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Predicting inter -organizational knowledge satisfaction through knowledge conversion and task characteristics in a minority -owned business

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ABSTRACT

Predicting Inter-Organizational Knowledge Satisfaction through Knowledge Conversion and Task Characteristics in a Minority-Owned Business

by

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M.B.A., University of Phoenix, 2003
B.S., University of Maryland University College, 2000

Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
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ABSTRACT

Knowledge management has been extensively studied from the single organization (intra-organizational) perspective for many years. Although the literature on intra-organizational knowledge is extensive, there still exist gaps in the literature with regards to knowledge being shared by multiple organizations (inter-organizational knowledge). Inter-organizational knowledge satisfaction is gained when the organizations successfully embody the knowledge gained via the cooperation and crystallizes that knowledge within the organization. The problem addressed in this study is the lack of a model for predicting inter-organizational knowledge satisfaction utilizing task characteristics and the knowledge conversion process. The purpose of the study was to predict inter-organizational knowledge satisfaction for a contract company. The research question addressed how task characteristic and knowledge conversion can predict inter-organizational knowledge satisfaction. The theoretical frameworks include Nonaka's theory on organizational knowledge creation and Becerra-Fernandez and Sabherwal's theory for task characteristics. The study is a correlation research design using multiple linear regression as the data analysis method. An online questionnaire was administered to all executives, first- and mid-level managers, and professionals. The predictor variables task characteristic and knowledge conversion are used to predict inter-organizational knowledge satisfaction (IOKS). Predictor variables accounted for 35.3% of the variance in the IOKS score. This study contributes to social change by helping organizations gain a competitive advantage through developing and implementing both creative and timely knowledge management initiatives to gain inter-organizational knowledge satisfaction.

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DEDICATION

This dissertation is dedicated to my family and friends who supported me during this time.

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I want to acknowledge my family and friends who have been there during this entire process. Their support has enabled me to finish this task. Without them I would have given up a long time ago.

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CHAPTER 1: INTRODUCTION

What is knowledge management? The literature provides many definitions for knowledge management. But perhaps the simplest definition of knowledge management is "sharing what we know with others, the emphasis is on human know-how and how it brings value to an organization" (OSD, 2007, p. 1). The knowledge management (KM) strategy of any organization should be structured to effectively use knowledge.

To accomplish this, organizations must rely on Information Technology (IT). Barquin posited that, "in effect, IT is necessary to do knowledge management in any complex environment; but it is not sufficient without understanding the people, the processes and the culture and incorporating them into the equation" (p. 2). As organizations develop knowledge management strategies they must establish objectives. Wiig (1997) states that the objectives of knowledge management should be: (a) To make the enterprise act as intelligently as possible to secure its viability and overall success and (b) To otherwise realize the best value of its knowledge assets (p. 1).

As organizations establish their objectives for knowledge management they must also focus on the inter-organizational knowledge satisfaction that can be gained from interacting with other organizations (cooperation). To accomplish this organization must understand what inter-organizational knowledge satisfaction is and how it can enhance the strategic position of the organization. The literature does not provide a definition for inter-organizational knowledge satisfaction. The literature however defines inter-organizational knowledge as the knowledge gained from one organization to another as they work within a multilateral agreement of corporation each organization exchanging knowledge one to the other. The author has chosen to define inter-organizational

knowledge satisfaction as the successful embodiment of knowledge gained within the cooperation and crystallized within the organization. For an organization to achieve effective knowledge management in the realm of inter-organizational knowledge the organization must view the interaction between itself and any external organization as a cooperation.

> Within the cooperation, inter-organizational learning processes occur between the involved elements (i.e. individuals) . . . .of different organizations. These individuals form an inter-organizational learning entity, which means that they are responsible for transferring, sharing, and developing knowledge from the point of view of the cooperation. (Hülsmann, Lohmann, and Wycisk, 2006, p. 23)

Within the context of the cooperation it is "possible to emphasize the learning results of a single organization or the success of the whole cooperation" (Hülsmann et al., et al., 2006, p. 24). This is accomplished by developing ways to crystallize the inter-organizational knowledge gained through the cooperation and seamlessly integrating that knowledge within the culture of the organization. Chapter 2 will provide a more concise review of the literature.

Problem Statement

The problem addressed in this study is the lack of a model for predicting inter-organizational knowledge satisfaction for the contract company utilizing task characteristics and the knowledge conversion process. A review of previous literature reveals that there is a lack of research on the relation between knowledge conversion process and task characteristics, in regards to inter-organizational knowledge satisfaction. Organizations currently have models in place for predicting intra-organizational knowledge which can be captured within the organization utilizing training programs, databases, social events, and information technology. These intra-organizational models

do not help to predict the inter-organizational knowledge satisfaction that can be gained via the cooperation.

As companies form cooperation's, the need to capture the knowledge that exists in each organization becomes critical to the strategic mission of the organization. Capturing this knowledge can be accomplished by moving current models for intra-organizational knowledge to the inter-organizational level and incorporating knowledge conversion and task characteristics into the knowledge conversion process of the organization. Through this accomplishment organizations will be able to predict the level of inter-organizational knowledge satisfaction that can be gained via the cooperation which benefits the contract company, workers, and their employees, as well as federal, state, and local governments.

Background of the Problem

The importance of knowledge management today requires a shift in our thinking. "Knowledge management today [should cater] to the critical issues of organizational adaptation, survival and competence in face of increasingly discontinuous environmental change" (Malhotra, 1998, p. 59) for organizations to be effective in this time of environmental change they must develop successful knowledge conversion processes. The knowledge conversion process can be accomplished through Nonaka's (1994) knowledge conversion spiral which consists of socialization, externalization, internalization, and combination (SEIC model) (pp. 19-20). Nonaka suggested that as organizations create knowledge, it should be understood in terms of a process that organizationally amplifies the knowledge created by individuals, and crystallizes it as a part of the knowledge network of the organization (p. 15).

Organizationally amplifying knowledge entails making the knowledge gained a key part of the way the organization conducts business. Nonaka implied it is possible to distinguish several levels of social interaction at which the knowledge created by an individual is transformed and legitimized (Nonaka, 1994, p. 15). Knowledge creations should be viewed as an upward spiral process, starting at the individual level moving up to the collective (group) level, and then to the organizational level, sometimes reaching out to the inter-organizational level" (p. 20).

If the knowledge creation process is done effectively, according to Nonaka, new knowledge associated with more advantageous organizational processes or technologies will be able to gain a broader currency within the organization (p. 17). Since the knowledge conversion process can create new knowledge, it raises the specific question of whether or not organizations as whole or different task characteristic groups in an organization can employ or emphasize a specific pattern of the knowledge conversion process. To answer the questions of whether different task characteristic groups in an organization can employ or emphasize a specific pattern of the knowledge conversion process Becerra-Fernandez and Sabherwal (2001) conducted a study on perceived knowledge satisfaction at the Kennedy Space Center.

The study examined two task dimensions, task orientation and task domain, as influencing the appropriate knowledge management processes. Task orientation can be divided into content-oriented and process-oriented tasks. Content-oriented tasks emphasize the specified goals need to be achieved. Process-oriented tasks, in contrast, focus on the processes or methods used to achieve goals (Becerra-Fernandez &

Sabherwal, 2001; Chou & He, 2004). In contrast task domain can be distinguished between focused and broad task domain (Becerra-Fernandez & Sabherwal, 2001).

Focused tasks are characterized as low task variety but greater specification, while broad tasks are characterized as high task variety and thus generate greater need for working with other subunits (Becerra-Fernandez & Sabherwal, 2001). These dimensions require different types of organizational knowledge, which in turn implies that different knowledge management processes would be appropriate (p. 27). For example, if a department specializes in web development, engineering design, software analysis, or project management, the knowledge management processes in place should be geared to those departmental specialties. Inter-organizational knowledge satisfaction can be achieved through organizational learning.

Organizational learning can encompass both intra-organizational and inter-organizational knowledge. Intra-organizational knowledge is defined as the internal learning processes within a single organization; inter-organizational learning in contrast describes learning processes between and with other organizations, for example in cooperation (Hülsmann et al., 2006, p. 22). This cooperation can consist of the contract company and the organization its knowledge workers are contracted too.

Intra-organizational knowledge views the organization as a social system. This social system is composed of the employees within the organization and their cognitive abilities (Hülsmann et al., 2003. p. 22), which consists of their thought processes and the way they process knowledge. The interaction of these individual elements and the effects on the organization as a whole describes the internal knowledge processing of the organization. For example, as employees socialize and exchange ideas or attend training

courses. Knowledge and information are exchanged during this process and stored in the intra-organizational structures and routines in order to enhance the knowledge of the organization (p. 22).

To move from an intra-organizational to inter-organizational level the contract company must view knowledge at the cooperation level. Cooperations consist of multiple organizations that work together for a common cause. Individuals within the cooperation interact to form an inter-organizational learning entity. This learning entity allows the individuals within the cooperation to move from an intra-organizational entity to an inter-organizational entity by transferring, sharing, and developing knowledge from the point of view of the cooperation.

The company that this research focused on was Data Solutions & Technology (DST). DS&T is a contract company based in Lanham, Maryland. It provides management, technical, information technology (IT), and logistics support services to various federal agencies such as the General Services Administration, United States Army, United States Navy, United States Air Force, the Defense Intelligence Agency, National Oceanic and Atmospheric Administration, National Institutes of Health, and the Federal Highway Administration.

DS&T has over 14 consecutive years of experience while managing over 100 contracts throughout the Continental United States (CONUS) and Outside the Continental United States (OCONUS). The President and Chief Executive Officer (CEO) has 30 years of human resource management experience and served as an USAF reservist retiring at the rank of Colonel. DS&T is woman-owned and veteran-operated company

with 355 employees. As a contract company, DS&T must send knowledge workers out to other companies who have contracted their services.

To successfully capture the inter-organizational knowledge of the cooperation the workers must become ingrained in the culture of the organizations they support. They must adapt to the host company's beliefs, views, and social structure. To accomplish this they must adapt to the host company's intra-organizational learning practices. Through this adaption Nonaka's knowledge conversion process can begin. Once begun inter-organizational knowledge can be successfully captured within the cooperation. It is important for DS&T to establish a model of the knowledge conversion process for each task characteristic group that will enhance the inter-organizational satisfaction of the organization.

Nature of the Study

The intent of this study was to ask the question: How does task characteristic and knowledge conversion predict inter-organizational knowledge satisfaction? To answer this question, two theories were tested; Nonaka (1994) knowledge conversion and Becerra-Fernandez and Sahberwal (2001) task characteristics. Nonaka's (1994) theory provided a foundation for the knowledge conversion process. Nonaka's theory focuses on "organizational knowledge creation, which is distinct from individual knowledge creation, and takes place when all four modes of knowledge creation [socialization, externalization, internalization, and combination] are 'organizationally' managed to form a continual cycle" (p. 20).

The second theory task characteristic was developed by Becerra-Fernandez and Sabherwal (2001). Becerra-Fernandez and Sabherwal theorized that the impact of the

knowledge management process is moderated by the content, namely the nature of the tasks performed by the individual and groups using the knowledge resulting from the knowledge management processes. The underlying theory states that the knowledge management process that departments should use depends on the nature of the tasks it performs. Two hypotheses were developed for this research: H_0: Task characteristics and knowledge conversion will not significantly predict inter-organizational knowledge satisfaction. H_1: Task characteristics and knowledge conversion will significantly predict inter-organizational knowledge satisfaction.

