Domain-relevant skills play a role as raw materials for individual creative productivity. For example, it is only possible to be creative in manufacturing an automobile, when a person has extensive knowledge about an automobile. The second component, creativity-relevant skills, encompass various cognitive styles such as working styles, thinking styles, and even personality traits. In her study, Amabile (1988) categorized risk-taking behaviors, social skills, persistence, concentration, independence, and self-discipline as relevant skills.

Expertise is particularly relevant with regard to the first two components because it represents deeper knowledge and creative problem solving abilities. Weisberg (2006) proposed that expertise and creativity are closely linked in that experts continuously engage in developing new techniques and skills based on their rich experience and detailed knowledge and exercise their skills adaptively to a specific situation. Weisberg (2006) continuously mentioned that expertise "serves as the basic for transfer of knowledge to the new situation, where that knowledge serves as the foundation for innovation" (p. 763). Furthermore, McLean (2011) provided empirical evidence for a positive association between employees' expertise and their creative performance.

According to Amabile's (1988) componential theory of creativity, the last component, and the most important one for individual creative performance, involves intrinsic task motivation. Amabile et al. (1996) even argued that a high degree of motivation can compensate for a deficiency in domain, creativity-relevant skills because motivation can drive a person to develop those skills. Intrinsic task motivation indicates a person's basic attitude toward a task and his/her reasons for taking responsibility for a given task. Situational variables make substantial differences in the level and frequency of employees' creative behavior (Amabile et al., 1996). In particular, several researchers have suggested that leadership enhances or deteriorates employees' creativity (Gong, Huang, & Farh, 2009; Tierney, 2008). Empirical studies have supported the association of employee creativity with transformational leadership (Gong et al., 2009) and non-controlling leadership (McLean, 2011).

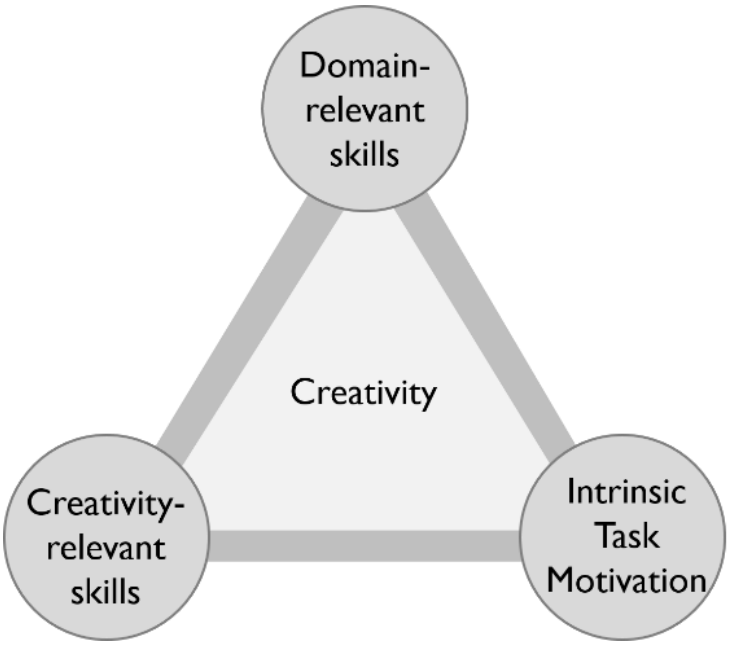

Figure 4. **Amabile's (1996) Componential Theory of Creativity.**

Structuration Theory

One of the most influential social theories in the field of organizational behaviors is Giddens's (1984) structuration theory (Albano, Masino, & Maggi, 2010; Jones & Karsten, 2008). A core concept of the theory is that a social or organizational phenomenon is the product of the constant, dynamic interplay between society (or an organization) (i.e., structure) and its individual members (i.e., agents or actors); thus, the theory describes the mutual, interdependent relationship between two parties, termed duality of a structure (Giddens, 1984). In other words, the theory argues that "human agents draw on social structures in their actions, and at the same time these actions serve to produce and reproduce social structure" (Jones & Karsten, 2008, p. 129).

Social structure implies rules and resources that suppress or promote actors' beliefs and behaviors. "Rules and resources are transformational in that they can be created, changed, and

recombined into different forms; also, they are mediating in that they are what actors use to tie social relations together" (Turner, 1986, p. 972). Rules regulate members' behaviors based on sanctions and provide the basis for effective communication. Resources denote the allocation of materials and authorities that generate power over human agents. In this sense, social structure is interpreted by human agents as power, sanctions, and communication, and human agents are capable of producing or reproducing the structure recursively. The structuration theory emphasizes that actors are equally capable of making a difference in, or even transforming social structure as their actions could reconstitute or sustain it (Oppong, 2014).

From this standpoint, Giddens rejected the traditional views that a social phenomenon is determined by either environmental factors or personal factors, and criticized the prevailing positivistic point of view that there is a single, universal truth that is stable and unchanging over time (Turner, 1986; Jones & Karsten, 2008). Similarly, Bandura's (1977) social-cognitive theory shared the basic tenet with the structuration theory as it also recognizes the roles of both personal and environmental factors, postulating that "people do not simply react to environmental events; they actively create their own environments and act to change them (Ryckman, 1997, p. 612). However, social-cognitive theory rather focuses on intrapersonal characteristics (e.g., self-efficacy) and neglects social structures, whereas the structuration theory emphasizes a nested feature of structure-agency interactions (Bandura, 1999; Oppong, 2014). In short, structuration theory considers that both the structuralist (stress on structures of society) and the humanist (stress on human agency) are equally valid, but suggests that an emphasis on either side is inappropriate (Giddens, 1984; Oppong; 2014).

The structuration theory (Giddens, 1984) serves as a theoretical framework, especially in social science, to explain the active interactions between agent features and structural features

(Albano et al., 2010; den Hond, Boersma, Heres, Kroes, & van Oirschot, 2012). However, most researchers have continued to empirically investigate the phenomenon and its associations with relevant factors separately at the individual level (i.e., agent features) and organizational level (i.e., structural features), and have neglected the interaction effects between factors across levels (see Figure 5). For this reason, it has been argued that research "leaves out a discussion of the interactions between agents and structure which the theory emphasizes" (Oppong, 2014, p. 115).

Considering this research gap, the current study attempts to examine the cross-level interactions between transformational leadership and the other independent variables, respectively, employee expertise, and the quality of interpersonal relationships, influencing a phenomenon of organizational knowledge creation. On the one hand, leadership influences individuals' actions, values, and beliefs, which is considered the internal system of organizational structure (Avolio et al., 2001). On the other hand, followers are also active actors and collaborators in the leadership influence process (Avolio, Zhu, Koh, & Bhatia, 2004).

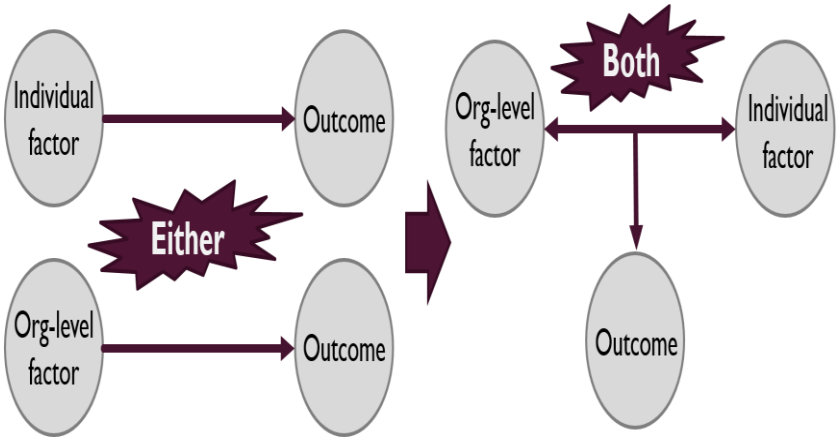

Figure 5. **Gidden's (1984) Structuration Theory.**

Individual-Level Factors and Hypotheses

Drawing on organizational knowledge creation theory (Nonaka & Toyama, 2003; Nonaka & von Krogh, 2009) and the componential theory of creativity (Amabile, 1988), three independent factors influencing the organizational knowledge creation practice were chosen for this study: employee expertise, the quality of interpersonal relationships, and transformational leadership. Reflecting on the nature and definition of each construct, employee expertise and the quality of interpersonal relationships are categorized as individual-level factors. This section provides a literature review on each construct at the individual level and the rationale for the hypotheses 1 (i.e., employee expertise will be positively associated with organizational knowledge creation) and 2 (i.e., the quality of interpersonal relationships will be positively associated with organizational knowledge creation.).

Employee Expertise

In knowledge-driven society, employees' expertise is a major factor determining the organizational competitive advantage (Kuhlmann & Ardichvili, 2015; Swanson & Holton, 2009). The concept of expertise resides within the heart of HRD, because HRD is described as "a process of developing and unleashing expertise" (Swanson & Holton, 2009, p. 252). Employee expertise represents the power of human resources that the organization possesses and has been recognized as a "secret weapon in the competitive market" (Germain & Tejeda, 2012, p. 203). For this reason, numerous corporations have invested in delivering training programs to develop employee expertise and promoting systems or processes to utilize those invaluable resources (Germain & Tejeda, 2012; Kuchinke, 1997).

Simply put, expertise represents knowledge, skills, and experiences at a deeper level, rather than a superficial level (Kuchinke, 1997). It is argued that employees with high expertise

perform faster and better and reflect on their thinking, method, and performance to improve (Ericsson, Charness, Feltovish, & Hoffman, 2006). Expertise is different from competence in that it recognizes domain-specific knowledge, experience, and problem solving skills that exceed the average and are outstanding, whereas competency denotes a set of specific skills and knowledge that is required to perform a task adequately and satisfactorily (Herling, 2000).

Numerous scholars in various discipline including psychology, knowledge engineering, and cognitive science have attempted to define expertise (Shanteau, 1992). For example, expert performance has been researched within a wide range of domains encompassing physical and cognitive domains such as music performance, sports, typing, chess, medicine, surgery, among others (Ericsson et al., 2006; Meinz, Hambrick, 2010; Wiel, Szegedi, & Weggeman, 2004). In the discipline of HRD, Swanson and Holton (2009) defined expertise as "the optimal level at which a person is able/or expected to perform within a specialized realm of human activity" (p. 258). The most frequently quoted definition in the HRD literature seems to be from Herling (2000), who describes expertise as "displayed behavior within a specialized domain and/or related domain in the form of consistently demonstrated actions of an individual that are both optimally efficient in their execution and effective in their results" (p. 20). For the purpose of this study, Herling's (2000) definition is employed, and the term employee expertise and expertise will be utilized interchangeably.

Despite a lack of consensus on the definition, some elements of expertise are commonly shared among scholars: 1) knowledge, 2) experience, and 3) problem solving (Germain & Tejeda, 2012; Herling, 2000; Swanson & Holton, 2009). These elements indicate that employee expertise is a multi-dimensional concept. First, knowledge appears in almost every theory or model describing expertise, even though categories of knowledge discussed in each work varies

(Herling, 2000; Swanson & Holton, 2009). Those types of knowledge include declarative knowledge (knowing factual information), procedural knowledge (knowing how to use knowledge), conditional knowledge (knowing when and where to apply knowledge) and meta-cognitive knowledge (knowing about knowing), and they can take a form of either tacit or explicit knowledge (Alexander, 1991; Van der Heijden, 2002). Some might argue that non-experts also possess different types of knowledge, but what distinguishes experts' knowledge from non-experts' knowledge is "how much they have, how well integrated it is, and how effectively it is geared to performance" (Bereiter & Scardamalia, 1993, p. 74).

Knowledge and expertise are also often organized in a hierarchical manner building from data, information, knowledge, to expertise. When data are gathered and understood, they become information. When information is personally applied, it is transformed into knowledge. Lastly, when knowledge is enriched with experience and education, it grows into expertise (Bender & Fish, 2000).

Second, the experience dimension of expertise has been discussed in terms of its quantity and quality. Ericsson (2008) posited, on the one hand, that for someone to achieve an international reputation in a certain field such as sports, arts, music, or sciences, it takes around 10 years of intense experience. On the other hand, he emphasized that the quality of experience actually determines superior performance, rather than a mere duration of the involvement. For example, from their observations, Bereiter and Scardamalia (1993) concluded that the length of service may distinguish old-timers from beginners, but not experts from experienced non-experts.

Third, experts use their deep knowledge and experience effectively and cooperatively to solve complex problems (Herling, 2000; Slatter, 1990; Swanson & Holton, 2009). They compile

three types of knowledge to solve problems: domain knowledge, task knowledge, and cooperative knowledge. Experts gain their domain knowledge by continuously engaging in research to improve their performance, and as they apply such knowledge in practice, they acquire task knowledge. Moreover, they communicate and interact with others using cooperative knowledge (Herling, 2000; Swanson & Holton, 2009).

Taking these core elements into consideration, several scholars have described the characteristics of experts. Kuchinke (1997) stated that "someone who has expertise is typically seen as highly skilled and knowledgeable in some specific area, is presumably dedicated to keeping up-to-date through practice and continued learning, and has a high level of commitment to the area or domain of expertise (p. 73). Ericsson et al. (2006) explained that "the development of expertise is largely a matter of amassing considerable skills, knowledge, and mechanisms that monitor and control cognitive processes to perform a delimited set of tasks efficiently and effectively. Experts restructure, reorganize, and refine their representation of knowledge and procedures for efficient application to their work-a-day environments" (p.57).

Employee Expertise and Organizational Knowledge Creation

Individuals' tacit knowledge is the resource, origin, or root of organizational knowledge (Nonaka & Toyama, 2003). Employee expertise represents the quality and quantity of tacit knowledge an individual possesses (Herling, 2000; Hinds, Patterson, & Pfeffer, 2001). Experts have larger knowledge bases and more complex, accessible knowledge structures, than those of novices (Lord & Maher, 1990). Experts know whether or when to use their knowledge and skills and adjust or blend their knowledge to meet the specific needs or features of each case (Eraut, 2005). In this sense, "any individual with expertise is able to create uniquely new knowledge" (Bender & Fish, 2000, p. 126). Empirical studies have also provided evidence that "experts have

richer and more detailed schemata to use in decision making, greater relevant knowledge to recall, an ability to focus more on inconsistencies in information, and less bias in their recall of information" (Smith et al., 2005, p. 348).

Knowledge is an inextricable part of expertise, and the organizational knowledge creation process leverages individual expertise to create organizational expertise (Ackerman, Pipek, & Wulf, 2003; Bereiter & Scardamalia, 1993). In other words, individual expertise is an invaluable knowledge asset in the knowledge creation process because, fundamentally, each individual possesses and creates knowledge (Ackerman et al, 2003; Chen & Huang, 2008; Herling & Provo, 2000).

Development of expertise does not merely entail mental capacities at the individual level, but also involves a social process because what makes knowledge and skills valuable is their social organization (Eraut, 2005). Moreover, through the interactions with peers and supervisors, expertise is further developed as complementing each other's strengths and weaknesses (Hakkarainen 2004). In this sense, employee expertise can be an input, output, or even a moderator in the organizational knowledge creation process.

Despite the importance and inseparable concept of expertise within the topic of HRD and knowledge creation, surprisingly, few research attempts have been made to empirically investigate the construct (Germain & Tejeda, 2012). One of the reasons may be because a standard instrument to measure expertise is elusive (Kuchinke, 1997). It is difficult to capture the necessary or required technical knowledge to obtain expertise as it differs across occupations and specific tasks or domains (Germain & Tejeda, 2012; Swanson & Holton, 2009).

Quality of Interpersonal Relationships

Human beings shape and find meaning and value about who they are and what they do through social interactions (Maslow, 1968; Schein, 2010). Thus, positive organizational scholarship emphasizes the creation of contexts in which people flourish and pays attention to effective relational practice as one of the critical keys that energizes the workplace (Bernstein, 2003; Cameron, Dutton, & Quinn, 2003). The quality of connections among individual members has been suggested to be a key to establishing effective relational practice (Dutton & Heaphy, 2003, Van den Bossche et al., 2006).

Connections in the workplace denote "short-term, dyadic positive interactions at work" that contribute to a relationship over time" (Stephens et al., 2011, p. 3). Positive human connections are "self-reinforcing, create positive spirals of excellence" (p. 270) and substantially influence individuals' well-being and work performance (Bernstein, 2003). Individuals who have high-quality connections at work feel more alive, open, engaged, and competent (Dutton, 2003). By constrast, low-quality connections provide a negative context where individuals feel disrespected and distrusted; consequently, it erodes people's initiatives, commitment, and loyalty (Dutton & Heaphy, 2003).

Dutton (2003) argued that a high-quality connection does not necessarily require an extensive, intimate relationship, and even one-email exchange can generate powerful energy and vitality between people. Thus, the quality of connections matters, but it varies. Dutton and Heaphy (2003) defined the quality of connection as "whether the connective tissue between individuals is life-giving or life-depleting (Dutton & Heaphy, 2003, p. 263) and discussed three structural features of connection-quality: higher emotional carrying capacity, tensility, and the degree of connectivity. Emotional carrying capacity indicates the extent to which members

withstand or communicate the expression of a broad range of emotions that include both negative and positive feelings (Carmeli et al., 2009). Tensility denotes a relational resilience to withstand conflicts or tensions and bounce back from setbacks (Stephen et al., 2003). The degree of connectivity describes a level of openness to new ideas, challenges, and influences (Dutton & Heaphy, 2003).

Dutton and Heaphy (2003) concurred that people in high quality connections share three subjective experiences: feelings of vitality and aliveness, positive regard, and mutuality. Feelings of vitality and aliveness imply an affective experiences associated with a positive energetic arousal and well-being both physically and mentally (Kark & Carmeli, 2009). Positive regard captures a feeling of being loved, respected, and known (Stephen et al., 2003). Mutuality describes the sense of full participation and engagement of people in the connection (Dutton & Heaphy, 2003).