To test these hypotheses, an online survey was administered to 49 executives, first, mid level managers, and professionals from a contract company based in Lanham, Maryland. Probability sampling, specifically purposive sampling, was used to select these individuals. Because of their position within the company the participants were able to understand the importance of knowledge management and influence the culture and direction of the company's strategic goals.

The nature of this study was based on correlation research which allowed the data to be analyzed using Multiple Linear Regressions (MLR). The purpose of MLR is to detect a linear relationship between a set of independent variables (knowledge conversion and task characteristics) and a dependent variable (inter-organizational knowledge satisfaction). MLR provides a means for making predictions. In general, multiple regression allows the researcher to ask general questions about prediction (Stanton, 2001). Analysis of the correlation between knowledge conversion and task characteristics will be described in chapter 3.

Research Questions

The dependent and independent variables are defined in table 1. The data obtained from this study answered the following research question:

How does task characteristic and knowledge conversion predict inter-organizational knowledge satisfaction?

Table 1.

Dependent and Independent Variables

Dependent	Independent
Inter-Organizational Knowledge Satisfaction	Knowledge conversion
	Task characteristics

Hypotheses

H_0: Task characteristics and knowledge conversion will not significantly predict inter-organizational knowledge satisfaction.

H_1: Task characteristics and knowledge conversion will significantly predict inter-organizational knowledge satisfaction.

Purpose of the Study

The purpose of this quantitative, correlation research study was to establish a model that can predict inter-organizational knowledge satisfaction for DS&T a minority-owned contract company in Lanham, Maryland. This study attempted to critically analyze the current literature on knowledge management and how theories of knowledge management can be applied to businesses that specialize in contract work. In addition, this study attempted to provide a better understanding of knowledge conversion and the knowledge transfer and creation process. The results of this study can help organizations

achieve inter-organizational knowledge satisfaction. Subsequently, organizations will be able to utilize a proper pattern of the knowledge conversion process for each task characteristic group in enhancing knowledge transfer and creation.

Theoretical Framework

This study was guided by Nonaka's (1994) knowledge conversion and Becerra-Fernandez and Sabherwal's (2001) task characteristics theories. Nonaka's theory provided a foundation for the knowledge conversion process. This theory focuses on organizational knowledge creation, which encompasses Nonaka's four modes of knowledge creation [socialization, externalization, internalization, and combination] (p. 20). Hülsmann (2003) describes Nonaka's knowledge creation as intra-organizational learning.

As one looks at knowledge from an organizational perspective one must see the organization as a system with interactions between various elements which effects the organization as a whole. Intra-organizational learning describes the internal knowledge processing of an organization as a result of the interaction between the individuals in the context of the specific organization. Nonaka (1994) posited that within this system, tacit and explicit knowledge creation is a process composed of four shifts between different modes of knowledge conversion (p. 22).

First, the socialization mode usually starts with the building of a team or field of interaction. This field facilitates the sharing of members' experiences and perspectives (Nonaka, 1994, p. 22). As the contract worker becomes ingrained within the host organization and begins to establish social networks, he or she will become a part of this process and begin to share their experience with those of the host company. After the

contract worker is socialized into the knowledge conversion process he or she moves to the next mode of knowledge conversion externalization.

The second mode of the knowledge conversion process is externalization. This mode is triggered by successive rounds of meaningful dialogue and the sophisticated use of metaphors which enable team members to articulate their own perspectives, and reveal hidden tacit knowledge that is otherwise hard to communicate (Nonaka, 1994, p 22). As the contract worker enters this mode he or she can articulate their own experiences within the host or parent company thus sharing tacit knowledge within the social network of the organization. The second mode of the knowledge conversion process focused on the exchange of meaningful dialogue and sophisticated metaphors. The third mode combination focuses on social processes.

The third mode of the knowledge conversion process is combination, which involves the use of social processes to combine different bodies of explicit knowledge held by individuals. “Individuals exchange and combine knowledge through such exchange mechanisms as meetings and telephone conversations” (Nonaka, 1994, p. 19). This mode of knowledge conversion allows the contractor to utilize the meetings and telephone conversations they experience to be converted to new knowledge. The third mode utilized meetings and telephone conversations to enhance the knowledge conversion process whereas the fourth mode internalization focuses on learning by doing.

Through this process the final mode of knowledge conversion is triggered, internalization which is characterized as learning by doing this mode requires the contractor to identify the knowledge relevant for one's self within the organizational knowledge. “Learning-by-doing, training, and exercises allow the individual to access the

knowledge realm of the group and the entire organization (Nonaka, 1994, p. 19). This mode allows for training programs and seminars to enhance the knowledge conversion of the employee and to help the trainees to understand the organization and themselves in the whole. Although, this mode of the knowledge conversion process utilizes training programs to enhance the learning process all four modes are vital to the knowledge conversion process.

The second theory is Becerra-Fernandez and Sabherwal (2001) research on task characteristics. Becerra-Fernandez and Sabherwal conducted research on task characteristics at the Kennedy Space Center (KSC). Becerra-Fernandez and Sabherwal (2001) theorized that the impact of the knowledge management process is moderated by the content, namely the nature of the tasks performed by the individual and groups using the knowledge resulting from the knowledge management processes. The underlying theory states that the knowledge management process that departments should use depends on the nature of the tasks it performs. This theory requires viewing each department at the aggregate level based on the predominant nature of its tasks, while recognizing that each department performs numerous tasks that are not similar (p. 27).

Becerra-Fernandez and Sabherwal (2001) suggested that knowledge has two dimensions on the department level: task orientation and task domain. Task orientation is used to identify the difference in various firms and organizational departments within the firm. Becerra-Fernandez and Sabherwal (2001) classified departments into two basic categories: (a) process-oriented and (b) content-oriented. The second dimension is reflected in the material-based and system-based industries. This second dimension task domain consists of two domains (a) focused and (b) broad task domains. The results of

the study support the contingency framework presented by Becerra-Fernandez and Sabherwal (2001) of the appropriateness of the four knowledge management processes. All processes other than externalization indicated an impact on perceived knowledge satisfaction (p. 47). These results indicate as stated by the researchers, that managers should try to understand the characteristics of their tasks, and then, based on task domain and orientation, identify and develop the knowledge management processes that are most appropriate (p. 48). Once the appropriate knowledge management process has been identified the organization can achieve inter-organizational knowledge satisfaction.

The researcher theorizes that inter-organizational knowledge satisfaction can be achieved by encompassing Nonaka's (1994) and Becerra-Fernandez and Sabherwal's (2001) theories. In order to utilize these theories successfully the organization must discontinue learning on an intra-organizational level by moving from the system level (or single organization perspective) to cooperation level (or multi-organizational). When learning from the cooperation level inter-organizational learning occurs between the individuals of different organizations and an inter-organizational learning entity is established. This learning entity places the responsibility for learning on the individual and holds them responsible for transferring, sharing, and developing knowledge from the perspective of the cooperation.

> Inter-organizational learning has been linked to the study of networks and the interaction between organizations. This link allows organizations to learn from each other with each element of the network hoping to benefit compared to acting alone. To further understand inter-organizational learning one must consider organizations as social systems these social systems constitute themselves through exchange processes. (Hülsmann et al., 2003, p. 22)

Their objective is to balance external demands with the system's structure and actions (Hülsmann et al., 2003, p. 22). This balance can be achieved through

organizational learning. Organizational learning can encompass both intra- and inter-organizational learning. Inter-organizational learning can provide competitive advantage and long term growth can be created by developing knowledge that is embedded in the context of the cooperation, and thus hard to imitate (Hülsmann et al., 2003, p. 25). Hülsmann et al. also suggested that inter-organizational learning consists of both active and reactive learning processes, always striving for a fit between internal demands of the cooperation and external demands of the environment on the one hand, and aiming at an improvement of the competitiveness on the other hand (p. 25).

Operational Definitions

The following terms are defined for the purpose of this study:

Combination: The process of creating explicit knowledge from explicit knowledge. The second mode of knowledge conversion involves the use of social processes to combine different bodies of explicit knowledge held by individuals. (Nonaka, 1994, p. 19)

Cooperation: A cooperation can be considered as a (virtual) system if there is a difference between itself and the surrounding environment (Luhmann 1968, 120). Within the cooperation inter-organizational learning processes occur between individuals of different organizations

Externalization: The process of converting tacit knowledge into explicit knowledge. The third mode of knowledge conversion relates to patterns of conversion involving both tacit and explicit knowledge. “It captures the idea that tacit and explicit knowledge are complementary and can expand over time through a process of mutual

interaction. This involves two different operations the other being internalization" (Nonaka, 1994, p. 19).

Information Technology (IT): The study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware. IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and securely retrieve information.

Internalization: The fourth mode of knowledge conversion relates to patterns of conversion involving both tacit and explicit knowledge. "It captures the idea that tacit and explicit knowledge are complementary and can expand over time through a process of mutual interaction. This involves two different operations the other being externalization" (Nonaka, 1994, p. 19).

Inter-organizational knowledge satisfaction: The successful embodiment of knowledge gained within the cooperation and crystallized within the organization.

Inter-organizational learning: Describes learning processes between and with other organizations, for example in a cooperation (Hülsmann et al., p. 22). "Inter-organizational learning refers to learning *from* other organizations (Knight 2002, 435), focusing on learning processes and relations between the partner organizations (Bosch-Sijtsema 2001, 38)" (cited in Hülsmann, Lohmann, & Wycisk, 2006, p. 24).

Intra-organizational learning: Focuses on the interactions within a single organization. "It describes the internal knowledge processing of a single organization as a result of the interaction between individuals in the context of the specific organization" (cited in Hülsmann, Lohmann, & Wycisk, 2006, p. 24).

Knowledge conversion: The assumption that knowledge is created through conversion between tacit and explicit knowledge. It consists of four different "modes" of knowledge conversion: "(1) from tacit knowledge to tacit knowledge, (2) from explicit knowledge to explicit knowledge, (3) from tacit knowledge to explicit knowledge, and (4) from explicit knowledge to tacit knowledge" (Nonaka, 1994, p. 18).

> *Knowledge management*: A systematic process for capturing and communicating knowledge people can use. "Understanding what your knowledge assets are and how to profit from them."Or the flip side of that: "to obsolete what you know before others obsolete it." Perhaps the simplest definition of knowledge management is "sharing what we know with others," in all of these definitions, the emphasis is on human know-how and how it brings value to an organization. (OSD, 2007, p. 1)

Task characteristics: Becerra-Fernandez and Sabherwal (2001) describe two task characteristics for their study as influencing the appropriate knowledge management processes, that is, task orientation and task domain. They posit that these task dimensions require different types of organizational knowledge, which in turn implies that different knowledge management processes would be appropriate (p. 27).

Task domain: This dimension distinguishes between focused and broad task domains, which are reflected in the material-based and system-based industries, respectively. "Subunits performing focused tasks have low task variability but greater specialization, while subunits performing broad tasks have greater task variability and greater need for working with other subunits within the organization" (Becerra-Fernandez & Sabherwal, 2001, p. 28).

Task orientation: Based on task orientation, organizational subunits have been classified into two basic categories: process-oriented and content-oriented. *Content-oriented tasks* focus on the specific ends or goals to be achieved. They concern issues

such as what products need to be developed and the specific design features that need to be achieved in the products. (Becerra-Fernandez & Sabherwal, 2001, p. 27) In *contrast, process oriented tasks* focus on the processes or means that should be used to attain the goals. They concern issues such as how to perform the processes needed to achieve the specific product design. (Becerra-Fernandez & Sabherwal, 2001, p. 27)

Organizational learning (or Learning organization): Organizational learning can be defined as the process within the organization by which knowledge about action-outcome relationships and the effect of the environment on these relationships is developed (Duncan & Weiss, 1979). This knowledge necessarily resides within individuals in the organization but is not identical to individual specific knowhow. Rather, it concerns knowledge that is communicable, consensual, and integrated—knowledge that in a sense is shared among many (but not necessarily all) of the members of an organization's dominant coalition (Nonaka and Johansson, 1985, p. 183). A learning organization is one that has a heightened capability to learn, adapt, and change. It is an organization in which learning processes are analyzed, developed, monitored, and aligned with the innovative goals of the organization (Cummings and Worley, 1993). Organizational learning can be understood as an umbrella term, encompassing both intra- and inter-organizational learning (Hülsmann et al., Lohmann, & Wycisk, 2006, p. 22).

Socialization: The process of creating tacit knowledge through shared experiences. The first mode of the knowledge conversion process that enables one to convert tacit knowledge through interaction between individuals this knowledge can be captured without language. “Apprentices work with their mentors and learn craftsmanship not through language but by observation, imitation, and practice. In

business on-the-job (OJT) uses the same principles. The key to acquiring tacit knowledge is experience" (Nonaka, 1994, p. 19).

Assumptions

There were several assumptions made for this study. The first assumption was that all participants' responses may not reflect their real opinions. The second assumption was that the participants have a strong knowledge of the company and the company processes. The third assumption was that all respondents have daily access to a computer. The researcher also assumed that all participants understood the questions presented within the questionnaire. The final assumption was that each participant was exposed to the same degree of external factors, such as training, management support, culture, and incentive programs that promote knowledge transfer and creation.

Scope Limitation and Delimitations of the Study

This study investigated the knowledge satisfaction process within Data Solutions & Technology (DS&T) a company located in Lanham, Maryland. The sample of participants in this study included executives, first- and mid-level managers, and professionals. The chosen company employed approximately 355 employees. It currently manages over 100 contracts throughout the Continental United States (CONUS) and Outside the Continental United States (OCONUS) performing management, logistics and operational, and information technology support for state and federal agencies which allows for a generalization to other similar contracting companies.

In this study, the target population included executives, first- and mid-level managers, and professionals who were selected as a target population for this study because of their familiarity to the company and the company's knowledge management

policies. The potential number of participants for this study was 99 which included all executives, first- and mid-level managers, and professionals.

The following elements are the limitations to the study:

1. This study encompassed 58 executives, first- and mid-level managers, and professionals of the possible 355 total employees.
2. Only one minority owned and operated company was used.
3. Participants may not have a knowledge management program located at the site to which they are assigned.
4. The study is not considering personality differences that could account for differing responsiveness to the survey.

To understand how individuals process knowledge, the researcher measured subjective points of view regarding individuals' responses to questions regarding knowledge conversion and task characteristics. Inter-organizational knowledge satisfaction was evaluated using responses to questions obtained from an online questionnaire. The duration of the survey was approximately two weeks.

Significance of the Study

The results of this study will add to the literature on knowledge management and provide a model for predicting inter-organizational knowledge satisfaction. The amount of literature on intra-organizational knowledge is extensive. The literature covers many aspects of knowledge management from Nonaka's (1994) knowledge creation and transfer to Perrow's (1968) task characteristics or Becerra-Fernandez and Sabherwal's (2001) task orientation. However, the literature fails to provide a model for how well task characteristic and knowledge conversion predict inter-organizational knowledge

satisfaction. Inter-organizational knowledge satisfaction will allow the individuals employed within the company to effectively transfer knowledge within the cooperation and provide for a knowledge-rich organization.

Given that knowledge is an organization's greatest asset and knowledge conversion is the primary means by which knowledge is interchanged, the findings of this study could help companies develop a model that can predict inter-organizational knowledge satisfaction. This study will contribute to the existing body of knowledge in the area of knowledge management considering, there is no current evidence or research being conducted to determine the relationship of how well knowledge transfer and creation; and task characteristics can predict inter-organizational knowledge satisfaction.

Social Change

This study could lead to a reduction in inter-organizational knowledge barriers which could enhance the conditions to share and develop new knowledge. The holistic view of knowledge sharing and joint knowledge development can contribute to improving the whole cooperation by contributing to the existing overall body of knowledge in the area of knowledge management specifically, inter-organizational knowledge. The existing body of literature is primarily focused on intra-organizational knowledge. However, the need to increase the awareness of how knowledge can be transferred and created organization to organization is critical in achieving the highest organizational potential of knowledge satisfaction. Therefore, this study will add more dimensions to the body of knowledge in the knowledge management field for inter-organizational knowledge.

Another implication for social change of this study will be addressed within the organization. In today's declining markets and economic upheaval knowledge plays a major role for organizations to achieve a strategic advantage over their competitors and to survive at a time when business from every sector have filed bankruptcy or required a government bailout. An effective knowledge-sharing environment must be developed within the company to transform traditional organizations into learning organizations.

Lack of trust, time, and the fact that knowledge management cannot be easily measured has caused managers to not invest in knowledge because they cannot see a direct cause and effect on the bottom-line of the organization. This mindset presents a barrier and causes difficulties to implementing a successful learning organization. It is essential for organizations to develop effective knowledge-sharing and knowledge-transferring methods that will allow the organization to overcome knowledge-sharing barriers and learning organizations difficulties.

The results and findings of this study suggest that different task situations in an organization frequently adopt different patterns of knowledge conversion in accomplishing knowledge transfer and creation. Therefore, the implications for social change can be quantified in terms of employee improvement (job satisfaction and enhanced knowledge or skill) at the individual level which can relate to an overall improvement for the organization at the organizational level. Knowledge gained from this study will help organizations develop effective inter-organization knowledge methods that can lead to inter-organizational knowledge satisfaction. Thus gaining organizational knowledge wealth, increased revenue, improved employee knowledge and skill, and providing the organization with a strategic advantage over its competitors.

Summary

The purpose of this quantitative, correlation research study was to predict inter-organizational knowledge satisfaction for contract companies that specialize in contract work for federal, state, and local governments, as well as the private sector. A review of previous literature reveals that there is a lack of research on the relation between Nonaka's (1994) knowledge conversion process and Becerra-Fernandez and Sabherwal's (2001) task characteristics, in regards to inter-organizational knowledge satisfaction for businesses that specialize in contract work. The nature of this study is based on correlation research utilizing Multiple Linear Regression (MLR) as the preferred data analysis method. MLR was chosen because it has the ability to find a linear relationship between a set of independent variables and a set of dependent variables. MLR is one of the most popular mathematical models for making predictions (Stanton, 2001).

The research question this study attempted to answer is: How well can task characteristics and knowledge conversion predict inter-organizational knowledge satisfaction? To answer this question one must first understand inter-organizational knowledge and the theories that will form the theoretical framework for the study; Becerra-Fernandez and Sabherwal's (2001) task characteristics and Nonaka's (1994) knowledge conversion. Becerra-Fernandez and Sabherwal's (2001) task characteristics support the contingency framework of the appropriateness of Nonaka's (1994) four knowledge creation processes. All of which except externalization indicated an impact on perceived knowledge satisfaction (p. 47). These results indicate that managers should try to understand the characteristics of their tasks, and then, based on task domain and

orientation, identify and develop the knowledge management processes that are most appropriate (p. 48).

The second theory, Nonaka (1994) knowledge conversion is developed around four modes of knowledge conversion socialization, externalization, internalization, and combination which are also known as the spiral model of knowledge creation. These four modes of knowledge conversion help to create knowledge within the organization. Although, tacit knowledge held by individuals may lie at the heart of the knowledge creating process, realizing the practical benefits of that knowledge centers on its externalization and amplification through dynamic interactions between all four modes of knowledge conversion (Nonaka, 1994, p. 20). By using the spiral model of knowledge creation, inter-organizational knowledge satisfaction can be predicted utilizing knowledge conversion and task characteristics.

Finally, this dissertation is organized as follows: Chapter 2 reviews the literature on intra- and inter-organizational knowledge satisfaction, knowledge conversion, and task characteristics. Chapter 3 discusses the research method used for the study. Chapter 4 discusses the data analysis and finally, chapter 5 provides recommendations and suggestions for future research.

CHAPTER 2: LITERATURE REVIEW

Content of the Review

This study attempted to develop a model by which contract companies could use to predict inter-organizational knowledge satisfaction. The study focused on the following research question: How does task characteristic and knowledge conversion predict inter-organizational knowledge satisfaction? Within a contingency framework that integrates knowledge conversion and task characteristics, chapter 2 provides an overview of the relevant literature in the area of Nonaka's (1994) knowledge conversion theory and Becerra-Fernandez and Sabherwal's (2001) task characteristic theory. These theories will frame the study.

Organization of the Review

The review describes how the research question is supported. Chapter 2 is divided into three sections. The first section will address the research method, organizational knowledge, knowledge management, and the key terms associated with knowledge management: data, information, and knowledge. The second section will discuss the two dimensions of knowledge ontological and epistemological dimensions. The ontological dimensions will include theories such as Becerra-Fernandez and Sabherwal's (2001) task characteristics; the knowledge worker, and peer mentoring. The epistemological dimension will include theories by Nonaka (1994, 1998) to include the socialization, externalization, internalization, and combination (SEIC) model, concepts of Ba, and Nonaka's spiral model. The third section will discuss the relationship of the proposed study to previous research and final conclude the chapter with a summary.

Strategy for Searching the Literature

This chapter reviews the literature on knowledge management and task characteristics. The primary source for this literature review included refereed journal articles from the Proquest, EBSCO database: Academic Search Premier, Business Source Premier, PsycARTICLES, PsycINFO, and SocINDEX. The EBSCO database was used to conduct searches based on keywords such as knowledge management, task characteristics, inter-organizational, and contract companies.

Research Methodology

The chosen research methodology for this research is Multiple Linear Regression (MLR). It was chosen by the researcher because it has the ability to find a linear relationship between a set of independent variables (knowledge conversion and task characteristics) and a dependent variable (inter-organizational knowledge satisfaction). MLR also allows the researcher to make predictions. There are several types of correlational research methods that utilize regression such as bivariate correlation, regression and prediction, multiple linear regression, factor analysis, correlational designs used to make causal conclusions, and system analysis.

These correlational research designs are founded on the assumption that reality is best described as a network of interacting and mutually-causal relationships. Everything affects—and is affected by—everything else. This type of relationship is not linear, as in experimental research (Davis, n.d.). Correlation research studies begin with selecting the problem, defining the population, selecting the sample, selecting the instruments, collecting the data, analyzing and interpreting data, and reporting the results and

conclusions. Correlational research was the chosen design for this study but other methods such as the case study and action research were also considered.