The quality of interpersonal relationships in work contexts significantly influences members' learning behaviors, psychological safety (Carmeli et al., 2009), higher error detection (Edmondson, 2004), and creative work involvement (Kark & Carmeli, 2009), work satisfaction, organizational commitment, and job performance (Liden, Wayne, & Sparrowe, 2000). The literature has also provided empirical evidence that the positive social interactions and connections at work also have physiological impacts on members such as on the cardiovascular system, immunity, and neuroendocrine system (Heaphy & Dutton, 2008).

Considering its significant contribution, researchers have investigated the organizational contexts that shape the patterns of social interactions, either enhancing or deteriorating the quality of interpersonal relationships (Cross & Parker, 2004; Dutton, 2003). Situated activities, organizational culture, and leadership can provide structural opportunities for connections and

largely influence the process that builds positive connections between members (Dutton & Heaphy, 2003; Heaphy & Dutton, 2008). Regarding situational activities, a socialization process in organizations can be highly designed, planned, and structured to increase the opportunities of building high quality interpersonal relationships. For example, assigning a specified relational role such as a mentor or creating a social space for interactions would increase the possibilities of positive social interaction (Baker & Dutton, 2007; Dutton, 2003). Building rules to facilitate relational meeting practices, "marked by the encouragement of listening, supporting and equipping meeting members to contribute, more respectful engagement, task enabling, and trust" is also helpful (Heaphy & Dutton, 2008, p. 153).

Furthermore, organizational culture, manifested by shared basic assumptions, values, beliefs, and norms (Schein, 2010), can nourish patterns of supporting and helping others, which, in turn, shape perceptions of positive social interactions (Liden et al., 2000). Lastly, leadership is fundamentally intertwined with both organizational culture and situated activities as they are created, influenced, and manipulated by leaders (Heaphy & Dutton, 2008; Schein, 2010).

Quality of Interpersonal Relationships and Organizational Knowledge Creation

Effective relational practice has become more crucial for organizational success than ever before, because, the nature of tasks in the workplace has changed to be more cognitively complex which requires more collaborations among members (Dutton & Heaphy, 2003; Fischer, 2000). Each individual brings unique values and experiences to an organization; therefore, the challenge is how to converge such differences into shared understanding to utilize their knowledge effectively throughout the organization (Van den Bossche, Gijselaers, Segers, & Kirschner, 2006). Research has also indicated that merely putting experts or individuals who are versed in a certain knowledge area does not guarantee that they can solve a complex problem;

what is important is understanding the factors that make up successful collaboration among the workers (Van den Bossche et al., 2006).

Each organizational member is an essential actor in creating new knowledge, and effective interactions and connections between individuals allow higher creativity, informational sharing, and concept creation, all of which improve the flow of knowledge (Dutton & Dukerich, 2006; Von Krogh et al., 2000, Nonaka & Toyama, 2003; Nonaka, 1994). Knowledge is co-created and emerges from relational interactions among members, rather than by an individual operating alone (Nonaka et al., 2000); thus, "effectiveness in a knowledge intensive workplace depends on…the degree to which an organization has constellations of positive collaborative working relationships throughout (Fletcher, 2012, p. 86). For example, mutual trust between individuals synergizes and lubricates the knowledge creation process (Nonaka et al., 2000). Politis (2003) provided empirical evidence of a positive relationship between interpersonal trust (faith in peers and management) and knowledge acquisition.

In summary, in the organizational knowledge creation process, the quality of interpersonal relationships is particularly important and relevant since human interaction is the core engine that drives knowledge conversion. However, the quality of relationships between people at work has been underappreciated and devalued in organizational settings (Dutton & Dukerich, 2006). While many corporations have made costly investments in installing and maintaining knowledge-management technologies, they have often neglected the power of the quality of interpersonal relationships among employees in spreading, sharing, and generating knowledge (Abrams, Cross, Lesser & Levin, 2003).

Moreover, despite the importance and contribution of relationships in organizational behaviors, only a handful of studies have empirically examined the quality of interpersonal

relationships (Carmeli et al., 2009; Dutton, 2003). Even though several studies have investigated the quality of relationship between members and leaders (e.g., leader-member exchange literature) (Liden, Sparrowe, & Wayne, 1997), relationships between members have largely been ignored in the current body of the literature (Braun et al., 2013; Liden, et al., 2000). This study will be the first attempt to examine the relationship between organizational knowledge creation and the quality of interpersonal relationships.

Organizational-Level Factor and Hypothesis

Given that the impact of leadership is implemented at a larger organizational level, leadership is generally considered the organizational unit of analysis (Gavin & Hofmann, 2002; Zaccaro & Klimoski, 2002). This section provides a literature review on transformational leadership and the rationale for the Hypothesis 3 (i.e., transformational leadership will be positively associated with organizational knowledge creation).

Transformational Leadership

Transformational leadership has been generally treated as effective leadership behaviors influencing multiple levels of the organization (Liden & Antonakis, 2009). A large volume of the literature has empirically demonstrated the impact on positive organizational behaviors such as organizational commitment (Avolio et al., 2004), work engagement (Song et al., 2012), organizational citizenship behavior (Piccolo & Colquitt, 2006), and job satisfaction (Braun et al., 2013), leading to superior individual performance, organizational performance, and innovation.

Transformational leadership is interpreted as a leader's motivational influence on followers to "achieve performance beyond expectations by transforming followers' attitudes, beliefs, and values" (p. 330) and is often contrasted with transactional leadership that requires the compliance of followers to the leader's wishes based on contingent rewards and exchanges

(Rafferty & Griffin, 2004). Transformational leadership focuses on mentoring, inspiring, empowering, and motivating all of which develop employees' potential abilities and achieve desired organizational performance (Hoyt, 2013). There are behavioral dimensions that constitute this particular style of leadership. Originally, Bass (1985) established four behavioral dimensions including idealized influence, intellectual stimulation, inspirational motivation, and individualized consideration. Idealized influence refers to the charismatic, role modeling behaviors of the leader and then are emulated by the followers (Bass, 1985; Piccolo & Colquitt, 2006). Intellectual stimulation denotes a leader's behavior to stimulate followers to generate new, creative ideas to solve a problem (Bass, 1985). Inspirational motivation describes a leader's behavior in articulating his or her vision which is emotionally appealing and leads to motivation and commitment among the employees (Song et al., 2012). Individualized consideration refers to a leader's supportive behavior, paying attentions to followers' personal challenges and needs (Bass, 1985; Song et al., 2012). More recently, based on empirical data and theoretical conceptualization, Rafferty and Griffin (2004) reframed and expanded the dimensions to include identified vision, inspirational communication, supportive leadership, intellectual stimulation, and personal recognition.

Leadership is a social process of actively interacting with members in a situated environment (Liden & Antonakis, 2009). In other words, leadership is socially constructed; thus, understanding the context interacting with leadership is a critical job for the relevant literature. From this standpoint, several scholars have argued that "leadership is by nature a multiple-level phenomenon," and those levels can vary and are driven from differences within teams or differences between teams (Chun, Yammarino, Dionne, Sosik, & Moon, 2009, p. 689).

Therefore, the effectiveness of transformational leadership might differ by the situated contexts such as followers' attributes or environmental characteristics.

Despite the predominant conception and expectation on transformational leadership as effective leadership behaviors (Bass & Riggio, 2005; Ayman et al., 2009), several researchers have postulated that transformational leadership does not always yield positive, effective results in every circumstance (Clements & Washbush, 1999). For example, Ayman and colleagues (2009), in their article "Is transformational leadership always perceived as effective?" investigated the impact of the gender composition of the leader-follower relationship on the relationship between leaders' transformational leadership behaviors and their followers' perceptions of the leaders' effectiveness and found that male followers devaluate female leaders' leadership effectiveness. Furthermore, in educational settings, Jeong, Hsiao, Kim, Song, and Bae (2015) found a negative moderation effect of principals' transformational leadership on teachers' work engagement when teachers' professionalism was high.

Therefore, it is crucial to understand the role of contexts or the leader-follower dynamics in the transformational leadership process. However, surprisingly, the psychological mechanisms and processes of leadership by which leaders influence knowledge creation has received very little attention, especially in terms of its moderating effect or interacting effect with the followers' characteristics (Avolio, et al., 2004; Conger, 1999). In other words, more research is needed to address the contingencies around which leadership is effective and in what circumstances (e.g., the quality of interpersonal relationships) or conditions (e.g., follower's personal traits), to enhance the organizational knowledge creation practice.

Transformational Leadership and Organizational Knowledge Creation

Leadership plays a pivotal role in the organizational knowledge creation process in terms of its effectiveness and efficiency (Bryant, 2003; Nonaka & Toyama, 2005). Leaders are capable of developing and redefining knowledge assets, providing knowledge visions, and building and energizing Ba. Leaders interact with organizational members not only in the SECI process and Ba and how they manage and develop knowledge assets, but they also actively participate in all three core elements (i.e., SECI process, Ba, and knowledge assets) (Nonaka et al., 2000).

Pertinent to the organizational knowledge creation, providing a knowledge vision is one of the important roles of leaders because it inspires organizational members to be committed to achieving that vision. As a leader suggests and articulates a desired blueprint for the organization and the necessary, relevant knowledge, the vision becomes a part of the individual members' personal value system (Avolio et al., 2001). Leaders can have a powerful influence on followers since they manage and shape the meanings and realities in which followers collectively make sense out of their daily work experiences (Nonaka & Toyama, 2005; Piccolo & Colquitt, 2006). An articulated knowledge vision from the leaders motivates organizational members to identify and retain relevant knowledge, and consequently, it vitalizes and accelerates the knowledge creation process (Nonaka, 1994). More importantly, leaders should make efforts to engage in constant dialogues with members to help communicate and internalize the knowledge vision (Nonaka & Toyama, 2005).

Another important role of leaders in facilitating the knowledge creation process is to develop and redefine the corporate knowledge assets as they continuously strive to identify what knowledge assets are available at present and what is needed to achieve the organizational vision (Nonaka et al., 2000). Based on the identified gap between the current status and the idealized

one, leaders establish a strategy to utilize, maintain, or even challenge the current knowledge assets and develop the new ones (Nonaka & Toyama, 2005; Von Krogh et al., 2012)

Furthermore, the influence of leaders on Ba across physical, mental, and virtual spaces in terms of its formation, evolution, and connection among various types of Ba is absolute as leaders possess the power to allocate human resources, finances, and materials (Rondinelli & Heffron, 2009; Von Krogh et al., 2012). Ba emerges spontaneously and intentionally. For example, leaders may facilitate Ba by arranging the physical spaces such as conference rooms, or cyberspace such as online discussion forums, or mental space such as shared objectives (Nonaka & Toyama, 2005). Leaders can also organize a task force to effectively cope with any external or internal changes, which is another example of generating Ba. Furthermore, leaders are also capable of leveraging individuals' change adaption behaviors as they provide meaning and interpretations of experiences to those changes (Nonaka, 1994). To better support the process forming and energizing Ba, it is crucial for leaders to foster the interactions among individuals and monitor external environmental changes.

Leaders who facilitate organizational knowledge creation share a substantial commonality with five behavioral dimensions of transformational leadership: a) vision, b) inspirational communication, c) supportive leadership, d) intellectual stimulation, and e) personal recognition (Rafferty & Griffin, 2004). Articulating an idealized picture of the organizational future promotes the internalization of values and goals among employees directing their adaptive behaviors (McClelland, 1975), which mixes with the role of expressing the knowledge vision. Inspirational communication involves delivering positive and convincing messages or statements to employees to build motivation, enthusiasm, and determination to help them achieve the vision and goals (Rafferty & Griffin, 2004; Yukl, 1981).

Supportive leadership suggests that leaders have individualized concerns or attention for their employees by understanding their personal needs and creating a psychologically safe environment (House, 1996). This behavioral dimension is useful and requires that leaders energize Ba, and facilitate interactions among employees. Intellectual stimulation is related to the leaders' behaviors encouraging creative ideas or solutions to new changes or problems among individuals (Bass, 1999). It is similar to the concept of creative chaos that triggers the knowledge creation process by purposefully introducing changes. In the knowledge creation process, it is imperative that leaders should stimulate organizational members to expand their intellectual capacity and encourage knowledge divergence in their dialogues. Free and on-going discussions empower organizational members to share their knowledge and create new ideas. At the same time, all leaders in the organization should bring a converging point to their continuous dialogues by providing the corporate vision as a guideline or focus for knowledge to be generated (Nonaka, 1994).

Lastly, personal recognition for excellent performance is another way to energize Ba by allocating resources and developing knowledge assets. In short, the policies, systems, or organizational climate that are generated and developed by transformational leaders are likely to produce a context that promotes the process of knowledge creation (Nonaka, 1994). In this sense, understanding the characteristics of transformational leadership provides insightful about the roles of leaders in the knowledge creation process (Bryant, 2003). Empirical studies have also supported the positive association of transformational leadership with knowledge management behaviors (Crawford, 2005), organizational learning (García-Morales, Jiménez-Barrionuevo, & Gutiérrez-Gutiérrez, 2012), and organizational knowledge creation (Song et al., 2012).

Interactionist Models of Organizational Knowledge Creation

Drawing on the structuration theory (Gidden, 1984), this study further hypothesizes about the cross-level interactions among independent factors influencing organizational knowledge creation. This section provides the rationales for the Hypotheses 4 (i.e., the relationship between employee expertise and organizational knowledge creation will be positively moderated by transformational leadership) and 5 (i.e., the relationship between the quality of interpersonal relationships and organizational knowledge creation will be positively moderated by transformational leadership).

Employee Expertise and Transformational Leadership

Individual expertise in the domain can be extended by engaging in deliberate practice (Ericsson & Charness, 1997). Deliberate practice is "deliberate" because it consists of highly structured activities or specifically designed tasks, aimed at performance improvement; it is practice that requires a deep, long-term engagement in those activities mindfully and repeatedly, with avoidance of exhaustion (Ericsson, 2008). Motivation to learn plays a pivotal role in having a successful engagement in deliberate practice and drawing a desirable outcome throughout the learning process (Ericsson, Nandagopal & Roring, 2009). In addition to motivation, feedback on performance and social support provided by peers or supervisors is salient for successful expertise development (Hattie & Timperley, 2007). Considering the characteristics of deliberate practice, "excellence is not as much a reflection of the person; rather, excellence depends on both culture and context" (Ziegler & Baker, 2013, p. 19). This type of culture and context are often created and manipulated by leaders' decisions (Schein, 2010).

Transformational leadership style is likely to provide an effective atmosphere for organizational members to engage in deliberate practice. Transformational leaders foster job

autonomy and empowerment as they respect individual members' goals, values, and beliefs. They also develop followers' self-engagement and high involvement by articulating inspirational values and meaningful rationales for the work (Bono & Judge, 2003) Thus, transformational leaders support the core elements of deliberate practice as they uplift the motivation and morale of organizational members, inspire them intellectually, and maximize the potential capabilities in each member (Bass, 1999; Hoyt, 2013).

Organizational members with a high level of expertise also have a tendency to make decisions or solve problems on their own and autonomously, based on their extensive experience and knowledge in the domain (Hambrick & Mason, 1984). Thus, high-controlling leadership may be detrimental for those members as it limits their autonomous exertion and experimentation when making decisions that lead to generating new knowledge (Smith et al., 2005). Similarly, Bass and Avolio (1994) concurred that consultant style of leadership may foster followers' expertise to the fullest.

Despite the clear arguments about the intertwined influence of transformational leadership on employee expertise and knowledge creation, so far, to the best of my knowledge, no studies have examined the moderating effect of transformational leadership in explaining the association between employee expertise and knowledge creation.

Quality of Interpersonal Relationships and Transformational Leadership

Considering the importance of collaboration in modern works and relational practice, the definitions of effective leadership increasingly conceptualize "the ability to create conditions under which co-constructed outcomes, such as coordinated action, collective achievement, and shared accountability, can be achieved" (Fletcher, 2012, p. 86). Building high quality connections or interpersonal relationships among members is considered an important leadership

task as it enhances organizational learning and innovation (Carmeli, Ben-Hador, & Waldman, 2009; Fletcher, 2007). Leaders should attempt to develop a shared culture or values that cultivate high quality connections in organizations. Leaders are capable of influencing the relationships among team members as they structure the organization, select and allocate a mix of people for each function, and promote their interactions (Liden & Antonakis, 2009). Furthermore, leaders construct the relational climate as a relational role model because leaders' behaviors related to interacting with members determine the quality of interpersonal relationships so the leaders' example and attitudes are likely to be emulated by individual members who are building their own interactions with other members (Carmeli et al., 2009; Dutton & Heaphy, 2003; Fletcher, 2007).

In their qualitative study, Abram et al. (2003) emphasized the importance of the leaders' role in building interpersonal trust, and they identified several leadership behaviors that promote members' learning and knowledge transfer: 1) ensure frequent and rich interaction; 2) engage in collaborative communication; 3) ensure that decisions are fair and transparent; 4) establish a shared vision; 5) create personal connections; and 6) be consistent between word and deed. Carmeli and her colleagues (2009) proposed leader relational behaviors that encourage collaboration and open communication and cultivate a trusting work environment. They also provided empirical evidence of its positive association with the quality of relationships among the members of a group.

Such leadership behaviors share some similarities with transformational leadership. Transformational leaders consistently care for and support individual members and demonstrate their trust in the members by providing an autonomous work environment with empowerment (Bass, 1999; Yukl, 1981). Transformational leaders are also committed to mentoring where open,

collaborative communication is necessary (Hoyt, 2013; Rafferty & Griffin, 2004). Empirical studies have also supported a positive association of transformational leadership with trust between the supervisor and team (Braun et al., 2013), indicating leaders' influence on building relations.

Surprisingly, however, compared to the popularity of theoretical discussions on transformational leadership, studies investigating organizational contexts enabling high quality relationships are lacking and have been largely neglected (Heaphy & Dutton, 2008). Even more surprising is that empirical work linking transformational leadership to the development of the quality of interpersonal relationships is even rarer (Carmeli et al., 2009).

CHAPTER III

METHODOLOGY

This chapter describes the research design, population and sample of the current study, instruments used to measure the four factors of interest, data collection procedure, and data screening and analysis methods and techniques.