The case study focuses on a single entity, with boundaries established by the researcher (Lichtman & Taylor, 1993)" (as cited in Simon, 2006, p. 48). Case studies answer the question "how" and "why". The case study is useful "when particularistic, descriptive, heuristic, and inductive phenomena are considered" (p. 48). The disadvantage to this type of research is it does not answer the question "what". The case study does not allow for evaluating what relationship exists between the dependent and independent variables. The case study is appropriate for answering the "how" and "why" question but it does not address the linear relationship between the variables. Another methodology considered for this study was action research.

Action research was also considered. Action research is a form a research that focuses on "immediate application, rather than the development of a theory" (Simon, 2006, p. 51). Action research focuses on specific problems in a particular situation and usually involves those who can immediately create change. (p. 51) describe action research as a systematic collection of information that is designed to bring about social change. This kind of research allows that there could be more than one right way to develop solutions to problems (p. 51) Action research also fails in establish the "what" relationship between the variables being studied. Action research requires immediate action and requires the buy in of those who can immediately affect change.

Knowledge Management

Knowledge management is not a new concept. Yet it is one of the most significant challenges facing modern business organizations" (March, Hevner, & Ram, 2000, p.327).

For organizations to be successful knowledge must be managed effectively. To accomplish this organization should have a clear definition of the differences between data, information, and knowledge.

Data

In general, most knowledge workers consider data to be raw facts without any meaning. Data can reside in many forms, like numbers, symbols and letters. Theorist such as Durrant (2001) defined data as "a set of objective facts about events or structured records of transactions" (p. 3); Davenport and Prusak (2000) states that data is "discrete, objective facts about events" (p. 2) with "no inherent meaning" (p. 3). To be effective data must have meaning this is accomplished by transforming data into information by combining it with meaning and value. Vast amounts of data do not enhance the knowledge experience or make an organization more knowledgeable. Vast "amounts of data can overwhelm organizations, [and] cause confusion" (Davenport, Harris, De Long, & Jacobson, 2001; Davenport & Prusak, 2000). Data is raw facts without meaning. For data to become valuable it must be combined with meaning and value transforming data from raw facts to information.

Information

Once data becomes information it is usually found in the form of a documents or audible or visible communications. According to Machlup (1983), information is a flow of messages or meanings which might add to, restructure or change knowledge (p. 15). In terms of creating knowledge, the semantic aspect of information is more relevant as it focuses on conveyed meaning. The syntactic aspect does not capture the importance of information in the knowledge creation process. According to Nonaka, information seen

from the semantic standpoint literally means that it contains new meaning (p. 16). As data becomes information it is transformed in to knowledge.

Knowledge

The literature defines knowledge in many ways. Nonaka (1994) defined knowledge as "a multifaceted concept with multilayered meanings" (p. 4). Fahey and Prusak (1998) defined knowledge as "what a knower knows" (p. 266). Knowledge was also defined as "the set of justified beliefs that enhance and entity's capability for effective action" (Alavi & Leidner, 2001; Nonaka, 1994). Knowledge, as suggested by Nonaka, can also be defined as "justified true belief"' (p. 15). "From this and previously mentioned definitions, knowledge therefore provides the highest benefits to organizations and contains the highest amount of complexity and meaning among the three terms" (Anothayanon, 2006, p. 32).

Organizational Knowledge

In researching knowledge one can begin with the literature on organizational knowledge. The literature on organizational knowledge suggests that the organization should be view as a collective mind, rather than an organizational mind and as a collective mind the organization is seen as consisting of individuals who coordinate their actions with each other. This coordination can consist of the exchange of knowledge from one individual to another. This allows the organization to incorporate the knowledge of many different individuals and groups into the collective mind of the organization. Viewing the organization as a collective mind allows for the integration of knowledge between the individuals within the organization thus establishing the collective mind.

This process of integration can take place at many points to include organizational routines, direction, or processes involving the sharing of explicit or implicit knowledge. As organizations share knowledge and become successful in becoming learning organizations they gain a competitive advantage. The literature describes organizational learning as encompassing both intra- and inter-organizational learning.

Intra-organizational knowledge

Intra-organizational learning deals with the internal learning processes within a single organization (Hülsmann, Lohmann, and Wycisk, 2006, p. 22). It focuses on how formal organizations, such as companies, government agencies, universities, for example, learn from experience (Argyris and Schon 1996; March and Olsen 1979). This form of organizational learning focuses on learning from within the organization (Hedberg 1981; Levitt and March 1988; March 1991) and is probably the most common theme in organizational learning literature. It requires viewing the organization as a social system composed of individuals who are subjects of the learning processes of the organization based on their cognitive abilities to learn. As these individuals interact within the organization knowledge and information are exchanged, shared, developed, and stored in intra-organizational structures and routines in order to improve the ability of the regarded organization to survive and to grow (Prange 1996, 167) (Hülsmann et al., p. 22).

Inter-organizational knowledge

Inter-organizational learning describes learning processes between and with other organizations (Hülsmann, Lohmann, and Wycisk 2006, p. 22) these other organizations or external partners are part of the learning processes (Hamel 1991; Larsson et al. 1998) of the organization and help to form cooperation. The external partners within the

cooperation are generally assumed to be organizations that differ in terms of experiences and bring a varying set of capabilities to the cooperation. As one looks at organizational learning, one would discover that inter-organizational learning does not occur by itself.

It is achieved with the confrontation and a combination of single formal organizations' experiences (Holmqvist 1999; Nelson and Winter 1982). Inter-organizational learning has been linked to the study of networks and the interaction between organizations. This link allows organizations to learn from each other with each element of the network hoping to benefit compared to acting alone (Hülsmann et al., 2006, p. 23). This implies that the development of formal organizations is necessary to build inter-organizational cooperations. The inter-organizational learning process becomes a symbiotic one. Linking the parent organization with the external organization; as in the relation between individuals and organizations, the learning of single organizations is what drives the learning of inter-organizational cooperation.

Through the cooperation organizations may be able to increase their knowledge stores which would not otherwise be possible if not for the cooperation and inter-organizational learning is deemed to be faster than acquisition through experience and more complete than acquisition through imitation (Huber, 1991, p. 97). Learning on this level requires the organization to form an inter-organizational learning entity, which means that they are responsible for transferring, sharing, and developing knowledge from the point of view of the cooperation (Hülsmann et al., 2003, p. 23). This learning entity is exemplified in Figure 1.

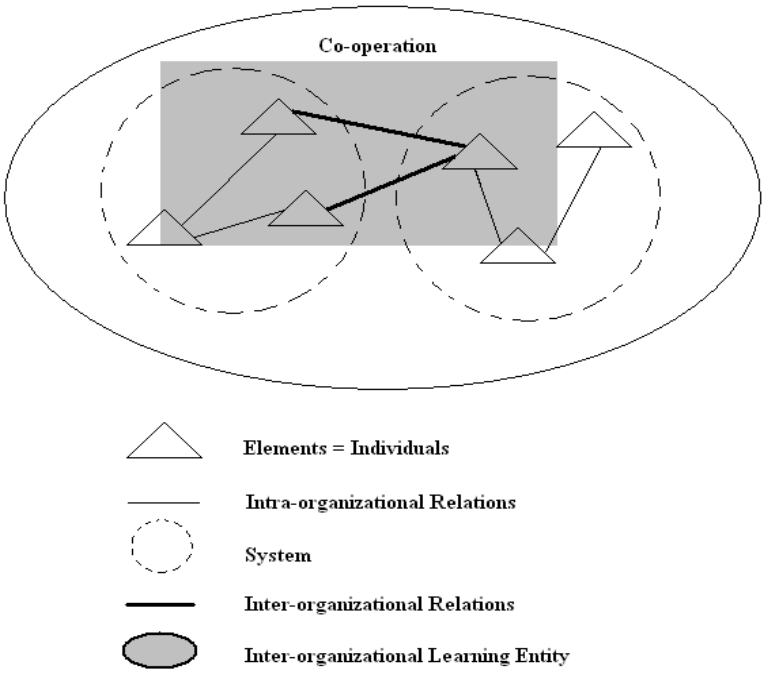

Figure 1. System-theoretic perspective of a cooperation (Hülsmann et al., 2006).

Hülsmann et al. (2006) posits that with inter-organizational learning there are two learning objectives. The first objective is successful learning on the system or intra-organizational level and the second objective is learning on the cooperation level. These two perspectives can be further divided into three categories: (a) knowledge transfer, (b) knowledge sharing, and (c) joint knowledge development (Holmqvist 1999; Nelson & Winter 1982).

The first category, knowledge transfer, refers to learning from other organizations. This perspective focuses on learning processes and relations between the partner organizations (Hülsmann et al., 2003, p. 24). Hülsmann et al. further stated that the main task is to determine what the single organization learns as a result of the cooperation (p. 24). This type of learning addresses the internal dealings of the partner's

knowledge. This process of knowledge transfer for the cooperation is the same for the organization; the only difference is that it occurs from one organization to another.

> The second category, knowledge sharing provides a benefit for the entire cooperation. In this perspective, the cooperation achieves a greater knowledge base than the single organization. Knowledge sharing can be interpreted as part of inter-organizational learning if there is a quantitative and/or qualitative alteration of the (inter-organizational) knowledge base. (Hülsmann et al., 2003, p. 24)

Through this knowledge, sharing knowledge is transferred from company to company within the cooperation. As that knowledge is transferred the parent or contract company is able to capture and retain the knowledge that is shared by both companies.

The last category is joint knowledge development. New knowledge can be created from synergy effects within the shared, inter-organizational knowledge base (Hülsmann et al., 2003, p. 24). Through this exchange, knowledge can be crystallized within the cooperation and form a joint knowledge base (see Figure 2). Inter-organizational learning can provide competitive advantage and long term growth and can be created by developing knowledge that is embedded in the context of the cooperation, and thus hard to imitate (p. 25). Hülsmann et al also suggested that inter-organizational learning consists of both active and reactive learning processes, always striving for a fit between internal demands of the cooperation and external demands of the environment on the one hand, and aiming at an improvement of the competitiveness on the other hand (p. 25).

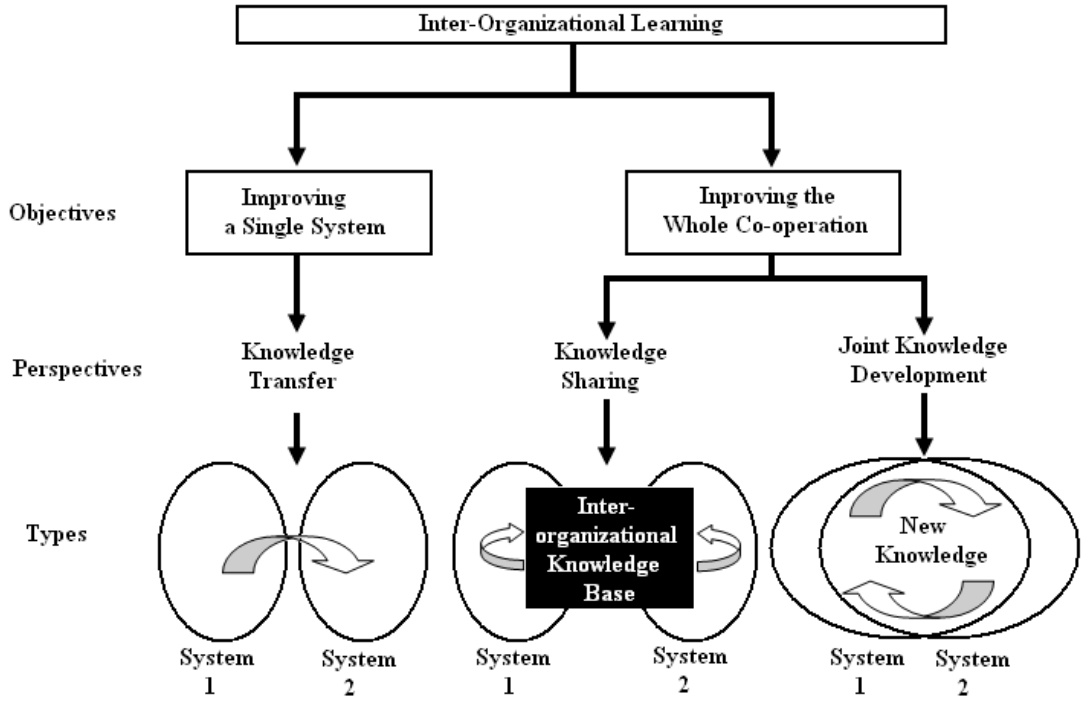

Figure 2. Inter-organizational learning framework (Hülsmann et al., 2006).

Two Dimensions of Knowledge Creation

Ontological Dimension

> Although ideas are formed in the minds of individuals, interactions between individuals typically play a critical role in developing ideas. The ontological dimension of knowledge creation focuses on the social interactions of the individuals within the organization. This knowledge creation can occur on the individual, group, organizational, and inter-organizational (e.g., organizational-to-organizational) levels. (Nonaka, 1994; Nonaka & Takeuchi, 1995)

Organizations knowledge creation should be encouraged throughout the organization. As knowledge is created within this process it should be crystallized as part of standard operating procedures within the organization. Nonaka (1994) further posits that there are several levels of social interaction at which knowledge can be created. Informal communities are one form of crystallizing individual knowledge within the

organization, since knowledge creation can occur on the individual, group, organizational, and inter-organizational level.

> Informal communities can provide the opportunity for nurturing the emergent properties of knowledge at each level and developing new ideas. Once this is done the organization must be able to integrate that knowledge into its own best practices. If this is done effectively, new knowledge associated with more advantageous organizational processes or technologies will be able to gain a broader currency within the organization. (Nonaka, 1994, p. 17)

In addition to the creation of knowledge within an organization, it is also possible that there will be formal provisions to build knowledge at an inter-organizational level. The creation of knowledge at the inter-organization level might occur if informal communities of interaction, that span the link between customers, suppliers, distributors, and even competitors, are put on a more formal basis, for example through the formation of alliances or outsourcing (Nonaka, 1994, p. 17). Contract companies must establish programs that span the link between the home office and the agency to which their employees are employed.

Epistemological Dimension

The epistemological dimension focuses on Polanyi's classification of human knowledge–explicit or tacit. Polanyi identified some forms of knowledge as “explicit” or codified knowledge which refers to knowledge that is transmittable in formal, systematic language (Nonaka, 1994, p. 16). It can be expressed in words and numbers and shared in the form of data, scientific formulae, specifications, manuals, and the like. Explicit knowledge can be readily transmitted between individuals formally and systematically because it is codified knowledge. (Davenport & Prusak, 2000; Nonaka; 1994; Nonaka & Takeuchi, 1995; Zack, 1999)

Hansen (1999) defined this as codification strategy because knowledge is carefully codified and stored in databases, where it can be accessed and used easily by anyone in the company (p. 107). Explicit knowledge is discrete or digital, as it is captured in records of the past such as libraries, archives, and databases and is assessed on a sequential basis (Nonaka, 1994, p. 17). In contrast to explicit knowledge Polanyi also defined knowledge as "tacit" which has a personal quality, which makes it hard to formalize and communicate.

Tacit knowledge is deeply rooted in action, commitment, and involvement in a specific context. In Polanyi's words, it "indwells" in a comprehensive cognizance of the human mind and body (Davenport & Prusak, 2000; Nonaka; 1994; Nonaka & Takeuchi, 1995; Zack, 1999). Nonaka (1998) described tacit knowledge as highly personal and hard to formalize, making it difficult to communicate or share with others. Subjective insights, intuitions, and hunches fall into this category of knowledge. “Tacit knowledge is deeply rooted in an individual's actions and experience as well as in the ideals, values, or emotions he or she embraces" (Nonaka, 1998, p. 41) and it includes personal experience, feeling, judgment, intuitions, and instincts (Nonaka et al., 2000, p. 7). A transfer of tacit knowledge can be successfully and primarily achieved by verbal methods, such as face-to-face communications, as well as through approaches of mentoring and storytelling (Anothayanon, 2006; Truran, 1998; Zack, 1999).

Nonaka (1998) further describes two dimensions to tacit knowledge. The first is the technical dimension, which encompasses the kind of informal personal skills or crafts often referred to as know-how. The second is the cognitive dimension. It consists of beliefs, ideals, values, schemata, and mental models which are deeply ingrained in us and

which we often take for granted. While difficult to articulate, this cognitive dimension of tacit knowledge shapes the way we perceive the world (p. 41).

Knowledge Conversion Theory

Nonaka (1994) stipulated that knowledge is created through the conversion of tacit and explicit knowledge. This involves four modes of knowledge conversion: (a) socialization–the creation of knowledge from tacit knowledge to tacit knowledge; (b) externalization–the creation of knowledge from tacit knowledge to explicit knowledge; (c) internalization–the creation of knowledge from explicit knowledge to tacit knowledge; and (d) combination–the creation of knowledge from explicit knowledge to explicit knowledge (Nonaka, 1994, p. 18; Nonaka & Takeuchi, p. 61) see figure 3. These four modes of knowledge creation make up the Spiral model or SECI model of knowledge creation.

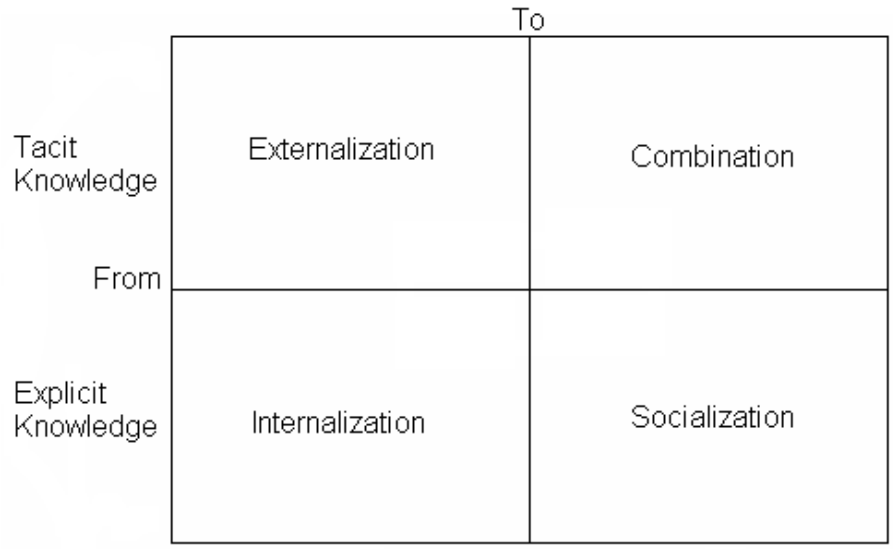

Figure 3. Nonaka's (1994) SECI Model

By using the spiral model of knowledge creation, tacit knowledge is entangled with the various modes of knowledge creation. According to Nonaka (1994), this spiral

action of tacit and explicit knowledge moves in an upward spiral process, starting at the individual level moving up to the collective (group) level, and then to the organizational level, sometimes reaching out to the inter-organizational level (p. 20). While organizational knowledge creation is a continuous process with no ultimate end, an organization needs to perfect this process at some point in order to accelerate the sharing of created knowledge beyond the boundary of the organization for further knowledge creation (p. 26). Knowledge creation within learning organizations must be a combination of knowledge conversion and ba.

Nonaka et al., (1998) defined ba as a shared space for emerging relationships. This space can be physical (e.g., office, dispersed business space), virtual (e.g., e-mail, teleconference), mental (e.g., shared experiences, ideas, ideals), or any combination of shared space. Ba is used with knowledge conversion because it provides a means for advancing individual and/or collective knowledge. It is from such a platform that a transcendental perspective integrates all information needed. Ba may also be thought of as the recognition of the self in all. According to the theory of existentialism, ba is a context which harbors meaning. Thus, ba is considered to be a shared space that serves as a foundation for knowledge creation (Nonaka & Konno, 1998, p. 40).

Knowledge is embedded in ba (in these shared spaces), where it is then acquired through one's own experience or reflections on the experiences of others. If knowledge is separated from ba it turns into information, which can then be communicated independently from ba. Information resides in media and networks and is tangible. In contrast, knowledge resides in ba and is intangible (Nonaka & Konno, 1998, pp. 40-41).

Ba is a part of the existentialist framework. The phenomenal place is where knowledge is created.

This place of knowledge creation can emerge in individuals, working groups, project teams, informal circles, temporary meetings, e-mail groups, and at the front-line contact with the customer. Ba is the world where the individual realizes himself as part of the environment on which his life depends (Nonaka & Konno, 1998, p. 41). There are four types of ba that correspond to the four stages of the SECI model. Each category describes a ba especially suited to each of the four knowledge conversion modes. These ba offer platforms for specific steps in the knowledge spiral process. Each ba supports a particular conversion process and thereby each ba increases the speed of the knowledge creation process. According to Nonaka and Konno (1998), Four Modes of Knowledge Creation and their Ba

Socialization

Socialization involves the sharing of tacit knowledge between individuals. Nonaka (1998) used the term socialization to emphasize that tacit knowledge is exchanged through joint activities–such as being together, spending time, living in the same environment–rather than through written or verbal instructions (p. 42). When used with ba, socialization is combined with originating ba, which focuses on where individuals share feelings, emotions, experiences, and mental models. An individual sympathizes or further empathizes with others, removing the barrier between the self and others, Care, love, trust, and commitment emerge from originating ba (Nonaka & Konno, 1998, pp. 47).

This allows then individual to acquire tacit knowledge without language. Apprentices work with their mentors and learn craftsmanship not through language but by observation, imitation, and practice the key to acquiring tacit knowledge is experience (Nonaka, 1994, p. 19). In essence, tacit knowledge can only be shared if people are allowed to be part of a larger community and, through that interaction, the individual gains new knowledge from the tacit knowledge provided by others (p. 19).

Externalization

Externalization is a process of transforming tacit knowledge into explicit knowledge (Nonaka, 1994, p. 19). Externalization requires the expression of tacit knowledge and its translation into comprehensible forms that can be understood by others (Nonaka & Konno, 1998, p. 43). During the externalization stage of the knowledge-creation process, an individual commits to the group and becomes one with the group. The sum of the individuals' intentions and ideas fuse and become integrated with the group's mental world (p. 43).

When used with ba, interacting ba is key to this process. Through interacting ba dialogue is the key for such conversions and the extensive use of metaphors is one of the conversion skills required to turn explicit knowledge into tacit knowledge (Nisbet, 1969; Nonaka & Konno, 1998, p. 47). Thus, self-transcendence is a key to group integration and conversion of tacit knowledge into explicit knowledge (Nonaka & Konno, 1998, p. 43).