Research Design

A social phenomenon emerges through interactions between individuals and larger social contexts. Individual behaviors are bounded in larger social contexts such as groups, organizations, societies, or nations (Burke, Joseph, Pasick, & Barker, 2009). Thus, inherently, social research involves a multilevel structure (e.g., individual employees are nested within an organization); therefore, multilevel modelling that allows incorporating variables at different hierarchical levels is required (Paterson & Goldstein, 1991). The most common questions in multilevel modelling include how individual and group variables influence one single individual outcome variable, and how group level variables moderate individual-level relationships (Gavin & Hofmann, 2002; Hox, 2010).

One of the long-held problems in the traditional studies of social science and management has been to analyze "all available data at one single level" (Hox, 2002, p. 4), which causes statistical and conceptual problems (Hitt, Beamish, Jackson, & Mathieu, 2007; Paterson & Goldstein, 1991). Researchers have not properly recognized and understood the implications of clusters (Killip, Mahfoud, & Pearce, 2004). Individuals belonging to the same institute (i.e., cluster) tend to have similar characteristics as they share the same cultural, political, and historical influences (Burke et al., 2009). Therefore, from the statistical point of view, in

multilevel data, the assumption of independence of observations, on which standard statistical tests heavily rely, is most likely to be violated. The presence of the clustering effects distorts the estimates of the standard errors (Dedrick et al., 2009). More appropriate analytic technical methods taking the clustering effect into account should be considered and are available with the advent of advanced statistical packages (Turner, 2015).

As delineated in the literature review section, drawing on three theories, this study incorporates three independent variables that influence the individual-level outcome variable (i.e., organizational knowledge creation): (1) employee expertise (the individual level); 2) the quality of interpersonal relationships (the individual level); and 3) transformational leadership (the group level). Furthermore, this study models an interactionist approach as it investigates cross-level interaction effects: how transformational leadership (group-level) moderates the relationships between individual-level variables. As a result, five hypotheses were developed, and the purpose of this study is in line with the goal of multilevel analysis.

For the purposes of the current study, a cross-sectional survey study was designed. The instrument used to measure each construct will be discussed later in this section. Two different versions of a web-based survey questionnaire were developed: one for team members and another for team leaders. Sampling units are groups already established in the organizations at hand; therefore, the study employed both cluster sampling and convenience sampling methods. Considering the multilevel data structure where individual employees are nested within teams (see Figure 6), hierarchical linear modeling to a two-level design is employed for the data analysis.

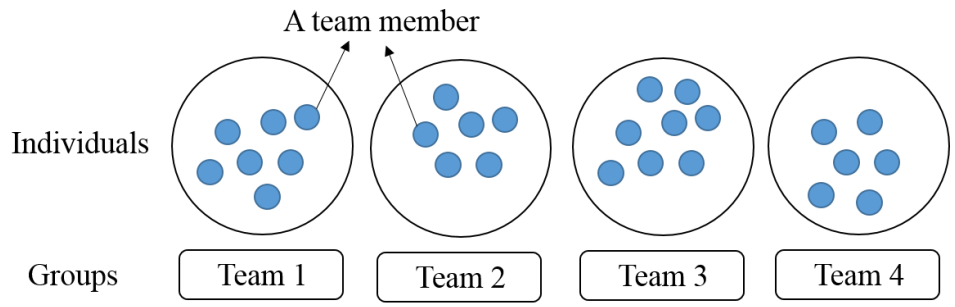

Figure 6. **Two-Level Nested Data Structure.**

Population and Study Sample

The target population for the current study is white-collar employees in U.S. companies across diverse industrial types, sectors, and sizes. White collar workers are generally considered knowledge workers whose tasks are more intellectual and creative, rather than routine and physical (Hopp, Iravani, & Liu, 2009). Some might think the target population should be limited to knowledge intensive industries because the focus of the current study is organizational knowledge creation practices. However, in fact, despite its popular wide use, the term "knowledge intensive industry" is superficial and covers everything and nothing because "all economic activity rests on knowledge" (Smith, 2000, p. 3). In the era of the knowledge-based economies, different types of knowledge are demanded for every worker or occupation; therefore, it is difficult to compare knowledge intensity (Choo & Bontis, 2002; Von Krogh et al., 2000). Furthermore, the focus of this study is to investigate the organizational knowledge creation enablers, not to gauge or compare the extent of knowledge intensity of each industry.

Regarding the size of companies, large companies seem to better support the current study in terms of the purpose and multilevel data collection as there are a wide range of teams and departments with relatively large numbers of members. Moreover, large companies are able to provide rich resources and opportunities to interact and collaborate among teams. In contrast,

small and medium-sized enterprises (SMEs) have fewer teams where only a few individuals work together in each unit (Brown, Hamilton, & Medoff, 1990). However, this study does not exclude or neglect SMEs, because they also need and require knowledge as a critical success factor as much as do large companies (Wong, 2005). Such wide inclusions will provide better generalizability of this study and broader applications of the findings. Furthermore, to hold constant the effects of the variances that are possibly driven from the organizational characteristics, the current study includes industry types, sectors, and sizes as control variables at the group level.

Multilevel analysis literature has provided few guidelines to help researchers determine an adequate sample size at each level for accurate estimation. As with two-level linear models, the most common rules of thumb differ by research question involving model parameters: a 30/30 rule for the fixed effects (Kreft, 1996) (i.e., a minimum of 30 groups with 30 individuals per group), a 50/20 rule for the cross-level interaction effects (Hox, 1998) (i.e., a minimum of 50 groups with 20 individuals per group), and a 100/10 rule for the variance-covariance components (Hox & Maas, 2001) (i.e., a minimum of 100 groups with 10 individuals per group). For the current study, the first three hypotheses (Hypotheses 1, 2, and 3) examine the regression coefficients (i.e., fixed effects such as average employee expertise-knowledge creation slope across teams), and the last two hypotheses (Hypotheses 4 and 5) investigate cross-level interactions (e.g., moderating effects of transformational leadership influencing the relationship between employee expertise and organizational knowledge creation). Therefore, 30/30 and 50/20 rules may apply for the current study. However, in many social science studies, such rules are challenging to meet, and often not very feasible (Bell, Morgan, Schoeneberger, Kromrey, & Ferron, 2014). For example, the 50/20 rule eventually requires 1,000 participants for a study. In

fact, only few multilevel analysis studies published in the organizational behavior or management literature have met such data conditions. More recently, in their Monte Carlo simulation study, Bell and his colleagues (2014) concluded that "researchers can more confidently apply multilevel modeling techniques with relatively small sample sizes, across a variety of model types, and make appropriate inferences regarding the point and interval estimates for fixed effects" (p. 10). In their study, the sample sizes went down to 5-10 participants for level 1, and 10 units for level 2.

Based on cluster sampling and convenience sampling methods, 288 team members across 58 teams (i.e., 58 team leaders) from different companies were invited to participate in this study. At the team member level, 248 participants responded to the survey, yielding a total response rate of 86.1% (See Table 1). At the team leader level, 40 team leaders completed the survey, resulting in a total response rate of 68.9%. Removing data of 18 teams due to the team leaders who did not respond to the survey resulted in deleting 85 additional responses at the team member level embedded within those teams, which further reduced down the sample size to 163. Considering that team leaders were only asked to rate on each team member's expertise and that team members are also asked to self-rate on their expertise (as I anticipated a low participation of team leaders as a potential problem at the study design stage), after consulting with my committee members, I decided to drop the team leader' ratings on expertise and utilize the self-rating scores instead. As a consequence of this change, a test for the presence of common method bias was conducted, which will be discussed in greater detail in the Data Analysis section. Out of the total 248 participants, 243 individuals completed all survey items. After deleting 24 multivariate outliers, there was a team that was left with one team member, which is not appropriate for multi-level analysis; thus, one additional observations was also removed. The

final valid sample consisted of 218 employees from 44 teams, yielding the valid response rate of 75.7%. The data screening process is further described in greater detail in the Data Screening section of this chapter.

Table 1
The Sample Size and the Total Response Rates

	Surveys Sent	Responses Received	Response Rate
Team members (employees)	288	248	86.1%
Team leaders (supervisors)	58	40	68.9%
Total	346	288	83.2%

Instrumentation

Two versions of the questionnaires were developed for the data collection based on the extant and validated measures of each variable of interest: organizational knowledge creation (Song, Yoon, & Uhm, 2012), transformational leadership (Rafferty & Griffin, 2004), employee expertise (Germain & Tejeda, 2012), and the quality of interpersonal relationships (Carmeli et al., 2009). Team members were asked to evaluate the transformational style of their team leaders and assess their own perceptions on organizational knowledge creation, the quality of interpersonal relationships, and expertise. Team leaders rated each employee's expertise in their teams (Note that their responses were excluded for the data analyses due to the sample size issue addressed above). Control variables include gender, age, educational background, and the length of service at the individual level; and firm size, sector, and industrial type at the organizational level. Excluding the demographic information, the total number of items in the questionnaires was sixty-five for team members and eighteen for team leaders, respectively (See Appendix C). This section provides more detailed information on each measure.

Measure of Employee Expertise

Despite its importance, few researchers have attempted to develop a scale to measure the perception of employee expertise, and such instruments have suffered from psychometric challenges and their limited applicability across various domains (Kuchinke, 1997; Swanson & Holton, 2009). Responding to this research gap, Germain and Tejeda (2012) developed an instrument to measure employee expertise that can be used across diverse occupations, named "Generalized Expertise Measure (GEM)." The GEM was developed in accordance with an inductive scale development approach. First, two panels of individuals were invited. The first panel generated items based on their definitions and components of expertise, and the second panel assessed the content adequacy of those items. Second, empirical validation was conducted using exploratory and confirmatory factor analyses.

As a result, a two-factor, 18-item scale was generated ($\chi 2$ (134)=217.6 ($p<0.001$); CFI=0.93; TLI=0.92; RMSEA=0.06), and the two constructs were labelled "Objective Expertise" and "Subjective Expertise" consisting of six items and twelve items, respectively. A five-point Likert scale was utilized for all of the items (1=strongly disagree to 5=strongly agree). The internal consistency of the six items representing objective expertise was 0.91, and that of the remaining items representing subjective expertise was 0.92. "The GEM is based on employee expertise as perceived and reported by another person" (Germain & Tejeda, 2012, p. 204); thus, in this study, team leaders will be asked to rate each team member's expertise. A sample item is, "This person has the drive to become what he or she is capable of becoming in his/her field." In my search for empirical studies utilizing this instrument, I found only one master's thesis (i.e., Nagmér, 2011). However, this study used the earlier version of GEM (Germain & Tejeda, 2009)

which consists of 16 items, and the data were collected based on self-report. The reliability across all items was reported to be 0.815.

Measure of the Quality of Interpersonal Relationships

Drawing on Dutton and Heaphy's (2003) conceptualization of high-quality relationships, Carmeli (2009) constructed an instrument consisting of two lower-order constructs (i.e., capacity of high-quality connections and experiences of high-quality connections). The first construct, high-quality connection capacities, is composed of three latent variables: emotional carrying capacity, tensility, and connectivity. The second construct, high-quality connection experiences, includes positive regard and mutuality. Based on the evaluation on the initial items for construct validity by four groups of review panels, the survey data were collected with a sample of 147 employees in Israel. Exploratory factor analyses and confirmatory factor analyses were conducted to support the empirical validity. As a result, a total of 23 items were retained, with 14 items loading on the first factor and 9 items loading on the second factor. The Cronbach's alpha values for each construct were 0.85 and 0.91, respectively. All items were rated on a five-point Likert scale (1=strongly disagree to 5=strongly agree). A sample item is, "Whenever anyone at work expresses an unpleasant feeling, she/he always does so in a constructive manner."

The instrument has been further used and validated in other studies. For example, Carmeli and his colleagues (2009) adapted 20 items from the instrument and confirmed its validity by using confirmatory analysis ($\chi 2$ (459)=779.4 ($p<0.001$); CFI=0.87; RMSEA=0.05). They also reported the reliability (i.e., the Cronbach alpha) of the subscales of emotional carrying capacity, tensility, connectivity, positive regard, and mutuality as .72, .77, .83, .84 and .85, respectively.

Measure of Transformational Leadership

Based on the works by Bass (1985), House (1998), and Podsakoff, MacKenzie, Moorman, and Fetter (1990), Rafferty and Griffin (2004) re-examined a theoretical framework of transformational leadership, identified five sub-dimensions and fifteen items, and empirically tested the discriminant validity ($\chi 2$ (451)= 1345.84($p<0.001$); GFI=0.95; CFI=097; NNFI=0.96; RMSEA=0.04). The five constructs include Vision, Inspirational Communication, Intellectual Stimulation, Supportive Leadership, and Personal Recognition, and three items are used to reflect each sub-dimension. A Likert-scale was utilized for the items ranging from 1 (strongly disagree) to 5 (strongly agree). The Cronbach's alpha values for each construct ranged from .82 to .96, and the discriminant validity was supported. A sample item is, "My team leader has ideas that have forced me to rethink some things that I have never questioned before." Subsequently, other researchers (e.g., Moss, 2008; Shao, Feng, & Liu, 2012) utilized the instrument and demonstrated an adequate reliability and validity in their respective samples.

Measure of Organizational Knowledge Creation

Song and his colleagues (2011, 2012) developed and empirically validated the Knowledge Creation Practice Inventory (KCPI) (Song et al., 2011; Song et al., 2012). In their first study (Song et al., 2011), based on the SECI process of knowledge conversion (Nonaka, 1994), the inventory was built through exploratory factor analysis and measurement construct validation, consisting of four factors (i.e., SECI) measured by 17 items. With adequate internal consistency (ranging from .82 to .88) and convergent validity, model-fit indices of the goodness of fit index (GFI = .87), comparative fit index (CFI = .98), and root mean square error approximation (RMSEA = .079) were judged as a good model fit with the data.

Song and his colleagues (2012) later reframed the research model based on five practical steps promoting each component of SECI theory (Nonaka & Takeuchi, 1995). The five steps include sharing tacit knowledge, creating concepts, justifying concepts, building archetypes, and cross-leveling knowledge (Nonaka & Toyama, 2005). After re-examining the initial items identified from the first version of KCPI (Song et al., 2011), the researchers built the modified KCPI consisting of five factors measured by 10 items. A sample of 914 employees working in the private business sector in South Korea was used to revalidate and confirm the practice-based KCPI. Utilizing two randomly selected subsets of the data, the results of both EFA and CFA supported the factor structure and the measurement model construct validity. The item internal consistency of the five constructs was statistically acceptable, ranging from .703 to .800.

More recently, Song (working paper) proposed a four-factor, twelve-item version of the KCPI as he removed the cross-leveling knowledge and added one more item for each of the remaining four factors. A Likert-scale was utilized for the items ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item is, "I conduct experiments and share the newly developed concepts with the entire organization to evaluate the value of the concepts."

Data Collection Procedure

An initial contact with acquaintances in personal networks was made to ask about their willingness to participate in the study. The initial contact was made via phone, email, or a face-to-face meeting. If an acquaintance agreed to participate, they introduced me to their entire team and the invitation letter (Appendix B) was sent out. If an acquaintance could not recruit his/her team, I requested them to introduce me to other teams in their organizations. In accordance with the approved protocol from the Texas A&M University IRB, upon agreement to participate, the consent form (Appendix A) was sent out. As this study was designed to collect multilevel

structured data, there was a need to identify clusters in the data set. In other words, team identification information for each participant was required. To ensure confidentiality, each participant was assigned a code number for classification similar to the example in Table 2 (the names in Table 2 are in pseudonyms).

Table 2
The Sample of Code Number for Team Identification

Team name	Team leader/member	Code
HR team		A
	Chris Haines (Team leader)	AL
	Donna Kester (Team member #1)	AM-1
	Rena Knell (Team member # 2)	AM-2
	Bruce Bloomfield (Team member #3)	AM-3
	Dan Viggiani (Team member #4)	AM-4
	Brice Darlington (Team member #5)	AM-5
	Joshua Rando (Team member #6)	AM-6
	Daniel Nocella (Team member #7)	AM-7
Tech team		
	Eric Maron (Team leader)	B
	Sara Lad (Team member #1)	BL
	Leonard Marquardt (Team member #2)	BM-1
	Steve Neushul (Team member #3)	BM-2
	John Pels (Team member #4)	BM-3
	Erica Bogosian (Team member #5)	BM-4
	Esther Reinagle (Team member #7)	BM-5

An online survey tool, *Qualtric*, was utilized for collecting questionnaire data. Two separate online surveys were used to collect data: one for team members regarding demographic information, the quality of interpersonal relationships, transformational leadership, and organizational knowledge creation; and the other for team leaders to rate the employee expertise of each team member. The survey link was sent to each participant via email. The data collection

process started immediately after approval from the University IRB and continued until October 2016.

Data Screening

HLM, IBM SPSS, and Mplus software packages were utilized for the data analysis. Before conducting the main analysis, hierarchical linear modeling, several preliminary analyses for the purposes of data screening and assumption checking were conducted: missing data, multicollinearity, outliers, normality, and homoscedasticity. All inferential statistical methods only function as intended when such assumptions are met (Dedrick et al., 2009). Violation of the associated assumptions can produce non-ignorable impacts on the results which are nonreplicable (Mertler & Vannatta, 2010).

First, Little's missing completely at random (MCAR) test (Little & Rubin, 2002) was conducted to determine the pattern of missing data. The test result supported the null hypothesis that the pattern of missing data is completely random ($\chi 2$= 761.868, df= 894, α= .999). Thus, using the list-wise deletion method, out of 248 cases, five cases were excluded, which was 2 % of the total sample. Most of the five participants rarely finished answering the survey questions.

Second, multicollinearity occurs when two or more predictors in the regression model are highly correlated. In regression analysis, the presence of multicollinearity among predictor variables can lead to a serious pitfall as it produces inaccurate parameter estimates of regression coefficients and standard errors (Blalock, 1963). The variance inflation factor (VIF) and tolerance were calculated to identify the degree of multicollinearity. The most common threshold value of VIF is considered 10, and that of tolerance is .1 (O'brien, 2007). The calculations of these statistics indicated that multilcolinearity was not a concern for this data set as tolerance and VIF scores across all predictors are, respectively, greater than .1 and less than 10. Along with

calculating VIF, in multilevel analysis, it is recommended to use centered data as it enables better interpretation of the main effects and avoiding multicollinearity (Hox, 2010; Garson, 2013). In this study, grand mean centering was used.