Combination

Combination involves the conversion of explicit knowledge into more complex sets of explicit knowledge. In practice, the combination phase relies on three processes.

First, capturing and integrating new explicit knowledge which is essential. Second, the dissemination of explicit knowledge is based on the process of transferring this form of knowledge directly by using presentations or meetings. Finally, the editing or processing of explicit knowledge makes it more usable (e.g., documents such as plans, reports, market data). (Nonaka & Konno, 1998, pp. 44-45)

When used with ba, the combination mode of knowledge creation can be enhanced with cyber ba. Cyber ba is a place of interaction in a virtual world instead of real space and time (Nonaka & Konno, 1998, p. 47). Here, the combining of new explicit knowledge with existing information and knowledge generates and systematizes explicit knowledge throughout the organization (p. 47). The combination of explicit knowledge is most efficiently supported in collaborative environments utilizing information technology. The use of on-line networks, group-ware, documentations, and database has been growing rapidly over the last decade, enhancing this conversion process (Nonaka & Konno, 1998, p. 47).

Internalization

The process of converting explicit knowledge into the organization's tacit knowledge is accomplished via learning-by-doing, training, and exercises to allow the individual to access the knowledge of the group and the entire organization (Nonaka & Konno, 1998, p. 45). There are two dimensions to internalization. Nonaka et al. (1998) stated explicit knowledge has to be embodied in action and practice. Thus the process of internalizing explicit knowledge actualizes concepts or methods about strategy, tactics, innovation, or improvement (p. 45).

Second, there is a process of embodying the explicit knowledge by using simulations or experiments to trigger learning by doing processes. New concepts or methods can thus be learned in virtual situations (p. 45). To facilitate this process teaching based on analysis, learning by continuous self-refinement through OJT or peripheral and active participation is stressed. Thus the internalization of knowledge is continuously enhanced by the use of formal knowledge (explicit) in real life or simulated applications. Exercising ba synthesizes Nishida's world and the Cartesian world through action (Nonaka & Konno, 1998, p. 47).

Task Characteristics Theory

Nonaka's (1994) knowledge conversion theory helps organizations to create knowledge within the epistemological dimension of organizational knowledge creation. Within the ontological dimension of knowledge creation Becerra-Fernandez and Sabherwal (2001) theorized that organizations are composed of a hierarchical structure with many different levels accomplishing varied tasks. As the organization becomes a learning organization, knowledge creation should not be considered as a blanket for the entire organization (p. 26). Each department or organizational level within the organization may require different methods of knowledge creation. What works for the engineering division may not work for the finance and acquisition division.

Becerra-Fernandez and Sabherwal (2001) conducted a study at the Kennedy Space Center (KSC) that focused on perceived knowledge satisfaction rather than an objective measure of knowledge effectiveness. In their article they argued that, "the effectiveness of a knowledge management process depends on the circumstances under which it is used" (pp. 26-27). The authors stepped away from the traditional universalistic

view that Nonaka's (1994) four knowledge management processes (socialization, externalization, internalization, and combination) are always effective. Instead they examined a contingency theoretic view, suggesting that the impact of a knowledge management process is moderated by the context in which the knowledge is being used (pp. 26-27).

A number of task characteristics have been studied at the level of organizational departments. Two task characteristics, task orientation and task domain were examined in Becerra-Fernandez and Sabherwal's (2001) study as influencing the appropriate knowledge management processes. The authors felt that these two task dimensions influence the appropriate knowledge management processes that should be used when considering various organizational levels or departments (p. 27). Becerra-Fernandez and Sabherwal argued that these task dimensions require different types of organizational knowledge, which in turn implies that different knowledge management processes would be appropriate (p. 27).

Task Orientation

As stated by Becerra-Fernandez and Sabherwal (2001), recent research in the field of strategic management and organizational theory has focused on the concept of task orientation for differentiating firms and organizational departments within the firm (p. 28). Based on their task orientation, organizational departments are classified as being process-oriented or content-oriented. Process-oriented task focus on and describe the processes or means that should be used to attain goals (Becerra-Fernandez & Sabherwal, 2001, p. 27). These tasks rely on 'know-how' or procedural knowledge and are associated with explicit knowledge. Process-oriented tasks can benefit from Nonaka's (1994)

socialization and internalization which produce tacit knowledge. In contrast, content-oriented task focus on the specific ends or goals to be achieved.

Content-oriented task are “concerned with the issues such as what products need to be developed and the specific design features that need to be achieved in the products” (Becerra-Fernandez & Sabherwal, 2001, p. 27). Becerra-Fernandez and Sabherwal suggested that content-oriented tasks rely upon 'know-what' or declarative knowledge which is associated with tacit knowledge (p. 28). Content-oriented tasks can benefit from Nonaka’s (1994) externalization and combination which results in explicit knowledge.

Task Domain

The next dimension is task domain. Task domain “distinguishes between focused and broad task domains, which are reflected in the material-based and system-based industries, respectively” (Becerra-Fernandez & Sabherwal, 2001, p. 28). Departments within an organization who’s task do not vary but require a greater specialization are considered focused domain. As knowledge workers perform tasks that are more focused, knowledge should be directly available to the individual. This often requires deep knowledge in a particular area or knowledge that is high in specificity (p. 28).

Externalization and internalization are essential to this task domain. Through externalization, the individual makes the knowledge more agreeable and understandable to others in the group, while through internalization the individual absorbs knowledge held by others in the group. Internalization and externalization are thus fundamental to knowledge management in a focused task domain (p. 28). Focused task domain focuses on jobs task that do not vary and require specialized skills broad task domain is the opposite.

Departments within the organization which have job task that vary and require the assistance of other departments within the organization are considered broad task domains. When knowledge-workers perform tasks that are broad in domain they rely on dynamic interaction in which individual units of "knowledge is combined and transformed through communication and coordination across different functional groups" (Becerra-Fernandez & Sabherwal, 2001, p. 28). This domain requires socialization and combination to be successful.

Socialization and combination processes are appropriate for integrating prior knowledge to create new knowledge within the broad domain. Becerra-Fernandez and Sabherwal (2001) suggested that when explicit knowledge is being integrated, combination processes can help produce new knowledge, whereas when the knowledge being integrated is tacit, socialization processes are more appropriate (p. 29). The following figure 4, illustrates Becerra-Fernandez and Sabherwal (2001) view of how organizational departments utilize task orientation and task domain.

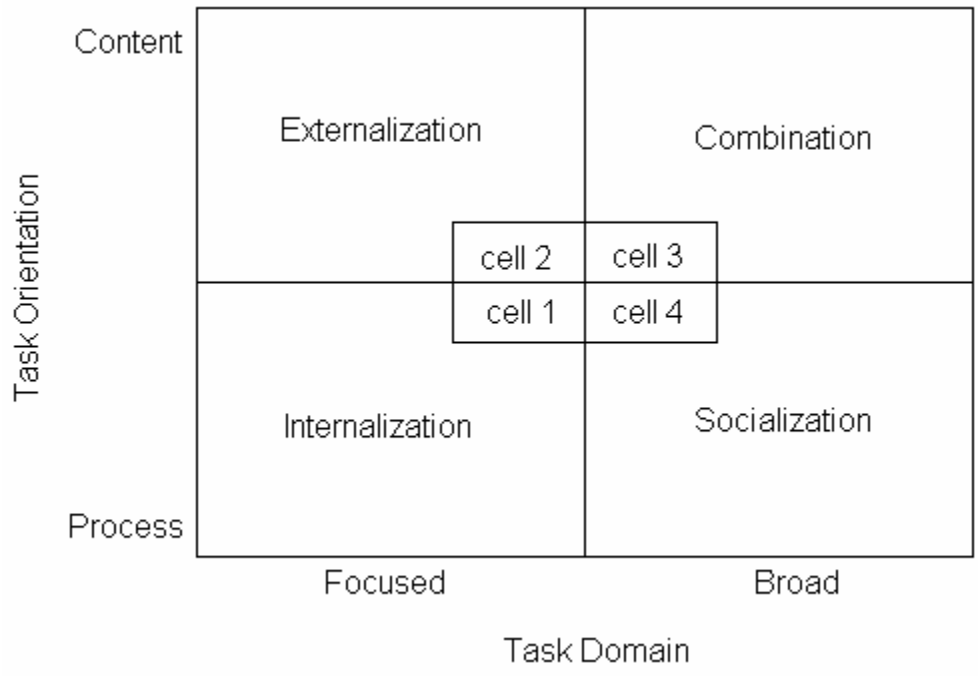

Figure 4. Expected appropriateness of the knowledge management process (Becerra-Fernandez & Sabherwal, 2001).

Task characteristics support the contingency framework presented by Becerra-Fernandez and Sabherwal (2001) of the appropriateness of the four knowledge management processes. All processes other than externalization indicated an impact on perceived knowledge satisfaction (p. 47). These results indicate as stated by the researchers, that managers should try to understand the characteristics of their tasks, and then, based on task domain and orientation, identify and develop the knowledge management processes that are most appropriate (p. 48).

Measuring knowledge satisfaction

> Businesses have been trying – and mainly failing – to calculate the return on knowledge-management investments for more than a decade. Early efforts to compute the total value of organizational knowledge were not only unconvincing but beside the point: They ignored the questions of how much of that knowledge was actually used to benefit the organization and whether efforts to capture and share knowledge put more of it to profitable use. (Cohen, 2006, p. 28)

How can organizations achieve a ROI on their KM investments? "By applying a systemic approach to evaluating needs, opportunities, and organizational commitment levels–and then establishing realistic and achievable goals, and adopting a methodology to consistently measure baseline metrics against projected goals" (Tobin, 2004, p. 2). Tobin (2004) further states that the following reasons provide a compelling case for measuring ROI:

1. Benchmarking metrics establishes a baseline.
2. Set expectations (an often ignored step in IT projects).
3. Gain management acceptance.
4. Create a repeatable model for measuring success.

5. Recognize true ROI (p. 2).

> There are two things that all organizations should keep in mind as they develop measures and metrics. First it is extremely difficult to create any measure of knowledge sharing that will show an absolute one-to-one correlation between a knowledge-sharing action and a business result. Secondly, to truly understand the impact of knowledge sharing and reuse, an organization must first understand the baseline business or process performance before beginning KM efforts. (Vestal, 2002, p. 1)

The American Productivity & Quality Center (APQC) conducted a consortium in 2000 entitled, Successfully Implementing Knowledge Management. The goal of the consortium was to focus on how some of the most advanced early KM adopters implement a knowledge management initiative, mobilize resources, create a business case, and measure and evolve their KM programs. The results of the consortium helped the APQC and the attendees to identify measurement approaches, specific measures in use, and how impact measures and are impacted by the evolution of KM. APQC discovered in their findings that "the need for measurement of KM follows a bell curve pattern through the life cycle of a business life cycle" (figure 5) (Lopez et al, 2001, p. 1). The knowledge management measurement bell curve consists of five stages each one distinct but depended on the other to help organizations develop and measure KM.