Third, influential outliers can pose a serious threat to the validity of parameter estimates from regression analysis and possibly cause heterogeneous error variance (Garson, 2013; Mertler & Vannatta, 2010). The presence of influential outliers across the sixty-five variables of the four constructs was inspected using Mahalanobis Distance against the chi-square distribution (Atkinson & Mulira, 1993). The probabilities of the Mahalanobis Distance beyond a stringent alpha level of .001 are indicative of multivariate outliers (Meyers, Gamst, & Guarino, 2013). As a result, out of the 243 observations, 24 cases were detected and eliminated, which was 9.8% of the sample.

Fourth, homogeneity of residual variances and residual normality were inspected using normal Q-Q plots, confirming that the data followed normal distribution and meet the assumption of homoscedasticity. Residual normality is required to properly employ a significance test (i.e., alpha region). Homogeneous residual variance ensures that variances are constant and random, not a function of Level-1 or Level-2 predictors (Garson, 2013; Hox, 2010).

Data Analysis

After the data screening process, descriptive statistics, factor analyses, reliability analyses, common method variance test, and hierarchical linear modeling were conducted using IBM-SPSS 18, Mplus 7, and HLM 7. First, using descriptive statistics, the means, the standard deviations, and the correlations among measures as well as basic demographic information of the respondents were examined. Second, a series of exploratory and confirmatory factor analyses were conducted to ensure construct the validity of each measure. Third, as with reliability

analyses, Cronbach's alpha was computed to gauge the internal consistency of a set of variables. Furthermore, before conducting HLM analysis, the intraclass correlation coefficient and design effect were calculated to validate the multilevel structure of the data. Second. interrater reliability and interrater agreement were computed to justify the data aggregation for variables at higher levels.

Validation of the Multilevel Data Structure

Even if researchers have a sample including multiple groups, the use of multilevel analysis is not always mandated. Supported by confirming evidence of the presence of a clustering effect in the dependent variable, multilevel analysis can be employed (Garson, 2013). Otherwise, the clustered structure can be ignored, and the traditional regression approach (i.e., ordinary least squares) is more appropriate to apply (Lai & Kwok, 2015). The intraclass correlation coefficient (ICC) reflects the ratio of the between-group variance of the total between and within-group variances; therefore, it provides an index for gauging the degree of the clustering effect (Hox, 2010). With reference to the current study, ICC provides an answer to the question: "What proportion of the variance in organizational knowledge creation is due to team (group) differences?" The numerical value of ICC generally ranges from 0 to 1 in magnitude, and the larger the ICC, the larger the between-group variance. For example, when ICC is calculated as 0.25, it indicates that 25% of the total variance is explained by the between-group component.

Another index justifying the use of a multilevel structure in the data is the design effect (deff), which is estimated as a function of the between-cluster variance (i.e., ICC) and the average cluster size (i.e., *c*) (Muthen & Satorra, 1995):

$$\text{deff} = 1 + (c\text{-}1) \times \text{ICC}$$

A general suggested threshold for a value of deff that tolerates the standard error has been considered to be smaller than two. In other words, when deff is less than 2, researchers can ignore the nested structure in the data (Hox & Mass, 2002). Lai and Kwok (2015) further suggested that if both Level-1 and Level-2 effects are of interest, HLM should be applied when deff is larger than 1.1.

Data Aggregation

The multilevel analysis deals with variables defined at different hierarchical levels. Some variables naturally reflect the nature of their unit of analysis (i.e., individual, group). For example, age and self-efficacy (individual-level variables) and organizational size and industrial type (organizational-level variables) can be directly measured at "their own natural level" (Hox, 2010, p. 2). However, some variables require aggregation to mirror their unit of analysis. For instance, the organizational climate and leadership conceptually emerge as organizational-level variables, but are often measured at the individual level by organizational members. Data aggregation allows the variables at a lower level to be reproduced at a higher level.

For the variables in the current study, transformational leadership was the group-level (Level 2) variable, and the variable is measured by each team member based on their perceptions of the team leader's leadership style. Therefore, data aggregation was performed to move the variable to a higher level. The average team members' evaluations of the team leaders' leadership was used as the leadership ratings for each team. To justify whether the aggregation is legitimate, examination of the agreement across the team members' transformational leadership ratings is recommended. Showing high agreement in within-group levels (e.g., team-member level) will ensure that the use of aggregating individual-level data is appropriate (LeBreton & Senter, 2007). The $r_{WG(J)}$ (James, Demaree, & Wolf, 1984) and intraclass correlations (ICCs;

McGraw & Wong, 1996) will be applied to examine the level of agreement in transformational leadership ratings of team members within each team.

Hierarchical Linear Modeling

Hierarchical linear modeling (HLM) is an optimal, rigorous tool to explore multilevel data as it takes the nested structure (i.e., the clustering effect at higher levels) into account (Raudenbush & Bryk, 2002). Ignoring the clustering effect can lead to misinterpretation of both the magnitude and direction in explaining the relationships between the variables (Garson, 2013). In multilevel modeling, "regression intercepts and slopes at the individual level may be treated as random effects of a higher level" (Garson, 2013, p. 4). HLM allows modeling variables at different levels simultaneously, analyzing the direct effects at different levels as well as the cross-level effects. Based on this reasoning, the HRD literature calls on researchers to extend their academic attempts to use multilevel analysis as a "better method" (p. 88) to capture organizational dynamics and interactions because the HRD related phenomena inevitably emerge within a nested structure (e.g., employees are nested in teams, and teams are nested within organizations) (Turner, 2015).

With reference to the current study, a sequence of four two-level hierarchical linear models were formulated for several reasons: 1) to investigate the direct effects of independent variables (i.e., employee expertise, the quality of interpersonal relationships, and transformational leadership) at different levels on the dependent variable (i.e., organizational knowledge creation), and 2) to examine the cross-level interaction effects between the individual and group level variables influencing the dependent variable. Through the models, this study utilized restricted maximum likelihood (REML) as an estimation method because REML is less

sensitive to a small, unbalanced sample size; thus, it produces more accurate, less-biased parameters (Garson, 2013; Dedrick et al., 2009).

Null model

The null model with no explanatory variables at Level 1 or 2 serves as a baseline model that is useful to investigate the extent to which the predictive ability of more complex models is improved by adding more predictors later. Also called an "unconditional model" or "intercept-only model," it provides estimates of within- and between-group variances in the outcome variable, which can be used to calculate the intraclass correlation. For the purpose of the current study, the null model forces partitioning of the variance in organizational knowledge creation into the individual-level residual variance (σ_e^2, within-group) and the group-level residual variance (σ_u^2, between-group). This model can be depicted in an HLM regression equation form as follows:

Level 1 $Y_{ij} = \beta_{0j} + e_{ij}$

Level 2 $\beta_{0j} = \gamma_{00} + u_{0j}$

Combined model $Y_{ij} = \gamma_{00} + u_{0j} + e_{ij}$

where Y_{ij} is the individual-level outcome (i.e., organizational knowledge creation) for member i within group j. β_{0j} and γ_{00}, respectively, represent the Level-1 intercept and the Level-2 intercept. e_{ij} and u_{0j} are the residual variances for each equation.

Random coefficient regression model with Level-1 predictors

The units of analysis in this model are the individual-level predictors, and the outcome. Y_{ij} is predicted by six individual-level predictor variables, but no Level-2 variable is specified. The slope and the intercept of the Level-1 equation are assumed to vary across groups. This

model allows the researcher to test Hypotheses 1 and 2. Using variable labels instead of algebraic symbols, the HLM regression equation can be set up as follows:

Level 1 $Y_{ij} = \beta_{0j} + \beta_{1j}$(Employee Expertise) + β_{2j}(The Quality of Interpersonal relationships) + β_{3j}(Age) + β_{4j}(Academic Background) + β_{5j}(Length of Service) + β_{6j}(Gender) + e_{ij}

Level 2 $\beta_{0j} = \gamma_{00} + u_{0j}$

$\beta_{1j} = \gamma_{10} + u_{1j}$

$\beta_{2j} = \gamma_{20} + u_{2j}$

$\beta_{3j} = \gamma_{30} + u_{3j}$

$\beta_{4j} = \gamma_{40} + u_{4j}$

$\beta_{5j} = \gamma_{50} + u_{5j}$

$\beta_{6j} = \gamma_{60} + u_{6j}$

Combined model $Y_{ij} = \gamma_{00} + \gamma_{10}$(Employee Expertise) + γ_{20}(the Quality of Interpersonal relationships)+ γ_{30}(age) + γ_{40}(Academic Background) + γ_{50}(Length of Service) + γ_{60}(Gender) + u_{1j}(Employee Expertise) + u_{2j}(The Quality of Interpersonal relationships) + u_{3j}(Age) + u_{4j}(Academic Background) + u_{5j}(Length of Service) + u_{6j}(Gender) + $u_{0j} + e_{ij}$

where $\beta_{1j,}\beta_{2j,}\beta_{3j,}\beta_{4j,}\beta_{5j,}$ and β_{6j} represent the regression coefficients of the individual-level equations. γ_{10}, γ_{20}, γ_{30}, γ_{40}, γ_{50}, and γ_{60} are the Level-2 intercepts. $u_{1j,}u_{2j,}u_{3j,}u_{4j,}u_{5j,}$ and u_{6j} represent the Level-2 residual variances. The results of *t*-tests associated with the γ_{10} and γ_{20} parameters direct the researcher to Hypotheses 1 and 2 testing.

Random coefficient regression model with level-2 predictors

This model adds Level-2 predictors to the previous one; thus, both Level-1 and Level-2 predictors are now specified. The adjusted mean (i.e., β_{0j}) in a group is further predicted by the Level-2 predictors. This model allows testing of Hypotheses 1, 2, and 3. Using variable labels instead of algebraic symbols, the HLM regression equation reads:

Level 1 $Y_{ij} = \beta_{0j} + \beta_{1j}$(Employee Expertise) + β_{2j}(The Quality of Interpersonal relationships) + β_{3j}(Age) + β_{4j}(Academic Background) + β_{5j}(Length of Service) + β_{6j}(Gender) + e_{ij}

Level 2 $\beta_{0j} = \gamma_{00} + \gamma_{01}$(Transformational Leadership) + γ_{02}(Firm Size) + γ_{03}(Sector) + γ_{04}(Industrial Type) + u_{0j}

$\beta_{1j} = \gamma_{10} + u_{1j}$

$\beta_{2j} = \gamma_{20} + u_{2j}$

$\beta_{3j} = \gamma_{30} + u_{3j}$

$\beta_{4j} = \gamma_{40} + u_{4j}$

$\beta_{5j} = \gamma_{50} + u_{5j}$

$\beta_{6j} = \gamma_{60} + u_{6j}$

Combined model $Y_{ij} = \gamma_{00} + \gamma_{10}$(Employee Expertise) + γ_{20}(The Quality of Interpersonal relationships)+ γ_{30}(Age) + γ_{40}(Academic Background) + γ_{50}(Length of Service) + γ_{60}(Gender) + γ_{01}(Transformational Leadership) + γ_{02}(Firm Size) + γ_{03}(Sector) + γ_{04}(Industrial Type) + u_{1j}(Employee expertise) + u_{2j}(The Quality of Interpersonal relationships) + u_{3j}(Age) + u_{4j}(Academic Background) + u_{5j}(Length of Service) + u_{6j}(Gender) + $u_{0j} + e_{ij}$

where $\gamma_{01,}$ $\gamma_{02,}$ $\gamma_{03,}$ and γ_{04} are the Level-2 slopes related to the Level-1 intercept. The results of *t* tests associated with the γ_{01} parameters direct the researcher to Hypothesis 3 testing.

Cross-level interaction model

The cross-level interaction terms are added to the preceding model. The relationships between the individual-level predictors and the outcome are further predicted by the group-level predictor. This model allows the researcher to test Hypotheses 1, 2, 3, 4 and 5.

Level 1 $Y_{ij} = \beta_{0j} + \beta_{1j}$(Employee Expertise) + β_{2j}(The Quality of Interpersonal relationships) + β_{3j}(Age) + β_{4j}(Academic Background) + β_{5j}(Length of Service) + β_{6j}(Gender) + e_{ij}

Level 2 $\beta_{0j} = \gamma_{00} + \gamma_{01}$(Transformational Leadership) + γ_{02}(Firm Size) + γ_{03}(Sector) + γ_{04}(Industrial Type) + u_{0j}

$\beta_{1j} = \gamma_{10} + \gamma_{11}$(Transformational Leadership) + u_{1j}

$\beta_{2j} = \gamma_{20} + \gamma_{21}$(Transformational Leadership) + u_{2j}

$\beta_{3j} = \gamma_{30} + u_{3j}$

$\beta_{4j} = \gamma_{40} + u_{4j}$

$\beta_{5j} = \gamma_{50} + u_{5j}$

$\beta_{6j} = \gamma_{60} + u_{6j}$

Combined model $Y_{ij} = \gamma_{00} + \gamma_{10}$(Employee Expertise) + γ_{20}(The Quality of Interpersonal relationships)+ γ_{30}(Age) + γ_{40}(Academic Background) + γ_{50}(Length of Service) + γ_{60}(Gender) + γ_{01}(Transformational Leadership) + γ_{02}(Firm Size) + γ_{03}(Sector) + γ_{04}(Industrial Type) + γ_{11}(Employee Expertise) * (Transformational Leadership) + γ_{21}(The Quality of Interpersonal

relationships)* (Transformational Leadership) +u_{1j}(Employee expertise) + u_{2j}(The Quality of Interpersonal relationships) + u_{3j}(Age) + u_{4j}(Academic Background) + u_{5j}(Length of Service) + u_{6j}(Gender) + u_{0j} + e_{ij}

where γ_{11} and γ_{21} represent the slope coefficients indicating the direction and strength of the associations between the group-level predictor and the individual-level regression coefficients (i.e., β_{1j} and β_{2j}). The results of *t* tests associated with the γ_{11} and γ_{21} parameters direct the researcher to Hypotheses 4 and 5 testing.

CHAPTER IV

RESULTS

In this chapter, the results of the analyses are reported including the descriptive statistics, exploratory factor analysis, confirmatory factor analysis, reliability analysis, correlation analysis, common method variance, data aggregation, and HLM.

Descriptive Statistics

Using IBM-SPSS 22, the descriptive statistics of 218 valid responses were computed. The statistics included demographic characteristics and the participants' responses to the 65 quantitative items in the four constructs of interest (i.e., 12 items for knowledge creation practice, 18 items for employee expertise, 20 items for quality of interpersonal relationships, and 15 items for transformational leadership) were computed.

Demographic Characteristics

As shown in Table 3, the demographic information of the respondents revealed that 69% of the participants were female. As for age, over half were in their 20s and 30s. 20.1% of the respondents were over 50 years old, and 19.7% were between 40 and 49 years old. For ethnicity, more than half of the respondents (62.8%) self-identified as Caucasian, 16.1% were Hispanic/Latino, 14.2% were African American/African/Caribbean, and 5.5% were Asian/Pacific Islander. With respect to educational level, 55.5% held college-level degrees, 29.9% held graduate-level degrees, and 14.7% of the respondents were high school graduates, Regarding the length of service in the current organization, 48.1% had worked 1 to 5 years, 19.4% of the respondents had worked less than 1 year, 13% had worked 6 to 10 years; 11.6% had worked 16 years or more, and 7.9% had worked 11 to 15 years; and. In terms of the

organizational size, 53.9% had more than 500 employees whereas 18% of the participating organizations had less than 50 employees. For the type of organization, 44.7% of the participating organizations were in the public, not-profit corporations, 30.7% were in school education, and 24.7% were private, profit corporations.

Table 3
Demographic Characteristics

Variable	Characteristics	Frequency	Valid %	Cumulative %
Gender	Male	67	31.0	31.0
	Female	149	69.0	100.0
	Missing	2		
Age	20-29 years old	65	29.8	29.8
	30-39 years old	66	30.3	60.1
	40-49 years old	43	19.7	79.8
	50-59 years old	33	15.1	95.0
	60-69 years old	11	5.0	100.0
Ethnicity	African American/African/Caribbean	31	14.2	14.2
	Asian/Pacific Islander	12	5.5	19.7
	Caucasian	137	62.8	82.6
	Hispanic/Latino	35	16.1	98.6
	Other	3	1.4	100.0
Educational background	High school or qualification for high school graduation	32	14.7	14.7
	Associate's degree	14	6.4	21.1
	Bachelor's degree	107	49.1	70.2
	Master's degree	64	29.4	99.5
	Ph.D. degree	1	.5	100.0
The length of service in the current organization	Less than 1 year	42	19.4	19.4
	1-5 years	104	48.1	67.6
	6-10 years	28	13.0	80.6
	11-15 years	17	7.9	88.4
	Over 16 years	25	11.6	100.0
	Missing	2		
The length of service in the current team	Less than 1 year	55	25.3	25.3
	1-2 years	55	25.3	50.7
	2-3 years	30	13.8	64.5

Table 3 (Continued)

Variable	Characteristics	Frequency	Valid %	Cumulative %
	3-4 years	17	7.8	72.4
	More than 4 years	60	27.6	100.0
	Missing	1		
Size of the organization	Less than 50 employees	39	18.0	18.0
	50-99 employees	19	8.8	26.7
	100-199 employees	16	7.4	34.1
	200-299 employees	18	8.3	42.4
	300-399 employees	4	1.8	44.2
	400-499 employees	4	1.8	46.1
	More than 500 employees	117	53.9	100.0
	Missing	1		
Type of the organization	Private, for-profit corporation	53	24.7	24.7
	Public, non-profit corporation	96	44.7	69.3
	School setting	66	30.7	100.0
	Missing	3		
Industry type	Manufacturing	4	1.9	1.9
	Agriculture	7	3.3	5.1
	Information Technology	13	6.0	11.2
	Transportation	2	0.9	12.1
	Telecommunication	64	29.8	41.9
	Educational Services	7	3.3	45.1
	Engineering	3	1.4	46.5
	Finance	8	3.7	50.2
	Other	107	49.8	100.0
	Missing	3		
	Total	218	100.0	

Descriptive Statistics for the Quantitative Items

Descriptive statistics for the 65 quantitative items were calculated using IBM-SPSS 22. The means and standard deviations (SD) along with the minimum (Min) and maximum (Max) scores for each item are reported in Table 4. The means for the four factors in the KCPI were 4.24 (KS), 3.92 (BP), 3.83 (CC), and 3.67 (JC), respectively. The means for the two factors in the measure of employee expertise were 4.22 (SE) and 4.12 (OE). The means for the four factors

in the measure of quality of interpersonal relationships were 4.04 (ML), 4.02 (ECC), 4.02 (POR), 3.79 (CT), and 3.47 (TS). The means for the measure of transformational leadership were 4.08 (PR), 4.07 (VI), 4.13 (IC), 3.98 (SL), and 3.83 (IS).

Table 4
Descriptive Statistics for the Four Constructs of Interest

Factor		Item	N	Min	Max	Mean	SD
Knowledge creation practice	Knowledge sharing (KS)	KCP_KS_1	217	2.00	5.00	4.40	0.63
		KCP_KS_2	216	1.00	5.00	4.28	0.76
		KCP_KS_3	217	1.00	5.00	4.04	0.86
	Creating concepts (CC)	KCP_CC_1	217	1.00	5.00	3.45	0.96
		KCP_CC_2	216	1.00	5.00	3.89	0.71
		KCP_CC_3	216	1.00	5.00	4.14	0.78
	Justifying concepts (JC)	KCP_JC_1	217	1.00	5.00	4.13	0.71
		KCP_JC_2	217	1.00	5.00	3.79	0.79
		KCP_JC_3	216	1.00	5.00	3.08	0.98
	Building prototypes (BP)	KCP_BP_1	217	2.00	5.00	3.99	0.68
		KCP_BP_2	217	1.00	5.00	3.67	1.02
		KCP_BP_3	216	2.00	5.00	4.10	0.69
Employee expertise	Objective expertise (OE)	DE_OE_1	214	1.00	5.00	4.55	0.64
		DE_OE_2	214	1.00	5.00	4.08	0.85
		DE_OE_3	213	1.00	5.00	4.50	0.59
		DE_OE_4	213	1.00	5.00	3.53	1.13
		DE_OE_5	213	1.00	5.00	3.92	0.98
		DE_OE_6	214	1.00	5.00	4.12	0.87
	Subjective expertise (SE)	DE_SE_1	214	1.00	5.00	4.36	0.74
		DE_SE_2	214	2.00	5.00	4.40	0.58
		DE_SE_3	214	3.00	5.00	4.69	0.47
		DE_SE_4	214	2.00	5.00	4.12	0.83
		DE_SE_5	214	2.00	5.00	4.19	0.62
		DE_SE_6	214	3.00	5.00	4.31	0.55
		DE_SE_7	214	2.00	5.00	4.36	0.60
		DE_SE_8	214	2.00	5.00	4.42	0.64
		DE_SE_9	214	2.00	5.00	4.23	0.71
		DE_SE_10	213	2.00	5.00	4.23	0.66
		DE_SE_11	213	1.00	5.00	3.60	0.94
		DE_SE_12	213	2.00	5.00	3.81	0.79

Table 4 (Continued)

Factor		Item	N	Min	Max	Mean	SD
Quality of interpersonal relationships	Emotional carrying capacity (ECC)	QIR_ECC_1	218	1.00	5.00	3.93	0.81
		QIR_ECC_2	218	1.00	5.00	4.13	0.78
		QIR_ECC_3	218	2.00	5.00	4.25	0.72
		QIR_ECC_4	218	1.00	5.00	4.05	0.76
		QIR_ECC_5	218	1.00	5.00	3.72	0.86
	Tensity (TS)	QIR_T_1	217	1.00	5.00	3.51	0.89
		QIR_T_2	217	1.00	5.00	3.31	0.94
		QIR_T_3	218	1.00	5.00	3.51	0.86
		QIR_T_4	218	1.00	5.00	3.53	0.97
	Connectivity (CT)	QIR_C_1	218	1.00	5.00	3.67	0.85
		QIR_C_2	218	1.00	5.00	3.64	0.83
		QIR_C_3	217	2.00	5.00	3.81	0.77
		QIR_C_4	218	1.00	5.00	4.00	0.79
	Positive regard (POR)	QIR_PR_1	218	1.00	5.00	4.08	0.78
		QIR_PR_2	218	1.00	5.00	3.97	0.83
		QIR_PR_3	218	1.00	5.00	4.00	0.85
	Mutuality(ML)	QIR_M_1	217	1.00	5.00	4.21	0.76
		QIR_M_2	218	1.00	5.00	4.08	0.67
		QIR_M_3	218	1.00	5.00	4.00	0.75
		QIR_M_4	218	1.00	5.00	3.85	0.78
Transformational leadership	Vision (VI)	TL_VI_1	216	1.00	5.00	4.03	0.89
		TL_VI_2	216	1.00	5.00	3.99	0.93
		TL_VI_3	216	1.00	5.00	4.20	0.88
	Inspirational communication (IC)	TL_IC_1	215	1.00	5.00	4.04	0.88
		TL_IC_2	215	1.00	5.00	4.21	0.76
		TL_IC_3	216	1.00	5.00	4.15	0.84
	Intellectual stimulation (IS)	TL_IS_1	216	1.00	5.00	3.92	0.98
		TL_IS_2	216	1.00	5.00	3.85	0.95
		TL_IS_3	216	1.00	5.00	3.71	0.98
	Supportive leadership (SL)	TL_SL_1	216	1.00	5.00	3.81	0.98
		TL_SL_2	216	1.00	5.00	4.05	0.93
		TL_SL_3	216	1.00	5.00	4.07	0.82
	Personal recognition (PR)	TL_PR_1	216	1.00	5.00	4.12	0.93
		TL_PR_2	215	1.00	5.00	4.01	0.92
		TL_PR_3	216	1.00	5.00	4.11	0.97

Results of Factor Analyses

Except for the measure of Transformational Leadership, the other three measures are fairly new, and only a few previous studies have used and validated these measures. Thus, it is worthwhile to test a performance of the existing measures for the sample of current study. Bowen and Guo (2012) recommended to conduct both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to test the psychometric properties and construct validity of existing measures. In conducting EFA, I fixed the number of factors to reflect the original measures because there behind strong theoretical backgrounds suggested by the authors who developed and validated their measures. For these reasons, I did not follow the eigenvalues-greater-than-1 rule. As a matter of fact, several authors (e.g., Conway & Huffcutt, 2003) do not recommend to rely on the eigenvalues-greater-than-1 rule to decide the number of factors to retain in EFA because it does not consistently produce an accurate number of factors. After conducting EFA, CFA was followed up to confirm the construct validity of each measure.

Organizational Knowledge Creation

The Kaiser-Meyer-Olkin measure of sampling adequacy (.79) and Bartlett's test of sphericity (p=.00) were tested, with the results indicating that the sample met the prerequisites for factor analysis (Hair, Black, Babin, & Anderson, 2010). The principal component analysis with an oblique rotation method was utilized for EFA. When 12 items were submitted with four factors for the EFA, 63.65% of the total variance was explained. However, four items (KS3, CC3, JC3, and BP, 2) did not load onto their theoretical factors and their loading coefficients were less than .40 (Meyers et al., 2013). After removing the four items, as shown in Table 5, nine items cumulatively accounted for 73.7% of the total variance and produced a simple structure with four factors. The eigenvalues of the four factors ranged from .745 to 3.068. All items loaded

onto the four hypothesized factors: Sharing Knowledge (KCP_KS_1 and KCP_KS_2), Creating Concepts (KCP_CC_1 and KCP_CC_2), Justifying Concepts (KCP_JC_1 and KCP_JC_2), and Building Prototypes (KCP_BP_1 and KCP_BP_3). The factor loadings of nine items ranged from .588 to .91 (See Table 6). Using the modified measure, CFA was conducted to establish the psychometric qualities. As a result, the construct validity of the four-factor model was confirmed using confirmatory factor analysis ($\chi 2$ (15) = 27.08, $p < .05$; CFI = .95; TLI = .91; RMSEA = .06; SRMR = .04).

Table 5
Total Variance Explained: KCPI

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.068	38.346	38.346	3.068	38.346	38.346	2.031
2	1.196	14.949	53.294	1.196	14.949	53.294	1.872
3	.888	11.100	64.394	.888	11.100	64.394	1.458
4	.745	9.313	73.707	.745	9.313	73.707	2.003
5	.648	8.103	81.811				
6	.522	6.523	88.334				
7	.504	6.298	94.632				
8	.429	5.368	100.000				

Note. Extraction method: principal component analysis.

Table 6
Structure Matrix: KCPI

	Component			
	1	2	3	4
KCP_KS_1		.873		
KCP_KS_2		.755		
KCP_CC_1			.870	
KCP_CC_2			.588	
KCP_JC_1	.674			
KCP_JC_2	.863			
KCP_BP_1				.773
KCP_BP_3				.911

Note: Extraction method: principal component analysis.
Rotation method: oblimin with Kaiser normalization.

Employee Expertise

The Kaiser-Meyer-Olkin measure of sampling adequacy (.84) and Bartlett's test of sphericity (p=.00) were tested, indicating that the sample met the prerequisites for factor analysis (Hair, Black, Babin, & Anderson, 2010). The principal component analysis with an oblique rotation method was utilized. When 18 items were submitted for the EFA, 47.6% of the total variance was explained and the eigenvalues of the two factors were 5.434 and 3.957, respectively, as shown in Table 7. All items loaded onto the two hypothesized factors: Objective Expertise (DE_OE_1 to DE_OE_6) and Subjective Expertise (DE_SE_1 to DE_SE_12). The factor loadings of 18 items ranged from .500 to .815 (see Table 8). The construct validity of the two-factor model was confirmed using confirmatory factor analysis ($\chi 2$ (127) =275.71, p< .00; CFI = .89; TLI = .86; RMSEA = .07; SRMR = .07).

Table 7

Total Variance Explained: Employee Expertise

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.848	32.489	32.489	5.848	32.489	32.489	5.434
2	2.717	15.096	47.585	2.717	15.096	47.585	3.957
3	1.250	6.945	54.531				
4	1.115	6.192	60.722				
5	.937	5.208	65.930				
6	.835	4.638	70.569				
7	.746	4.145	74.714				
8	.673	3.741	78.455				
9	.603	3.351	81.806				
10	.538	2.987	84.793				
11	.482	2.680	87.473				
12	.440	2.443	89.916				
13	.391	2.172	92.088				
14	.379	2.105	94.193				
15	.314	1.745	95.938				
16	.284	1.575	97.513				
17	.271	1.504	99.017				
18	.177	.983	100.000				

Note. Extraction method: principal component analysis.

Table 8

Structure Matrix: Employee Expertise

	Component	
	1	2
DE_OE_1		.719
DE_OE_2		.783
DE_OE_3		.815
DE_OE_4		.454
DE_OE_5		.783
DE_OE_6		.771
DE_SE_1	.500	
DE_SE_2	.567	
DE_SE_3	.540	
DE_SE_4	.701	
DE_SE_5	.653	
DE_SE_6	.626	
DE_SE_7	.701	
DE_SE_8	.622	
DE_SE_9	.780	
DE_SE_10	.735	
DE_SE_11	.666	
DE_SE_12	.683	

Note: Extraction method: principal component analysis.
Rotation method: oblimin with Kaiser normalization.

Quality of Interpersonal Relationships

The Kaiser-Meyer-Olkin measure of sampling adequacy (.90) and Bartlett's test of sphericity (p=.00) were tested, indicating that the sample met the prerequisites for factor analysis (Hair, Black, Babin, & Anderson, 2010). The principal component analysis with an oblique rotation method was utilized. When 20 items were submitted for the EFA, 72.16% of the total variance was explained. The item QIR_M_1 was removed because it did not load onto its hypothesized factor, Mutuality, but loaded onto a different factor, Positive regard. With 19 items, the EFA results indicated that 73.85% of the total variance was accounted for, and the

eigenvalues of the five factors ranged from 1.642 to 6.455, as shown in Table 9. All items loaded onto the five hypothesized factors: Emotional Carrying Capacity (QIR_ECC_1 to QIR_ECC_5), Tensility (QIR_T_1 to QIR_T_4), Connectivity (QIR_C_1 to QIR_C_4), Positive Regard (QIR_PR_1 to QIR_PR_3), and Mutuality (QIR_M_2 to QIR_M_4). The factor loadings of the 19 items ranged from .500 to .815 (see Table 10). The construct validity of the five-factor model was confirmed using confirmatory factor analysis ($\chi 2$ (135) =239.04, p< .00; CFI = .94; TLI = .93; RMSEA = .06; SRMR = .07). The second-order factor model was also confirmed ($\chi 2$ (133) =237.21, p< .00; CFI = .94; TLI = .93; RMSEA = .06; SRMR = .07).

Table 9

Total Variance Explained: Quality of Interpersonal Relationships

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.540	44.946	44.946	8.540	44.946	44.946	6.455
2	2.085	10.976	55.922	2.085	10.976	55.922	5.206
3	1.389	7.309	63.231	1.389	7.309	63.231	5.001
4	1.204	6.336	69.566	1.204	6.336	69.566	1.642
5	.814	4.285	73.851	.814	4.285	73.851	4.803
6	.705	3.708	77.559				
7	.630	3.315	80.875				
8	.531	2.792	83.667				
9	.444	2.337	86.004				
10	.408	2.147	88.151				
11	.361	1.900	90.051				
12	.349	1.838	91.889				
13	.284	1.493	93.382				
14	.272	1.431	94.813				
15	.255	1.345	96.158				
16	.220	1.158	97.316				
17	.210	1.106	98.422				
18	.186	.978	99.400				

Table 9 (Continued)

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
19	.114	.600	100.000				

Note. Extraction method: principal component analysis.

Table 10

Structure Matrix: Quality of Interpersonal Relationships

	Component				
	1	2	3	4	5
QIR_ECC_1	.792				
QIR_ECC_2	.666				
QIR_ECC_3	.664				
QIR_ECC_4	.771				
QIR_ECC_5	.554				
QIR_T_1					.837
QIR_T_2					.552
QIR_T_3					.548
QIR_T_4					.759
QIR_C_1		.816			
QIR_C_2		.909			
QIR_C_3		.894			
QIR_C_4		.671			
QIR_PR_1			.806		
QIR_PR_2			.862		
QIR_PR_3			.804		
QIR_M_2				.854	
QIR_M_3				.902	
QIR_M_4				.844	

Note: Extraction method: principal component analysis.
Rotation method: oblimin with Kaiser normalization.

Transformational Leadership

The Kaiser-Meyer-Olkin measure of sampling adequacy (.92) and Bartlett's test of sphericity (p=.00) were tested, indicating that the sample met the prerequisites for factor analysis (Hair, Black, Babin, & Anderson, 2010). The principal component analysis with an oblique rotation method was utilized. When 15 items were submitted for the EFA, 84.08% of the total variance was explained and the eigenvalues of the two factors ranged from .753 to 8.798, as shown in Table 11. All items loaded onto the five hypothesized factors: Vision (TL_VI_1 to TL_VI_3), Inspirational Communication (TL_IC_1 to TL_IC_3), Intellectual Stimulation (TL_IS_1 to TL_IS_3), Supportive Leadership (TL_SL_1 to TL_SL_3), and Personal Recognition (TL_PR_1 to TL_PR_3). The factor loadings of the 15 items ranged from -.828 to .957 (see Table 12). The construct validity of the five-factor model was confirmed using confirmatory factor analysis ($\chi 2$ (83) =123.71, p< .01; CFI = .98; TLI = .98; RMSEA = .05; SRMR = .04).

Table 11
Total Variance Explained: Transformational Leadership

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.798	58.655	58.655	8.798	58.655	58.655	6.734
2	1.296	8.641	67.295	1.296	8.641	67.295	5.092
3	1.160	7.731	75.026	1.160	7.731	75.026	5.182
4	.753	5.019	80.045	.753	5.019	80.045	6.510
5	.606	4.042	84.088	.606	4.042	84.088	4.239
6	.445	2.966	87.054				
7	.341	2.276	89.329				
8	.313	2.086	91.415				
9	.291	1.941	93.356				
10	.247	1.644	95.000				

Table 11 (Continued)

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
11	.202	1.348	96.348				
12	.173	1.151	97.500				
13	.152	1.011	98.511				
14	.126	.839	99.350				
15	.098	.650	100.000				

Note. Extraction method: principal component analysis.

Table 12

Structure Matrix: Transformational Leadership

	Component				
	1	2	3	4	5
TL_VI_1			.908		
TL_VI_2			.911		
TL_VI_3			.795		
TL_IC_1					-.828
TL_IC_2					-.848
TL_IC_3					-.719
TL_IS_1		.834			
TL_IS_2		.936			
TL_IS_3		.905			
TL_SL_1	.918				
TL_SL_2	.948				
TL_SL_3	.925				
TL_PR_1				.957	
TL_PR_2				.928	
TL_PR_3				.951	

Note: Extraction method: principal component analysis.
Rotation method: oblimin with Kaiser normalization.

Results of Reliability Analyses

Reliabilities were estimated for the four measures (i.e., knowledge creation practice, employee expertise, quality of interpersonal relationship, and transformational leadership) to determine whether or not the results of using the selected instruments are consistent (Hair et al., 2010). Cronbach's α was computed for each measure using IBM-SPSS 22, As shown in Table 13, the results of the internal consistency of the four measures ranged from .76 to .95. A general cut-off value for an alpha coefficient is greater than .70 (Kline, 2005; Meyers et al., 2013), and Cronbach's alpha for all instruments exceeded .76.