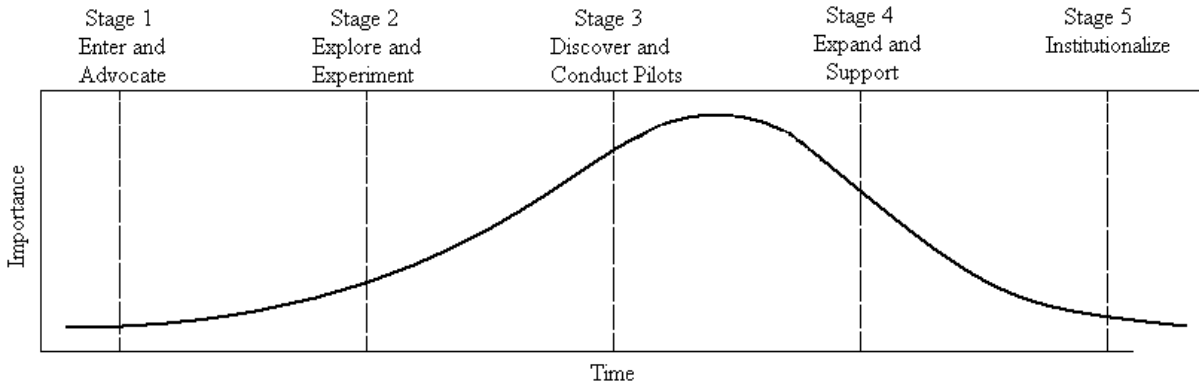

Figure 5. Knowledge Management Measurement Bell Curve

Stage 1: Enter and Advocate.

"Someone must become inspired with the vision of what it would be like if the organization could effectively support human knowledge capture, transfer, and use" Lopez et al, 2001, p. 1). This individual must be an advocate for knowledge management. They should inspire others to join the search for projects that can demonstrate the value of KM. In this first stage there are specific measurements:

1. "Find redundant efforts, discover areas where knowledge is lost, and find points of frustration in your employee base" (Lopez et al, 2001, p. 2).
2. "Interviewing key stakeholders helps uncover KM needs and exposes areas of lost time, effort, and therefore money" (Lopez et al, 2001, p. 2).

This stage of measurement is mainly concerned with finding stakeholders who believe in KM. This can be accomplished by "highlighting the greatest areas of 'pain' within your organization" (Lopez et al, 2001, p. 2) and showing how KM can be applied to these areas to garnish improvements. Another option is making comparisons of other companies who are similar to the organization who have successfully implemented KM and can show a productivity jump with operating cost plummeting.

Stage 2, Explore and Experiment.

During this second stage a practical definition of KM must be developed and formulated within the organization and consideration of its applicability to the organization must be developed. In an interview conducted by an anonymous source, Dr. Kevin C. Desouza stated, "Within an organization there should be a definition of KM. The definition of KM should clearly articulate the components of KM, the activities that need to be executed under each component, and the drivers, resources and intricacies of each activity (Anonymous, 2006, p. 6).

This stage should continue the movement toward a knowledge centric organization. Lopez et al, (2001) suggests that this movement can start from several isolated grassroots knowledge-enabling activities and develop into a cross-corporate vision and strategy (p. 2). These successful projects could gain support from senior management which in turn could further support the need for KM within the organization.

Stage two should end with a shift to specific knowledge management ideas and principles that can demonstrate the value of KM. Measurements at this stage consist of three main categories: anecdotal (war stories and success stories), quantitative (growth), and qualitative (mainly extrapolation form anecdotal). At this stage, financial measurement should not be the goal except as a byproduct of other concurrent efforts. Financial measurement will happen at later stages in the process. Focus should be on meaningful measures that concentrate on exploring the various opportunities in your organization for implementing knowledge management practices, developing your organization's knowledge management strategies, measuring the progress toward organizational awareness, and experimenting with different knowledge management concepts. (Lopez et al, 2001, p. 2)

Measurement at this stage should consist of:

1. Measure for progress – this is a measure of the progress one achieves as they develop and grow sponsorship and support within the organization.
2. Measure the gap – this is a measure of the how knowledge is or isn't being used within the organization.

3. Measure against a benchmark – use benchmarking within other organizations as a means to persuade senior management as well as a means to measure where the KM program is in comparison.

4. Measure your cultural readiness – at this stage one must develop a knowledge-sharing culture. This can be measured by observing teams within the organization that foster employee information exchange, teamwork, collaboration, and trust development.

Stage 3, Discover and conduct pilots.

> This stage signals the formal implementation of a knowledge management initiative. The goal of this stage is to provide evidence of knowledge management's business value by conducting pilots and capturing lessons learned that can be transferred and used to help the organization better implement KM on a larger and expanding scale. (Lopez et al, 2001, p. 3)

Measures appropriate for this stage are more focused on business strategy. The goal for this stage to ensure direct business value is gained through the KM initiative. The hard and soft lessons learned should be used as building blocks for future stages. Examples of measures at this point are:

1. Measure the business value – document both the hard and soft business value from each KM project. "Begin to map measurements to the organizations specific business goals" (Lopez et al, 2001, p. 4).

2. Measure the retention of knowledge – this is a measurement of the amount of knowledge gained and the cost for retrieval and reuse. Lopez et al, (2001) states that quantifiable measurements are not enough; they must be balanced with qualitative data to ensure an accurate full picture (p. 4).

3. Measure the cultural impact – such as anecdotal stories, performance reviews, and public and private recognition and rewards for individuals and teams.

4. Measure the effectiveness of sharing communities – communities of practice must be measured.

5. Measure the ownership of capture and compilation – what are the costs involved in capturing information in a usable manor? Is the information retrievable if not then it is of no use. “Is the cost of the capture process too high in comparison to the value of the captured information or knowledge” (Lopez et al, 2001, p. 5)? Are key measurements that must be analyzed for all KM projects?

6. Measure project management effectiveness and intended results – “successful projects will contribute to building organizational support and future funding” (Lopez et al, 2001, p. 5).

Stage 4, expand and support.

When the organization reaches this stage KM has proven to be a valuable asset to the organization and has become funded. As other parts of the organization see its value the demand for KM becomes high. “High visibility and the authority to expand are a mixed blessing; the added visibility of costs and resources devoted to KM will require more formal business evaluation and ROI justification” (Lopez et al, 2001, p. 6). Measures at this stage should be measured against the fitness of the knowledge areas in relation to the whole organization. It is also important at this stage according to Lopez et al, (2001) to tap into the values of the organization and determine whether a culture shift is occurring (p. 6).

Even at this stage ROI must still be justified. “To estimate ROI, add the costs of a community (including labor, meetings, facilitates) and then define how much effort is spent on KM by knowledge management experts. Then decide how much effort has been

saved by sharing solutions in the community" (Lopez et al, 2001, p. 6). Items that can be measured at this stage are:

1. Community and market place – (a) how much knowledge comes into or out of the community; (b) the amount of feedback that comes into and out of the community; and (c) the quality of the feedback (Lopez et al, 2001, p. 7).

2. Environment – this can be measured "through sophisticated methods of value assessment, e.g., measuring the values of employees and business owners to see if they match" (Lopez et al, 2001, p. 7).

3. KM processes – in this measure the organization measures whether or a person has managed the KM process correctly and set the right limits (Lopez et al, 2001, p. 7).

Stage 5, Institutionalize knowledge management.

This stage is a continuance of stage 4 the primary difference is that in this stage the organization will take the information gained in stage 4 and see it through to its logical conclusion. To include the following differences (a) it does not happen unless KM is embedded in the business model, (b) the organization structure must be realigned, and (c) evidence of knowledge management competency becomes part of the formal performance evaluation (Lopez et al, 2001, p. 7).

Measuring knowledge is the key to any organizations success. Without clear measurements of the knowledge management process the organization will be unable to determine the value that KM projects are making within the organization. The remaining literature review will be focused on the research method.

Conclusion

For contract companies to succeed in government today they must develop infrastructures for knowledge management. Companies must move from the intra-organizational level to the inter-organizational level as they conduct business with the government. These companies must develop a clear understanding of the concepts and meaning of knowledge management.

According to Nonaka's theory of knowledge creation (Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995), an organization cannot create knowledge by itself; instead, individual knowledge is the basis of organizational knowledge creation. Nonaka and Takeuchi (1995) described two dimensions of knowledge creation. The first dimension is the ontological dimension. This dimension deals with communities of interaction, which is created through the interactions between individuals. These communities contribute to the amplification and development of new knowledge (Nonaka, 1994, p. 15). The second dimension is the epistemological dimension. This dimension focuses on Polanyi classification of human knowledge–explicit or tacit. Explicit or codified knowledge refers to knowledge that is transmittable in formal, systematic language. On the other hand, tacit knowledge has a personal quality, which makes it hard to formalize and communicate (Nonaka, 1994, p. 16).

Nonaka (1994) stipulated that knowledge is created through the conversion of tacit and explicit knowledge. This conversion postulates four modes of knowledge conversion: (a) socialization–the creation of knowledge from tacit knowledge to tacit knowledge, (b) externalization–the creation of knowledge from tacit knowledge to explicit knowledge, (c) internalization–the creation of knowledge from explicit

knowledge to tacit knowledge and (d) combination–the creation of knowledge from explicit knowledge to explicit knowledge (p. 18).

Knowledge creation within learning organizations must be a combination of knowledge conversion and ba. Managers must understand that ba exists at many levels and these levels may be connected to form a greater ba (Nonaka & Konno, 1998, p. 41). Managing emergent knowledge in ba requires a different sort of leadership. Top management must come to the realization that knowledge needs to be nurtured, supported, enhanced, and cared for. According to Nonaka and Konno, thinking in terms of systems and ecologies'" can help provide for the creation of platforms and cultures where knowledge can freely emerge (pp. 53-54).

The comprehensive review of the relevant literature on the theories of Nonaka's (1994) knowledge conversion process and Becerra-Fernandez and Sabherwal (2001) task characteristics and the concept of knowledge transfer and creation is previously discussed. The review discloses that there is a lack of research on the relation between the theories of Nonaka's knowledge conversion process and Becerra-Fernandez and Sabherwal task characteristics for organizations that specialize in inter-organizational learning. It was not until recently that inter-organizational knowledge was linked to organizational learning (Hülsmann et al., Lohmann, and Wycisk, 2006, 21).

There are still gaps in the theoretical foundation of inter-organizational learning (Hülsmann et al., 2006, p. 21) which is due to a lack of a clear distinction between inter-organizational and intra-organizational learning. This review evidently confirms that different task characteristic groups require different types of knowledge and a blanket approach to knowledge management cannot be used for the accomplishment of

knowledge transfer and creation. The research method that was used to examine the research question is discussed in chapter 3.

CHAPTER 3:

METHODOLOGY

The purpose of this quantitative, correlation research study was to measure inter-organizational knowledge satisfaction for a minority-owned contract company in Lanham, Maryland. This study attempted to analyze the current literature on knowledge management and how theories of knowledge management can be applied to businesses that specialize in inter-organizational learning or knowledge management. The nature of this study was based on correlational research. Correlational research allows the researcher to examine how accurately the knowledge conversion process can be evaluated from a combination of knowledge conversion and task characteristics.

The data for this study was analyzed using Multiple Linear Regressions (MLR). MLR was chosen because it has the ability to find a linear relationship between a set of independent variables and a set of dependent variables. The coefficients provide some indication of the independent variables' effect on the dependent variable and MLR is one of the most popular mathematical models for making predictions (Stanton, 2001).