Table 13
Estimates of Reliability

Measure	N of items	Cronbach's α
Knowledge creation practice	9	.76
Employee expertise	18	.86
Quality of interpersonal relationship	19	.93
Transformational leadership	15	.95

Results of Correlation Analyses

Table 14 displays the means, standard deviations, and correlations among variables. Individual-level variables are below the diagonal and aggregated variables above the diagonal. The correlation results indicated that knowledge creation practice was positively correlated with employee expertise ($r = .37$, $p < .01$), quality of interpersonal relationship ($r = .32$, $p < .01$), and transformational leadership ($r = .38$, $p < .01$). These results provide initial support for Hypotheses 1, 2, and 3.

Table 14

Means, Standard Deviations, and Correlations[a]

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender	1.69	.46		-.07	.25**	-.08	-.22**	.11	.24**	-.19**	.28**	.21**	.09
2. Age	2.35	1.20	-.08		.28**	.76**	-.40**	-.16*	-.07	.29**	-.34**	-.10	.04
3. Edu	2.95	.98	-.22**	-.12		-.40**	-.16*	-.07	-.01	.27**	.08	.22**	.36**
4. Length1	2.44	1.22	.03	.61**	-.20**		.78**	-.19**	.19**	.08	-.41**	-.19**	-.04
5. Length2	2.87	1.56	-.03	.53**	-.09	.66**		-.08	-.02	.16*	-.17*	-.12	.02
6. Size	5.03	2.36	-.05	-.02	-.04	-.11	-.52		.24**	-.03	-.04	-.12	-.04
7. Type	2.16	.73	.13	.04	-.01	.12	-.01	-.24**		-.23**	-.06	-.11	.07
8. EE	4.18	.41	-.21**	.13	.15*	.06	.09	-.02	-.12	(.76)	-.01	.00	.30**
9. QIR	3.85	.54	.03	-.16*	.05	-.17*	-.06	-.01	-.04	.22**	(.86)	.58**	.32**
10. TL	4.02	.70	.49	-.21**	.03	-.15*	-.10	-.02	-.05	.10	.53**	(.93)	.47**
11. KCP	4.00	.46	-.09	-.06	.29**	-.05	-.06	-.02	.04	.37**	.32**	.38**	(.95)

Note. [a]Values below the diagonal result from individual-level analyses; those above the diagonal result from team-level analyses; Internal consistency reliabilities are in parentheses; Edu=educational background; Length1=length of service in the current organization; Length2=Length or service in the current work team; Size=organizational size; Type=organizational type; EE=employee expertise; QIR=quality of interpersonal relationship; TL=transformational leadership; KCP=knowledge creation practice; *p <.05, **p <.01

Common Method Variance

Common method variance (CMV) may be a concern because a self-perception-based survey was administered at one time from the same respondents for data collection purposes. CMV is the "variance that is attributable to the measurement method rather than to the constructs the measures represent" (Podsakoff, MacKenzie, Lee, Podsakoff, 2003, p. 879). Following the statistical procedures suggested by Podsakoff et al. (2003), both exploratory factor analysis (EFA) and the confirmatory factor analysis (CFA) were conducted. The EFA results indicated that more than one factor was detected and the first factor accounted for only 22% of the total variance. Next, the CFA results demonstrated that the four-factor model provided better fit indices [$\chi 2$ (1671) =2555.86, p< .01; CFI = .88; TLI = .87; RMSEA = .05; SRMR = .07] than the model fit of the one-factor model [$\chi 2$ (1710) =6192.79, p< .01; CFI = .38; TLI = .36; RMSEA = .11; SRMR = .13]. These results led to the conclusion that CMV was a minor issue in the present

study; thus, the constructs of Organizational Knowledge Creation, Employee Expertise, Quality of Interpersonal Relationships, and Transformational Leadership were unlikely to have loaded on a single factor but on four distinct factors.

Data Aggregation

All four variables in the present study were measured at the lowest level of analysis (i.e., individual-level); therefore, the data aggregation method was required to create the transformational leadership variable at a higher level of analysis (i.e., team-level). To justify the appropriateness for the data aggregation technique, $r_{wg(j)}$ (James, Demaree, & Wolf, 1984) and intraclass correlations (ICCs; McGraw & Wong, 1996) were computed. The average $r_{wg(j)}$ value for the transformational leadership score was .78, indicating strong interrater agreement among team members within teams (Lebreton & Senter, 2008). Furthermore, the values of ICC(1) and ICC(2) were .10 and .58, respectively. Although the ICC(2) estimate was lower than desired, the value of ICC(1) represented a medium effect, suggesting that team membership influenced team members' ratings of their supervisors' transformational leadership. The low ICC(2) estimate might be due in part to the small unit sizes in the sample, which is often observed in organizational studies (Bliese, 2000). These statistics were also comparable to aggregate constructs found in prior research (e.g., Gong, Kim, Lee, & Zhu, 2013; Kirtman, Chen, Farh, Chen, & Lowe, 2009). Thus, these results provided sufficient statistical justification for use of the data aggregation technique on the transformational leadership scores.

Hierarchical Linear Modeling

Null Model

An intercept only model that contains no explanatory variables allows me to partition the variance in knowledge creation practice into its within-group variance and between-group

variance. The values of these two components were 0.188 and 0.023, respectively. With this information, the intraclass correlation (ICC) and design effect (*deff)* were calculated. The intraclass correlation index value was 0.11, indicating that 11% of the variance in knowledge creation practice resided between teams. An ICC of 0.11 with an average cluster size of five yields a *deff* of 1.45. According to Lai and Kwok's (2015) Monte Carlos simulation study, when the *deff* is larger than 1.1, the clustering effect cannot be ignored; thus, the use of multilevel analyses was required in the current study.

Model 1

The control variables were specified in Model 1, including Gender, Age, Education, Length of Service at the Current Organization, Length of Service in the Current Work Team at Level 1 (i.e., individual-level) and Organizational Size and Organizational Type at Level 2 (i.e., team-level). All of the control variables except gender and organizational type were grand mean centered. As displayed in Table 15, employees' educational background was positively associated with their knowledge creation practice ($\hat{\gamma}$= .137, p<.01). In other words, as educational background increased by 1 point, knowledge creation practice increased by .137 points. Moreover, to interpret the meaning of the intercept, the expected knowledge creation practice score was 4.029 for female employees with an average length of service, age, academic background working at an organization of an average size,

Model 2

Individual-level variables were added in Model 2, including employee expertise and quality of interpersonal relationship. Hypothesis 1 predicted that employee expertise would be positively related to knowledge creation practice. Supporting Hypothesis 1, employee expertise had a significant, positive relationship with knowledge creation practice ($\hat{\gamma}$= .324, p<.01).

Hypothesis 2 posited that quality of interpersonal relationship would exhibit a positive association with knowledge creation practice. In support of Hypothesis 2, the influence of quality of interpersonal relationship on knowledge creation practice was statistically significant and positive.

Model 3

To test Hypothesis 3, transformational leadership was included as a team-level variable. Model 3 provided the effect of transformational leadership after controlling for all of the individual-level variables and team-level control variables. Hypothesis 3 posited that team leaders' transformational leadership positively related to employees' knowledge creation practice. The results indicated that the influence of transformational leadership on knowledge creation was statistically significant and positive ($\hat{\gamma}$= .497, p<.05), supporting Hypothesis 3.

Model 4

Hypotheses 4 and 5 suggested that transformational leadership would positively moderate the relationships of employee expertise and quality of interpersonal relationship with knowledge creation practice, respectively. To test these hypotheses, transformational leadership was added as a predictor to the slopes equation, also referred to as the slopes-as-outcomes model. Cross-level analyses using HLM estimations revealed there was no significant moderation effect of transformational leadership on the relationship between employee expertise and knowledge creation practice ($\hat{\gamma}$=.848, p>.05); thus, Hypothesis 4 was not supported. Regarding Hypothesis 5, the result was unexpected and contrary to the hypothesis. Transformational leadership exhibited a significant and negative moderation effect in explaining the positive association between quality of interpersonal relationship and knowledge creation ($\hat{\gamma}$=-1.139, p<.05). This result indicates that the relationship of quality of interpersonal relationship with knowledge

creation is weaker when a team leader's transformational leadership is stronger. Figure 7 shows the plot of the interaction effect.

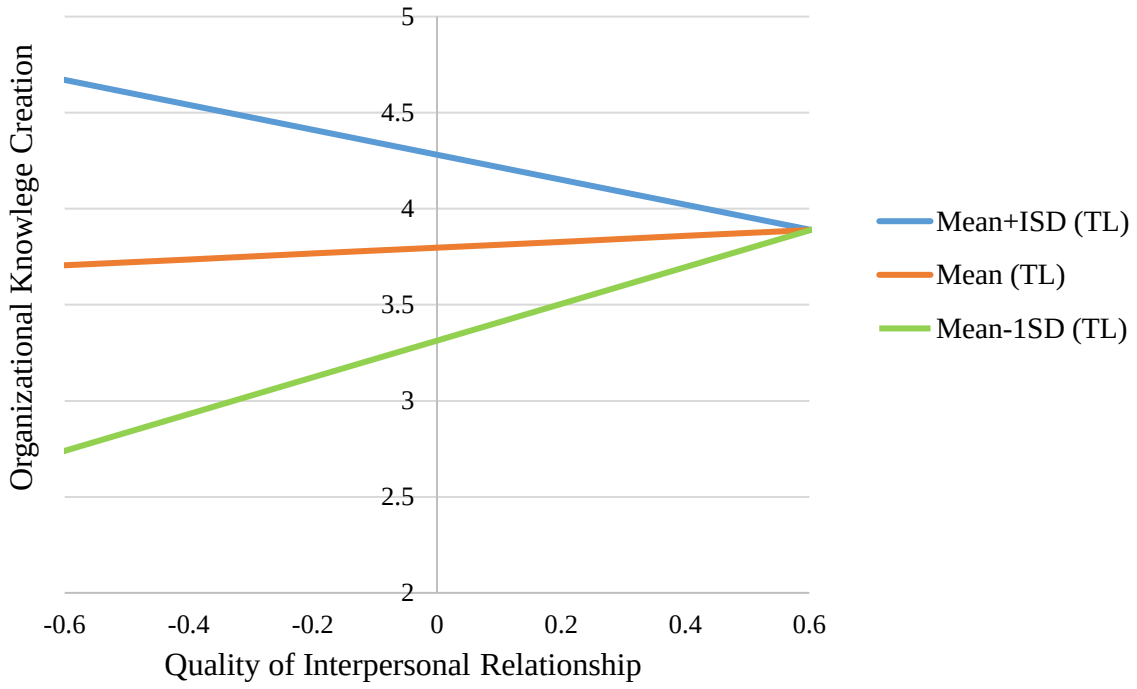

Figure 7. **Decomposing Interaction Effects for Quality of Interpersonal Relationships on Knowledge Creation Practice by Three Levels of Transformation Leadership.**

Table 15

Hierarchical Linear Modeling Results for Organizational Knowledge Creation

Variables	Null model	Model 1	Model 2	Model 3	Model 4
Level 1 main effects					
(Intercept)	4.002**(.039)	4.029**(.128)	3.907**(.115)	3.894**(.168)	3.944**(.100)
Gender		-.052 (.055)	-.018 (.049)	-.040 (.048)	-.060 (.048)
Age		-.021 (.042)	-.022 (.035)	-.038 (.036)	-.032 (.033)
Edu		.137**(.033)	.108**(.028)	.097**(.027)	.082**(.028)
Length1		.034 (.030)	.037 (.027)	.036 (.026)	.023 (.027)
Length2		-.025 (.021)	-.029 (.020)	-.029 (.021)	-.015 (.020)
EE			.324**(.082)	.321**(.085)	.329**(.077)
QIR			.203**(.068)	.188**(.065)	.158* (.065)
Level 2 main effects					
Size		.003 (.014)	.008 (.012)	.012 (.013)	.002 (.012)
Type		.027 (.050)	.057 (.046)	.083 (.040)	.079 (.041)
TL				.497* (.220)	.690* (.282)
Cross-level interactions					
DE×TL					.848 (.461)
QIR×TL					-1.139* (.565)
Residual[1]		.170	.140	.141	.116
Residual[2]		.019	.012	.001	.002
Deviance	269.417	242.614	189.599	522.142	510.77
AIC	275.417	262.614	213.599	548.142	544.770
BIC	285.515	296.085	253.238	590.824	600.585

Note. n= 218 employees (Level 1) in 44 teams (Level 2). Coefficients (based on grand-centering) are reported with standard errors in parenthesis. Edu = Educational background; Length 1= length of service in the current organization; Length 2=length of service in the current team; Size = organizational size; Type= organizational type; EE=employee expertise; QIR= quality of interpersonal relationship; TL=transformational leadership Residual[1]= within-level residual variance; Residual[2]= between-level residual variance; AIC=Akaike information criterion; BIC=Bayesian information criterion; ***p* <.01, **p* <.05

CHAPTER V

CONCLUSIONS

In this chapter, the findings from the research hypotheses are discussed with their distinct contributions. The implications of the current study for HRD research and practice are provided, along with the limitations and future study recommendations.

Discussion

Drawing on Nonaka's (1994) organizational knowledge creation theory and Amabile's (1988) componential theory of creativity, this study examined the main effects of employee expertise, quality of interpersonal relationship, and transformational leadership on organizational knowledge creation. Guided by Giddens's (1984) structuration theory, this study also investigated the interaction effects of transformational leadership in explaining the main effects.

Hypothesis 1: The Main Effect of Employee Expertise

As hypothesized, this study found a positive relationship between employee expertise and organizational knowledge creation. Similarly, with a sample of 416 employees in R&D departments, Jeong, McLean, McLean, Yoo, and Bartlett (2017) found that domain expertise is positively associated with knowledge performance (i.e., the quantity of intellectual property such as the number of invention disclosures and patent applications). Tiwana and McLean (2005) also found a strong association between expertise integration and team-level creativity, suggesting that teams developing linkages among individual team members' domain expertise are more likely to generate novel ideas and knowledge. Several authors have argued that individuals with high expertise have a capability to create new knowledge since they possess extensive

knowledge, quality experience, and advanced problem solving and reflection skills (Bender & Fish, 2000; Herling, 2000).

According to Nonaka's knowledge creation theory, each individual's tacit knowledge (e.g., expertise) is indeed presumed to be the key resource and root of organizational knowledge creation, but one of the most important factors that makes it possible to bring this individual-level knowledge to the organizational level is social interactions among organizational members. Experts use three types of knowledge to solve problems: domain knowledge, task knowledge, and cooperative knowledge. Experts gain their domain knowledge by continuously engaging in research to improve their performance, and as they apply such knowledge in practice, they acquire task knowledge. They communicate and interact with others using cooperative knowledge (Herling, 2000; Swanson & Holton, 2009).

Experts have stronger communication skills and better cooperation competency than novices (Ericsson, Charness, Feltovich, & Hoffman, 2006). Santeau (1987) also noted that experts can be quite verbal in personal conversations. Dew, Read, Sarasvathy, and Wiltbank (2009) found that, compared with novices, entrepreneurial experts talk more, theorize from their previous experiences more, and emphasize their partnership network more. Pruthi and Nagpaul (1978) also demonstrated that highly creative scientists engaged in extensive communication with peers compared their less creative counterparts. Additionally, Kelly and Caplan (1993) found in their field study, compared to average performers, top performers have better interpersonal networks. Therefore, individuals with high expertise are likely to have more social interactions and dialogues with others in terms of both quantity and quality using their cooperative knowledge and experience, which should expedite the organizational knowledge creation process, making it possible to convert their tacit knowledge to explicit and to exchange

explicit knowledge. The current study is noteworthy in that it provides the first empirical evidence explaining the positive relationship between employee expertise and organizational knowledge creation.

Hypothesis 2: The Main Effect of Quality of Interpersonal Relationships

The current study demonstrated a positive association between quality of interpersonal relationships and organizational knowledge creation. In an organization that has positive social interactions, there is a greater degree of intimacy and closeness among organizational members. In such a culture, people are more open to new ideas and engage in dialogues with greater reciprocity and frequency (Dutton & Heaphy, 2003). It has also been argued that positive social interactions increase the opportunities to share and interpret each other's knowledge and apply it in different contexts (De Long & Fahey, 2000). In this sense, knowledge sharing practice is often described as "synergistic collaborations of individuals who work toward a common goal" (Gagne, 2009, p. 572). This study affirms the role of the quality of interpersonal relationship in facilitating a conversion process between tacit and explicit knowledge.

Prior empirical research has also identified the importance of interpersonal relationship in organizations to enhance individual and organizational knowledge performance. For example, Carmeli, Brueller, and Dutton (2008) demonstrated that high-quality relationships cultivate psychological safety, which ultimately, results in higher levels of learning behaviors in the workplace. Losada (1999) also found that a high degree of connectivity in a team, characterized by generating expansive emotional spaces and showing appreciation and encouragement to other members in the team, increased the team's performance and opened up possibilities for creativity. Brachos, Kostopoulos, Soderquist, and Prastacos (2007) demonstrated that trustworthiness among team members had a positive and significant influence on individuals'

perceived usefulness of knowledge. Additionally, Levin and Cross (2004) found that strong ties, manifested by closeness in a working relationship and communication frequency, have a positive association with receiving useful knowledge. The current study has value in that this is the first study to provide empirical evidence that quality of interpersonal relationship plays a facilitating role in organizational knowledge creation.

Hypothesis 3: The Main Effect of Transformational Leadership

Consistent with Song et al.'s (2012) study, the current study also found a positive association between transformational leadership and organizational knowledge creation. It should be noted that Song and his colleagues (2012) used data collected from employees working in Korean for-profit organizations, whereas this study collected multi-level data from white-collar employees in U.S. companies including both for-profit and non-profit organizations. These results may imply that the influence of transformational leadership on organizational knowledge creation is generic, rather than culture-specific. Compared to the rich theoretical works of other authors, surprisingly, in my search, Song et al.'s (2012) study was the only empirical work that addressed the direct association between transformational leadership and organizational knowledge creation. The current study adds another piece of empirical evidence supporting the positive role of transformational learning in creating organizational knowledge.

Although other empirical studies did not directly examine the influence of transformational leadership on organizational knowledge creation, they help us understand the positive relationship between these two constructs. For example, transformational leaders value employee development and provide learning resources, which creates and maintains a learning organization (Bass, 2000). Song and Kolb (2009) also found that a learning organizational culture positively influences the organizational knowledge creation process. Transformational

leaders are expected to provide mentoring and coaching as a part of their individualized consideration characteristic, and Yang (2007) found that leaders playing a role as a mentor or facilitator enhance knowledge sharing effectiveness in the organization. Chen and Barnes (2006) also demonstrated that transformational leadership is a significant predictor of internal knowledge sharing. Additionally, García-Morales, Lloréns-Montes, and Verdú-Jover (2008) demonstrated that transformational leadership is positively related to organizational knowledge slack, organizational knowledge absorptive capacity, and organizational learning.

Hypothesis 4: The Moderation Effect of Transformational Leadership on the Relationship between Employee Expertise and Organizational Knowledge Creation

This study found no significant moderation effect of transformational leadership on the relationship between employee expertise and organizational knowledge creation. A possible explanation for this finding may be based on the characteristics of experts. Experts are often characterized as intelligent, self-confident, and having strong achievement motivation and a desire for dominance and autonomy (Fiest, 1999; Shanteau, 1987). With extensive knowledge and experience in their specialized field, experts are confident in their ability to explore alternatives and make decisions, even when there is ambiguity (Mumford & Gustafson, 1988). Moreover, experts often identify themselves with their work and care about the profession itself rather than the particular organization in which they are employed. Thus, they are highly motivated and interested in expanding their knowledge and skills to make a substantial investment in the ongoing development of their expertise (Kuchinke, 1997; Mumford, Scott, Gaddis, & Strange, 2002). Additionally, individuals with high expertise appreciate a working environment where they are given autonomy since they rely on their independent judgement and are ready to take responsibility for their own actions.

The individuals who possess the professionalism, expertise, and independence act to neutralize, or substitute for, leadership (Kerr & Jermier, 1978; Mumford et al., 2002). Bass (1985) also argued that individuals who perceive themselves as rational, intelligent, highly educated, and autonomous workers may be even resistant to the influence of a transformational leader. Although transformational leadership stimulates followers intellectually and motivates them to do their best (Avolio & Bass, 1988, p. 33), followers with strong achievement motivation and who have high expertise may override the advantages of transformational leaderhip. Moreover, focusing on the leader's vision may restrict the autonomy of experts in pursuing their own vision of their work. Eisenbeiß and Boerner (2013) demonstrated that transformational leadership increases followers' dependency on their leader, which eventually limits their creativity and innovativeness. A dependent follower tends to merely receive guidance, direction, and identity from the leader, needs approval and affirmation for their decisions, and often lacks confidence (Birtchnell, 1988), which is opposite to what individuals with high expertise typically desire. Therefore, considering the characteristics of an expert, I suspect that transformational leadership does not have a significant moderating effect on the relationship between employee expertise and organizational knowledge creation. This finding is meaningful in that it reveals the psychological mechanisms of leadership by which transformational leaders influence organizational knowledge creation, especially in terms of the interacting effect with the followers' characteristics (i.e., expertise).

Hypothesis 5: The Moderation Effect of Transformational Leadership on the Relationship between Quality of Interpersonal Relationships and Organizational Knowledge Creation

This study unexpectedly revealed a negative moderation effect of transformational leadership in explaining the positive association between quality of interpersonal relationship

and organizational knowledge creation. In other words, when transformational leadership is stronger, the positive influence of quality of interpersonal relationship on organizational knowledge creation becomes weaker. The possible explanations for the negative moderation effect of transformational leadership are described below.

One of the most important components of transformational leadership is charisma (Bass, 1985). The characteristics of transformational leadership considerably overlap with those of charismatic leadership in that both types of leadership describe a leader who articulates an appealing vision, empowers and inspires followers, stimulates them intellectually, and develops a collective identity among followers (Shamir, House, & Arthur, 1993). In this sense, "charismatic leadership was the most exemplary form that transformational leaders could assume" (Conger, 1999, p. 149).

Few leadership studies have noted the dangers of a charismatic leader. Most scholars have focused on the positive face of charisma, arguing that the term charisma is value-neutral in that it does not distinguish between unethical and ethical behaviors of the leader (Conger, 1999; Boone, 2006; Howell & Avolio, 1992). To capture the negative aspects, Howell and House (1992) described two types of charismatic leaders: socialized leaders and personalized leaders. While socialized charismatic leaders demonstrate the bright side of charismatic leadership (e.g., empowering and developing followers, providing visions, etc.), personalized charismatic leaders are authoritarian and narcissistic with visions that reflect their personal interests. They also ask for unquestioning obedience, and treat followers as a means rather than ends. In reality, every charismatic leader possesses some aspect of both types (Howell & House, 1993).

In conjunction with this dark side, there are some ethical concerns about transformational leaders as they can manipulate followers or become coercive "for what they judge to be for the

common good" (Bass & Steidlmeier, 1999, p. 186). Transformational leadership demands a strong, emotional relationship between leaders and followers (Jung, 2001). When followers are manipulated by the leader, they may not have opportunities to express their opinions or participate in defining the higher common goal. Instead, they are forced to engage in an intense high level of emotional attachment and commitment to the goal, and in this sense, they may feel burned out and exhausted (Harrison, 1987). Boone (2006) argued that unethical transformational leaders may even tarnish the values of honesty, loyalty, fairness, justice, and equality at work to accomplish the goal. These behaviors of the leader are almost antithetical to the core components of high-quality interpersonal relationship which include mutual respect, expansive emotional space, and openness to new ideas and influences (Dutton & Heaphy, 2003).

Furthermore, drawing on social learning theory (Bandura, 1999), followers who observe the unethical behaviors of their leaders behave similarly toward their coworkers. By role modeling the negative interpersonal behaviors of leaders, employees are likely to manage their relationship conflicts and tensions with fellow team members in a destructive way. Mayer, Aquino, Greenbaum, and Kuenzi (2012) demonstrated a negative relationship between ethical behavior and unit relationship conflict, concluding that the leader creates the group norms for how to treat others and, ultimately, influences interpersonal dynamics in work groups. A leader's unethical behaviors are often considered to be hazards that deteriorate interpersonal relationships in the workplace which stifles opportunities for constructive social interactions or dialogues (Brown & Treviño, 2006). Eventually, these actions and attitudes interrupt the organizational knowledge creation process. The current study is worthwhile in that, to the best of my knowledge, it provides the first empirical evidence revealing the negative side of transformational leadership in relation with interpersonal relationship at work.

Implications

The current study extends the theoretical literature and provides real-life applications. Implications of this study for theory and practice in the field of HRD are discussed based on the findings and discussions.

Theoretical Implications

This study's theoretical contributions are to both the organizational knowledge creation literature and to leadership literature. For the knowledge creation literature, the current study provides empirical evidence on how three essential elements of the knowledge creation process (i.e., *ba*, knowledge assets, and the SECI process) influence and interact with each other. Employee expertise represents both the quality and quantity of each individual's unique knowledge stock, and thus, serves as a firm-specific knowledge asset. The quality of interpersonal relationships speaks for both *ba* and a knowledge asset as it describes a relational context of the organization where knowledge is created and, at the same time, an emotional knowledge asset such as care, love, and trust (Nonaka et al., 2000). Transformational leadership promotes knowledge assets and builds and energizes *ba* by cultivating an organizational culture and providing critical resources (e.g., knowledge vision). The results of this study support that all three factors (i.e., employee expertise, quality of interpersonal relationship, and transformational leadership) enhance organizational knowledge creation (i.e., the SECI process). It also reveals a mechanism of how leadership interacts with knowledge assets and *ba* to influence the organizational knowledge creation process. In this sense, this study also confirms Nonaka and his colleagues' (2000) argument that "knowledge is created through the interactions amongst individuals or between individuals and their environments, rather than by an individual operating alone" (p. 15). This study is particularly meaningful in that it helps define a role of leadership

associated with *ba* (i.e., context) and knowledge assets, which has seldom been discussed in the current body of literature (von Krogh et al., 2012).

There has been an interesting debate in the literature related to the role of expertise in creative performance. Some have argued that expertise and inflexibility are a trade-off as experts may have difficulty adapting to new rules and interpreting problems from the perspectives of others; hence, expertise stifles creativity (Lewandowsky & Thomas, 2009; Chi, 2006). In contrast, others have argued that expertise is required to effectively create and leverage knowledge (Amabile, 1988; Ericsson et al., 2008; Mumford et al, 2002). The results of this study support the latter point of view in that it found that employee expertise has generally positive effects on organizational knowledge creation, and is independent of the degree of transformational leadership. Nonaka (1994) also emphasized that although leadership plays a critical role in articulating and amplifying knowledge, "tacit knowledge held by individuals may lie at the heart of the knowledge creation process" (p. 20). The current study also identified the positive influence of quality of interpersonal relationship on organizational knowledge creation, affirming Nonaka's (1994) arguments that communities of interaction spanning around a team, departmental, or organizational boundaries are fundamental to organizational knowledge creation. Although individuals can generate novel ideas and knowledge, their expertise remains personal unless it is articulated and expanded through social interactions (von Krogh et al., 2012).

For the leadership literature, this study provides some intriguing insights on the role of transformational leadership in the organizational knowledge creation process. The findings shed light on the contingent role of transformational leadership as a double-edged sword. On one side, this study found that transformational leadership promotes organizational knowledge creation. In

fact, transformational leadership has been widely regarded as a favorable leader quality that enables positive attitudinal, motivational, and behavioral changes that improve numerous performance outcomes across individual, group, and organizational levels (Wang, Oh, Courtright, & Colbert, 2011). This study expands that focus to include organizational knowledge creation.

On the other side, however, this study contributes to the theory by offering an analytic model that includes the dark side of transformational leadership. First, it was found that transformational leadership weakens the positive influence of quality of interpersonal relationship on organizational knowledge creation. My evidence indicated that transformational leadership does not cultivate a context for socialization that enables individuals to share their mental models, feelings, and experiences. Particularly due to their charisma and their narcissistic tendencies, transformational leaders can lead to the creation of an achievement-oriented culture, as opposed to relationship-oriented, which can be socially undesirable or even destructive, or it can increase followers' dependency (Basu & Green, 1997; Eisenbeiß & Boerner, 2013; Lindholm, 1990). These behaviors of leaders are most likely to be emulated by their followers (Mumford et al., 2002), resulting in creating a narrow emotional space, distrust, and dishonesty among followers.

This study also revealed that transformational leadership does not have an impact on the relationship between employee expertise and organizational knowledge creation. By virtue of experts' characteristics such as autonomy, professional focus, and intrinsic motivation, transformational leadership may not make a difference in their knowledge performance. Since experts can sometimes be very harsh in their evaluation of others, including their leaders, thus, it is particularly hard for leaders to obtain the credibility from experts to exercise influence. For

this reason, several scholars have argued that to lead a group of experts, it is essential for leaders to have technical expertise and creative problem-solving skills (Mumford et al., 2002; Tierney, Farmer, & Graen, 1999). However, the nature of transformational leadership does not guarantee a leader's competencies in terms of expertise and creativity, so they may not have influence on people with expertise in creating organizational knowledge, as evidenced by this study.

Considering the general trend that transformational leadership is considered an invaluable asset, these findings may seem surprising and counter-intuitive. However, a few empirical studies have provided insights on negative aspects of transformational leadership. Jeong and her colleagues (2016) demonstrated that a negative influence of principals' transformational leadership that moderated the relationship between teachers' professionalism and work engagement. Eistinbei and Boerner (2013) also found that transformational leadership increases followers' dependency, which, in turn, reduces creativity. Additionally, Basu and Green (1997) demonstrated a negative relationship between transformational leadership and innovative behaviors of followers. Including the current study, these findings affirm that leadership does not operate in a vacuum, but rather is a social process by nature. Therefore, the influence of transformational leadership may vary across organizational settings or according to followers' characteristics, both of which are largely under-researched (Conger, 1999; Liden & Antonakis, 2009; Yukl, 1999; house & Aditya, 1997). Von Krogh and his colleagues (2012) also argued that the success of transformational leadership on organizational knowledge creation is not guaranteed, but is dependent on context. This study adds one step in unveiling the complex processes through which transformational leaders and followers may interact to bring about organizational knowledge creation. In other words, this study provides a deeper understanding of how transformational leadership operates and what risks it may imply.

Practical Implications

This study provides practical implications for white-collar organizations seeking to increase their capabilities for organizational knowledge creation. The current study helps inform chief knowledge managers and executives so they can better understand the individual and contextual factors and learn how these factors interplay to enable organizational knowledge creation. De long and Fahey (2000) pointed out that even though most executives intuitively recognize the importance of organizational knowledge creation, they have a hard time articulating how and what factors actually relate to the construct. After understanding the facilitating role of employee expertise, quality of interpersonal relationship, and transformational leadership in organizational knowledge creation practice, they can design HR practices and policies to adapt or reshape the supportive culture in their organizations.

First, HR practitioners and management should provide various training and development opportunities for their employees to cultivate their expertise. Including formal training programs, informal learning opportunities such as structured on-the-job training, networking, and job shadowing can be offered to update and expand employees' knowledge, skills, and experiences. Management might also consider ways to recruit and sustain employees with greater expertise. Moreover, considering the characteristics of experts who value autonomy, organizations should establish HR interventions in which self-motivation and self-direction can be encouraged and blossomed (Drucker, 1999). For example, the leader facilitates his or her working group to formulate a shared consensual vision, rather than imposing the leader's vision, as a way to lead employees with expertise. Additionally, leaders should put their efforts into enhancing their own expertise and creativity to effectively work with and be a role model to knowledge workers (Eppler & Sukowski, 2000).

Second, to enhance the organizational knowledge base, organizations should create a work environment that cultivates high-quality relationships and encourages employees to freely discuss and exchange ideas. Today's organizations are interested in enhancing the quality of interpersonal relationships in the workplace (Mayer et al., 2012). To cultivate high-quality interpersonal relationships, leaders must build great teams and communities in the organization and create a culture of trust among all group members (Hitt & Ireland, 2002). Leaders should also build various channels to bridge communication between leaders and employees and among employees. Organizational members' positive experiences of connecting with others build human capacity and matters for organizational functioning (Heaphy & Dutton, 2008). Leader can also design HR practices that increase employees' experience with positive interactions at work. For example, as a part of socialization practices, organizations can routinely rotate their employees to become members of new teams or departments or assign mentors to new employees, which increases opportunities for positive social interactions (Baker & Dutton, 2007; Cross & Parker, 2004). Another example is to facilitate a relational aspect of everyday meeting practices and to encourage meeting members to listen and appreciate each other's contributions and to collaborate and build trust respectfully (Baker & Dutton, 2007). Furthermore, leaders should portray a "relational image" that models a sense of shared fate, common identity, cooperation, and interdependence in organizations (Heaphy & Dutton, 2008).

Lastly, as for leadership development that is pertinent to organizational knowledge creation, transformational leadership training is recommended, but with some caveats. The training programs should effectively cover the possible negative effects of transformational leadership as well as the well-documented positive aspects of such leadership, and encourage leaders to embrace the socialized leader aspect and minimize the personalized leader aspect.

Moreover, leadership development programs should consider how to improve leaders' relational attentiveness. Relational attentiveness refers to "a leader's capacity to perceive and respond to other people's emotional state" (Heaphy & Dutton, 2008, p. 154), which is crucial in facilitating positive social interaction at work. Leaders should pay more attention to how to build, repair, and sustain the connective tissue of a work group, department, and organization (Dutton, 2003).

Limitations and Future Research Recommendations

Despite the unique contributions of this study, it has some limitations, which also point to avenues for future research. First, team members' expertise was measured using self-assessment; thus, self-serving and social desirability biases may be present. Unfortunately, team leaders' ratings on their followers' expertise were not obtained because most team leaders invited for this study were unwilling to participate. Although some empirical research (e.g., Harris & Schaubroeck, 1988) has indicated that there is a moderate correlation between self-supervisor ratings, future researchers should collect data using a multi-source measurement of expertise including ratings from peers and their supervisors as well as self-ratings. Related to this limitation, there may be concern about a same-source bias associated with the use of self-reported measures for this study. However, following Podsakoff et al.'s (2003) recommendations, it was concluded that common method variance is not likely to pose a pervasive problem in this study.

Second, one should be cautious in generalizing the findings of this study using samples of white-collar employee in the United States. The findings may not be the same for blue-collar employees or manual laborers in other international cultural contexts. For instance, Tierney and Farmer (2002) found a different set of predictors for creative performance between their blue-collar and white-collar samples. Knowledge workers have a strong intrinsic motivation for

personal growth and a desire for achievement, and they tend to value the challenging nature of work (Drucker, 1999). Moreover, future researchers should investigate the influences of national culture on organizational knowledge creation. Based on the cultural dimensions such as power distance and individualism-collectivism, suggested by Hofstede, Hofstede, Minkov (2010), one can assume that national cultural norms could have substantial impact on mechanisms of workplace socialization and leadership that influence the SECI process. For example, Jiacheng, Lu, and Francesco (2010) found in their cross-cultural study that there were differences in knowledge sharing motivation depending on nationality. For example, Chinese employees in a high power distance and collectivism culture engage in knowledge sharing activities in pursuit of harmonious relationships with and recognition from referent groups and due to a fear of punishment, whereas U.S employees in a low power distance and individualism culture participate in knowledge sharing activities driven by individual determinations. For these reasons, they posited that the best knowledge management practices developed in Western can be ineffective or even dysfunctional in non-western environments.

Third, this study only tested three factors with a two-level analysis. Other individual, contextual factors are likely to play a role in organizational knowledge creation. Future researchers should continue exploring other sets of predictors, moderators, and mediators. I hope the current study will stimulate future research efforts to investigate dynamic interactions between the person and environment, *Ba* and knowledge assets, influencing the SECI process. Clearly, much more work is needed to collect evidence to comprehend the dynamic process of organizational knowledge creation by incorporating different combinations of variables, validating models across populations and replicating those studies to increase confidence in them.

Fourth, there may be a different set of factors influencing each phase of the SECI process, which opens avenues for future research. For example, employee expertise would be more related to the socialization and externalization phases than other phases since expertise represents deeper quality and higher quantity of one's knowledge and sharing experiences. This is even more assumed because, as previously discussed, experts have higher competencies in communication and cooperation. As another example, leadership might play a crucial role in the internalization stage as it requires support from HR interventions such as a knowledge management system to disseminate knowledge to the entire organization. In a similar vein, another future research suggestion includes exploring what behavioral dimension of transformational leadership is most relevant to organizational knowledge creation overall or each phase of the SECI process. For example, Sosik, Kahai, and Avolio (1998) posited that intellectual stimulation is the most influential behavioral dimension of transformational leadership that promotes employee creativity as it develops followers' generative and exploratory thinking. Does it operate the same as organizational knowledge creation?

Lastly, the current study makes a useful contribution to ongoing future research in relation to the dark side of transformational leadership, which has been far less documented than the bright side. I call for more in-depth future studies to investigate what aspects of transformational leadership have a negative influence on quality of interpersonal relationship in the workplace. Conger (1999) also pointed out that most leadership scholars have focused their attention on the positive face of transformational leadership or charisma; thus, the potential liability of transformational leaders has been largely overlooked. Only recently has there been a growing body of literature interested in the dysfunctional side of leadership (e.g., injustice, political/unethical behaviors), which is actually "a reflection of a broader critical thinking

movement in organizational sciences" (Karakitapoğlu-Aygün & Gumusluoglu, 2013). Thus, much work is still needed in this area.

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APPENDIX A

PARTICIPANT CONSENT FORM

Project Title: A Multilevel Analysis on the Influences of Employee Expertise and Quality of Interpersonal relationships on Organizational Knowledge Creation: Moderating Role of Transformational Leadership

You are invited to take part in a research study being conducted by Shinhee Jeong and Dr. Michael Beyerlein, researchers from Texas A&M University. You are being asked to read this form so that you know about this research study. The information in this form is provided to help you decide whether or not to take part. If you decide you do not want to participate, there will be no penalty to you, and you will not lose any benefits you normally would have.

Why Is This Study Being Done?
Knowledge creation is the key intangible resource and asset for corporate innovation. Several studies have provided evidence that organizational knowledge creation increases the number of new products and services, intellectual capital, and overall performance of the firm. Therefore, effective knowledge creation is imperative.

Surprisingly, researchers have not focused much attention on how to promote and facilitate organizational knowledge creation. Despite the animated discussion on knowledge itself as an invaluable resource, it has been argued that we are still far behind in understanding the organizational knowledge creation process.

The purpose of this study is to examine the association of knowledge creation practice with employee expertise, the quality of interpersonal relationshipss, and transformational leadership.

Why Am I Being Asked To Be In This Study?

You are being asked to be in this study because you work at 1) a U.S.-based organization, and 2) your position includes knowledge work that is important.

How Many People Will Be Asked To Be In This Study?

Approximately 300 people (approximately 30 teams with 10 people per team) from different companies will be invited to participate in this study.

What Are The Alternatives To Being In This Study?

The alternative to being in the study is not to participate.

What Will I Be Asked To Do In This Study?

You will be asked to complete a questionnaire delivered through an on-line survey tool, and it is estimated to take less than 20 minutes.

Are There Any Risks To Me?

There are no more risks than you would come across in everyday life if you decide to participate in this study.

Are There Any Benefits To Me?

The key benefit to you is that you can reflect on how your organizational climate facilitates organizational knowledge creation. In particular, your company can look at the quantified scores for various organizational behaviors at the individual, group, and team levels, such as leadership style, employee expertise, and quality of interpersonal relationshipss to determine where investment would increase your organization's knowledge creation capability.

Will There Be Any Costs To Me?

Aside from your time, there are no costs for taking part in this study.

Will I Be Paid To Be In This Study?

You will not be paid for being in this study.

Will Information From This Study Be Kept Private?

The records of this study will be kept completely private. No identifiers linking you to this study will be included in any type of report that might be published. Research records will be stored securely and only the researchers specified above will have access to the records.

Information about you will be stored in computer files protected with a password. This consent form will be filed securely in Shinhee Jeong's office.

Information about you will be kept strictly confidential to the extent permitted or required by law. People who have access to your information include the co-principal investigators and research study personnel. Representatives of regulatory agencies such as the Office of Human Research Protections (OHRP) and entities such as the Texas A&M University Human Subjects Protection Program may access your records to make sure the study is being run correctly and that information is collected properly. Information about you and related to this study will be kept confidential to the extent permitted or required by law.

Who may I Contact for More Information?

You may contact the principal investigator, Shinhee Jeong, to discuss any concerns or complaint about this research at 979-224-1614 or jeongsh00@neo.tamu.edu. You may also contact the principal investigator's advisor, Dr. Michael Beyerlein at beyerlein@tamu.edu.

For questions about your rights as a research participant; or if you have questions, complaints, or concerns about the research, you may call the Texas A&M University Human Subjects Protection Program office at (979) 458-4067 or irb@tamu.edu.

What if I Change My Mind About Participating?

This research is voluntary and you have the choice to be in this research study or not. You may decide to not begin or to stop participating at any time. If you choose not to be in this study or stop

being in the study, there will be no effect on your employment, relationship with Texas A&M University, relationship with the interviewer, or the company for which you work.

By participating in the interview, you are giving permission for the investigator to use your information for research purposes.

Statement of Consent

I agree to be in this study and know that I am not giving up any legal rights by signing this form. The procedures, risks, and benefits have been explained to me, and my questions have been answered. I can ask more questions if I want. A copy of this entire, signed consent form will be given to me.

_____ _____

Participant's Signature Date

_____ _____

Printed Name Date

Investigator's Affidavit:

Either I have or my agent has carefully explained to the participant the nature of the above project. I hereby certify that to the best of my knowledge the person who signed this consent form was informed of the nature, demands, benefits, and risks involved in his/her participation.

_____ _____

Presenter's Signature Date

_____ _____

Printed Name Date

APPENDIX B

STUDY INVITATION LETTER

Dear:

We are initiating a research study on organizational knowledge creation practice. The purpose of the study is to investigate organizational knowledge creation enablers and the interactions among enablers as they operate horizontally and vertically in the organization.

We are likely to agree that competitive advantage is fueled by innovation in processes and products. Knowledge creation is the key intangible resource and asset making that possible. It may seem intuitively obvious and the popular press makes frequent statements about the relationship of knowledge, innovation, and competitive advantage. Surprisingly, researchers have not focused much attention on the way those relationships play out in the complex setting of a multilevel organization. Good research can aid in refining the decision process around these key ingredients to organizational sustainability.

Several studies have provided evidence that organizational knowledge creation increases the number of new products and services, intellectual capital, and overall performance of the firm. Therefore, effective knowledge creation is imperative. More importantly, individually created knowledge should be crystallized and connected with an organization's knowledge system. But research-based conclusions about where the leverage points lie are scarce.

Driven by relevant theories, we would like to examine the associations of 5 factors with organizational knowledge creation practice. Those factors include employee expertise, work engagement, quality of interpersonal relationships, transformational leadership, and organizational learning culture. We have already drafted a questionnaire for gathering the relevant data. It has two versions: one for team members and the other for team leaders. Team members will be asked to respond to 65 question items, and it is expected to take less than 20 minutes. The questionnaire for team leaders, consisting of 18 items, will ask them to rate the expertise of each team member (followers).

As we will utilize a multilevel data analysis, we need to match each team member with his/her team leader. For the purpose of maintaining confidentiality and anonymity of the responses, we will work with the staff in the organization to assign "a code" for each participant. Examples are as follows for fictional teams A and B (L = leader, M = member).

Team name Team leader/member Code

Team name	Team leader/member	Code
HR team		A
	Chris Haines (Team leader)	AL
	Donna Kester (Team member #1)	AM-1
	Rena Knell (Team member # 2)	AM-2

	Bruce Bloomfield (Team member #3)	AM-3
	Dan Viggiani (Team member #4)	AM-4
	Brice Darlington (Team member #5)	AM-5
Tech team		
	Eric Maron (Team leader)	B
	Sara Lad (Team member #1)	BL
	Leonard Marquardt (Team member #2)	BM-1
	Steve Neushul (Team member #3)	BM-2
	John Pels (Team member #4)	BM-3
	Erica Bogosian (Team member #5)	BM-4
	Esther Reinagle (Team member #7)	BM-5

The participating company will benefit in several ways.

1. The company can measure current performance of knowledge creation capability.

2. We will prepare a detailed report so the company can look at the quantified scores for various organizational behaviors at the individual, group, and team levels, such as leadership style, employee expertise, work engagement, quality of interpersonal relationships, and organizational learning environment to determine where investment would increase knowledge creation capability.

3. Above all, based on solid data, the opportunity will emerge for various HR interventions that can be designed and implemented to improve any related practices.

Surveying the entire company would be the best scenario. However, for generating useful results for the company and the researchers, if you can provide access to only one or two teams, it will still be very beneficial. Please be informed that the results of this study are solely for research purposes, and there is no financial cost to the company.

Thank you in advance. Looking forward to hearing from you.

Sincerely,
Shinhee Jeong, Ph.D. Candidate
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APPENDIX C

QUESTIONNAIRE (FOR TEAM MEMBER'S USE)

Instructions

1. To make this research valid and reliable, please be as **open and candid** as possible. Information you provide will be an invaluable asset to enhance the knowledge creation capability of your organization.
2. Your responses are **confidential.**
3. The estimated time for this survey is about 20 minutes.

Demographic information

1. The identification code

2. Gender

❍ Male ❍ Female

3. Age

❍ 20-29 ❍ 30-39 ❍ 40-49 ❍ 50-59 ❍ 60-69

4. Educational background

❍ High school or qualification for high school graduation
❍ Associate's degree
❍ Bachelor's degree
❍ Master's degree
❍ Ph.D. degree

5. The length of service in the current organization

- ❍ Less than 1 year
- ❍ 1-5 years
- ❍ 6-10 years
- ❍ 11-15 years
- ❍ Over 16 years

6. Regarding your primary work group, how long have you been a member?

- ❍ Less than 1 year
- ❍ 1-2 years
- ❍ 2-3 years
- ❍ 3-4 years
- ❍ More than 4 years

7. The primary position in the current organization

- ❍ Team member
- ❍ Team leader
- ❍ Manager
- ❍ Senior Manager
- ❍ Executive
- ❍ Other (describe it)_____

8. Size of the firm

- ❍ less than 99 employees
- ❍ 100-299 employees
- ❍ 300-499 employees
- ❍ 500-799 employees
- ❍ More than 800 employees

9. Organzational Type

- ❍ Public

- ❍ Private

10. Industrial Type
    - ❍ Manufacturing
    - ❍ Agriculture
    - ❍ Information Technology
    - ❍ Transportation
    - ❍ Educational Services
    - ❍ Telecommunication
    - ❍ Electronics
    - ❍ Engineering
    - ❍ Construction
    - ❍ Others (please specify):

● **Please answer the following items <u>regarding your primary team</u> (where you spend the most time)**

Section 1. Knowledge creation practice

	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
1. I share experiences with other people.					
2. I collect work-related information and ideas from (in)formal relationships with other people.					
3. I gather work-related information from other departments.					
4. I develop new ideas through constructive dialogue by using figures and diagrams.					
5. I develop general rules and concepts based on several possible examples.					
6. I facilitate creative and constructive conversations among the members.					

	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
7. I engage in continued dialogue through reflection among the members to develop new ideas.					
8. My newly developed concepts are evaluated by a reasonable evaluation system and organizational vision /mission.					
9. I conduct experiments and share the newly developed concepts with the entire organization to evaluate the value of the concepts.					
10. I combine existing and new concepts in meaningful ways.					
11. Various departments collaborate to build the final model.					
12. I use newly learned knowledge as the source for the next applications.					

Section 2. Employee expertise

	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
1. I have knowledge that is specific to my field of work.					
2. I have the necessary education to be an expert in my field.					
3. I have knowledge about my field.					
4. I conduct research related to my field.					
5. I have the required qualifications to be an expert in my field.					
6. I have been trained in my area of expertise.					
7. I am ambitious about my work in the company.					
8. I can assess whether a work-related situation is important or not.					

	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
9. I am capable of improving myself.					
10. I am charismatic.					
11. I can deduce things from work-related situations easily.					
12. I am intuitive in my job.					
13. I am able to judge what things are important in my job.					
14. I have the drive to become what I am capable of becoming in my field.					
15. I am self-assured.					
16. I have self-confidence.					
17. I am an expert who is outgoing.					
18. I can talk my way through any work-related situation.					

Section 3. The Quality of interpersonal relationships

	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
1. My co-workers and I do not have any difficulty expressing our feelings to each other.					
2. We are not afraid to express unpleasant feelings at work.					
3. Whenever anyone at work expresses an unpleasant feeling, she/he does so in a constructive manner.					
4. If someone gets upset with other co-workers, she/he knows they will try to understand her/him.					
5. I am able to express my frustrations without offending anyone.					

	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
6. My co-workers and I cope well with the conflicts we experience at work.					
7. My co-workers and I cope well with the tensions we experience at work					
8. My co-workers and I cope well with the pressures experienced at work.					
9. Even during times of stress and pressure, we manage to find effective solutions.					
10. We are open to listening to our co-workers' new ideas.					
11. We are very open to diverse influences, even if they come from unconventional sources, such as new employees, customers, etc.					
12. We are attentive to new opportunities that can make our system more efficient and effective.					
13. We know how to accept people who are different from us.					
14. I feel that my co-workers like me.					
15. I feel that my co-workers and I try to develop meaningful relationships with one another.					
16. I feel that my co-workers understand me.					
17. The relationship between my co-workers and myself is based on mutual respect.					
18. My co-workers and I are committed to one another at work.					
19. There is a sense of empathy among my co-workers and myself.					
20. I feel that my co-workers and I do things for one another.					

Section 5. Transformational leadership (* indicates a reverse-scored item)

	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
1. My supervisor has a clear understanding of where we are going in the unit.					
2. My supervisor has a clear sense of where he/she wants our unit to be in 5 years.					
3. My supervisor has no idea where the organization is going*.					
4. My supervisor says things that make employees proud to be a part of this organization.					
5. My supervisor says positive things about the work unit.					
6. My supervisor encourages people to see changing environments as situations full of opportunities.					
7. My supervisor challenges me to think about old problems in new ways.					
8. My supervisor has ideas that have forced me to rethink some things that I have never questioned before.					
9. My supervisor has challenged me to rethink some of my basic assumptions about my work.					
10. My supervisor considers my personal feelings before acting.					
11. My supervisor behaves in a manner which is thoughtful and takes my personal needs into consideration.					
12. My supervisor sees that the interests of employees are given due consideration.					
13. My supervisor commends me when I do an above-average job.					
14. My supervisor acknowledges improvement in my quality of work.					
15. My supervisor personally compliments me when I do outstanding work.					

That completes your survey. Thank you for your participation.

APPENDIX D

QUESTIONNAIRE (FOR TEAM LEADER'S USE)

Instructions

1. To make this research valid and reliable, please be as **open and candid** as possible. Information you provide will be an invaluable asset to enhance the knowledge creation capability of your organization.
2. Your responses are **confidential**
3. The estimated time for this survey is about 30 minutes.

Demographic information

1. The identification code

2. Gender

❍ Male ❍ Female

3. Age

❍ 20-29 ❍ 30-39 ❍ 40-49 ❍ 50-59 ❍ 60-69

4. Educational background

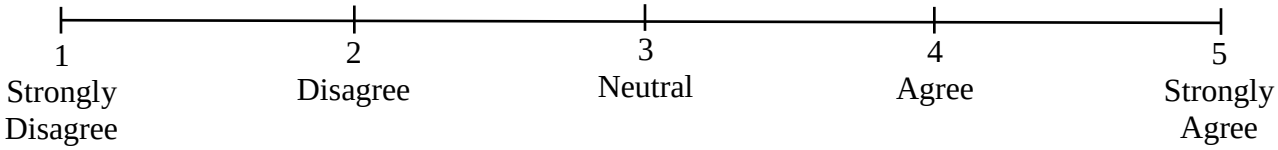
❍ High school or qualification for high school graduation
❍ Associate's degree
❍ Bachelor's degree
❍ Master's degree
❍ Ph.D. degree

5. The length of service in the current organization

❍ Less than 1 year
❍ 1-5 years
❍ 6-10 years

- ❍ 11-15 years
- ❍ Over 16 years

- **Please insert the score (on the scale of 1 to 5) for each item in the table reflecting how you perceive each individual team member.**



Item 1. This person has knowledge that is specific to his/her field of work.
Item 2. This person has the education necessary to be an expert in his/her field.
Item 3. This person has knowledge about his/her field.
Item 4. This person conducts research related to his/her field.
Item 5. This person has the qualifications required to be an expert in his/her field.
Item 6. This person has been trained in his/ her area of expertise.
Item 7. This person is ambitious about his/her work in the company.
Item 8. This person can assess whether a work-related situation is important or not.
Item 9. This person is capable of improving himself/ herself.
Item 10. This person is charismatic.
Item 11. This person can deduce things from work-related situations easily.
Item 12. This person is intuitive in his/her job.
Item 13. This person is able to judge what things are important in his/her job.
Item 14. This person has the drive to become what he/she is capable of becoming in his/her field.
Item 15. This person is self-assured.
Item 16. This person has self-confidence.
Item 17. This person is an expert who is outgoing.
Item 18. This person can talk his/her way through any work-related situation.

Employee Code (example : AM-1)								
Item 1								
Item 2								
Item 3								
Item 4								
Item 5								
Item 6								
Item 7								

Employee Code (example : AM-1)								
Item 8								
Item 9								
Item 10								
Item 11								
Item 12								
Item 13								
Item 14								
Item 15								
Item 16								
Item 17								
Item 18								

That completes your survey. Thank you for your participation.