In general, multiple linear regression allows the researcher to ask general questions about prediction (Stanton, 2001). Multiple linear regression will allow the researcher to analysis the relationship between the dependent variable and the independent variables and provide a means for generating a hypotheses about knowledge conversion. Correlational research designs such as MLR are founded on the assumption that reality is best described as a network of interacting and mutually-causal relationships.

The case study was also considered as a possible methodology for this research study but was rejected because it did not address the "what" question. The case study concentrates on a single unit or entity, with boundaries established by the researcher (Simon, 2006, p. 48). According to Simon, case studies answer the question "how" and "why," it is useful when particularistic, descriptive, heuristic, and inductive phenomena are considered (p. 48). The disadvantage to this type of research is that it does not answer the question "what". The case study does not allow for evaluating "what" relationship exists between the dependent and independent variables. Action research was also considered for this research.

Action research is a form a research that focuses on the immediate application, rather than the development of a theory (Simon, 2006, p. 51). Action research focuses on specific problems in a particular situation and usually involves those who can immediately create change. Bogdan and Biklen (1992) described action research as a systematic collection of information designed to bring about social change. This kind of research allows for multiple solutions to problems (Simon, 2006, p. 51). Action research also fails in establish the "what" relationship between the variables being studied. Action research requires immediate action and commitment of those who can immediately affect change. This chapter discusses the following: the research question, hypothesis, research design, setting and sample, instrumentation and materials, threats to statistical conclusion validity and participants' rights. The research tool is also discussed.

Research Question

The data obtained from this study answers the following research question: How does task characteristic and knowledge conversion predict inter-organizational knowledge satisfaction?

Hypothesis

H_0: Task characteristics and knowledge conversion will not significantly predict inter-organizational knowledge satisfaction.

H_1: Task characteristics and knowledge conversion will significantly predict inter-organizational knowledge satisfaction.

Independent and Dependent Variables

The independent variables are task characteristic and knowledge conversion. The dependent variable is inter-organizational knowledge satisfaction.

Research Design and Approach

The research design for this study is quantitative which allows the research to determine the relationship between an independent variable and a dependent variable within a population. The quantitative design lends itself to either descriptive or experimental design. A descriptive study establishes only associations between variables, whereas an experimental design establishes causality.

To accurately estimate the relationship between variables using quantitative research, the sample size should be sufficient. If using a descriptive design, the study usually needs a sample of hundreds of participants; if using an experimental design then the sample can consist of only tens of participants. The researcher can reduce bias by increasing the sample size and selecting them randomly from the population. In

quantitative studies, the characteristics of the subject can affect the relationship between the “what”? This relationship can be limited by using a less heterogeneous sample of subjects or by measuring the characteristics of the subject and including them in the analysis.

The approach chosen for this research was correlational research. Correlational research represents a general approach to research that focuses on assessing the covariation among naturally occurring variables. The goal of correlational research is to identify predictive relationships by using correlations or more sophisticated statistical techniques. The results of correlational research also have implications for decision making, as reflected in the appropriate use of actuarial prediction “the greatest limitation of correlational research is the problem of interpreting causal relationships” (Shaughnessy, Zechmeister, and Zechmeister, 2002).

Multiple linear regression (MLR) which is a form of correlational research was chosen as the preferred method for this study. MLR is the best method of correlational research for answering the problem whether or not inter-organizational knowledge satisfaction can be predicted within the contract company utilizing knowledge conversion and task characteristics. Because the problem statement being addressed in this study has two predictor variables knowledge conversion and task characteristics with one criterion variable being inter-organizational knowledge satisfaction MLR is the logical choice.

MLR allows the researcher to learn more about the relationship between these predictor variables and the criterion variable. MLR provides the researcher with numerous advantages for data mining situations. In general, multiple linear regression allows the researcher to ask the general question "what is the best predictor of ...” For

example, educational researchers might want to learn what are the best predictors of success in high-school. This research design will allow the research to ask "what is the best predictor of inter-organizational knowledge satisfaction?"

Setting and Sample

This study investigated the knowledge satisfaction process within a contract company located in Lanham, Maryland. The sample of participants in this study included executives, first- and mid-level managers, and professionals. The chosen company employs approximately 355 employees. The company manages over 100 contracts throughout the Continental United States (CONUS) and Outside the Continental United States (OCONUS) performing management, logistics and operational, and information technology support for state and federal agencies which allows for a generalization to other similar contracting companies.

To be eligible for this study, the participants had to be an executive, first- or mid-level manager, or professional who worked for the company at least one year, and who familiar with the company's knowledge management policies. The potential participants of this study are 58 including all executives, first- and mid-level managers, and professionals from a sample of 99 possible participants. The sample will be attained using probability sampling, specifically purposive sampling.

Purposive sampling was chosen because it allows the selection of a sample of people or other units for a specific purpose; in this instance, first and mid level managers were chosen for their knowledge of company processes. Power analysis was conducted to select the proper sample size from the population. Purposive sampling allowed the researcher to select the participant based on specific criteria.

Sample size was determined by conducting a power analysis. Power analysis or "power" is the probability that the research or test will find a statistically significant difference if such a difference exists. It allows researcher to correctly reject the null hypothesis, if a statistically significant prediction model, does in fact exist. When using power analysis three factors: effect size, alpha, and sample size are used. Prior studies can be used to determine the effect size.

There is limited research on this subject and therefore, an effect size could not be determined for this study; thus a medium affect size of $r^2 = .15$ was chosen. G*Power 3 power analysis software (cite the article for G*Power) was used to conduct the priori power analysis. Using this method, a samples size of 58 was determined sufficient to yield a power of .80. The analysis assumed an alpha of .05, effect size f^2 of .01764706, and two predictor variables.

Instrumentation and Materials

The survey instrument that was used in this study was an online survey entitled Inter-organizational Knowledge Satisfaction. The survey consisted of three separate modules (a) knowledge conversion process, (b) task characteristics, and (c) knowledge transfer and creation. All of which have been used in prior knowledge management research. Each module of the online survey will use a 5-point Likert scale ranging from 1 (Very seldom) to 5 (Very often).

Knowledge Conversion Process

The first module is the knowledge conversion module (Appendix B). This module is composed of four patterns that describe the knowledge conversion process performed by an individual or an organization. This module measures how knowledge is transferred

and created within and between two types of knowledge tacit and explicit by the four patterns of knowledge conversion: socialization (tacit knowledge to tacit knowledge), externalization (tacit knowledge to explicit knowledge), internalization (explicit knowledge to tacit knowledge), and combination (explicit knowledge to explicit knowledge) (Nonaka, 1994, pp. 18-20). These four patterns of knowledge conversion make up the knowledge conversion variable.

This module consists of a 5-point Likert scale ranging from 1 (Very seldom) to 5 (Very often) with each pattern of the knowledge conversion process measuring a specific aspect of knowledge conversion. The module is scored by calculating the means of the four patterns of knowledge conversion for each respondent. The medians for the entire sample are determined and then sorted by the means score. The scores for socialization measure the sharing of tacit knowledge between individuals. Through this direct contact knowledge is exchanged without the need for written communication. The second pattern externalization measures how knowledge is converted from tacit knowledge into explicit knowledge.

This process involves the use of metaphors, analogies, or narratives, and visuals. The third pattern combination measures the conversion of explicit knowledge into more complex sets of explicit knowledge “in this stage, the key issues are communication and diffusion processes and the systemization of knowledge” (Konno and Nonaka, 1998, p. 44). Finally, internalization measures how newly created explicit knowledge is converted into the organization's tacit knowledge. Which can be accomplished via learning-by-doing, training, and exercises this allows the organizational members to exchange knowledge from one to another.

Task Characteristics

The second module of the online questionnaire was initially developed by Withey et al., (1983) (Appendix B). This instrument was developed after evaluating six prior instruments used to measure Perrow's (1967) theory on task characteristics. This module measures Perrow's (1967) proposed two dimensions that described organizational technology as the actions employed to transform inputs into outputs task variety and task analyzability (Withey, et al., 1983, p.46). This module consists of a 5-point Likert scale ranging from 1 (Very seldom) to 5 (Very often) which measures respondent's opinions with regard to task variety and task analyzability.

The module is scored by calculating the means of the two dimensions for task characteristics (task variety and task analyzability) once the means for all respondents is determined. The medians for the entire sample are determined and then the scores are sorted by the means. The scores for task variety measure the variety in daily tasks performed by the individual and scores for task analyzability measure the process or procedures for performing those tasks.

Knowledge Transfer and Creation

The final module of the survey was designed by Bryant (2005) for his study on peer mentoring and knowledge sharing. This module measures how knowledge is created and transferred among workers. This module consists of a 5-point Likert scale ranging from 1 (Very seldom) to 5 (Very often) which measures respondent's opinions with regard to knowledge transfer and knowledge creation.

The module is scored by calculating the means for knowledge transfer and creation. The medians for the entire sample are determined and then the scores are sorted

by the means. The scores for knowledge transfer measure how knowledge is transferred from the individual to the organization. When measuring knowledge creation the median score indentifies how the knowledge is transferred.

Reliability and validity

The reliability and validity assessments of the measures for this study were performed indicating that the assessment tool is valid and reliable. The data was collected and analyzed, using multiple regression analysis and the assumptions for multicollinearity, normality, linearity, and homoscedasticity were tested. The assumptions for multicollinearity indicated that the Pearson Product-Moment Correlation between the two independent variables knowledge conversion and task characteristics was not significant, $r = -.08$, $p = .61$.

Normality was also tested and the findings of the study indicated that normality was not a concern. The assumptions for linearity were met, indicated by an acceptable distribution of residual. Homoscedasticity was also examined and found that the data adequately met this assumption. The results of the study indicated that the alternate hypothesis was supported. The summary, conclusion, and recommendations of this study will be discussed in chapter 5.

Procedures

The survey method was chosen as the preferred method for data collection for this study. An online questionnaire composed of Becerra-Fernandez and Sabherwal (2001) questionnaire Knowledge Conversion Process, Withey et al., (1983) questionnaire Task Characteristics, and finally, Anothayanon (2006) questionnaire Knowledge Transfer and Creation hosted on the website (www.SurveyMonkey.com). This site was only

responsible for hosting the survey not scoring it. By hosting the questionnaire the participants in the study were able to log in at their convenience. The questionnaire was posted for approximately two weeks to give all participants ample time to respond. After one week and there is no response by the participants a second letter will go out to the participants to encourage their participation.

The company president was the initial contact for the company. Through her recommendation the vice president, Human Resource acted as the gatekeeper for the research study along with the Sr., Director Human Capital Management. Once the sample population was chosen with the assistance of the HR department an introductory email was sent out from the company to all participants introducing the researcher. A few days later an email from the author was sent to the employees. It contained the following items: the introduction of the study, the purpose of the survey, the procedures of the survey, the confidentiality of the results, and contact information describing the research and its goals.

The participants were given approximately two weeks to reply to the questionnaire. Employees were allowed to use company resources to include computers, email, and internet access to participate in the study. The results from the questionnaire provided information for measuring inter-organizational knowledge satisfaction. Results of the survey are provided in chapter 4.

Threats to Statistical Conclusion Validity

In research there is generally four tests of validity (i.e., internal, construct, external, and conclusion) of the four, conclusion validity is one of the least considered. Originally, conclusion validity was labeled “statistical conclusion validity” in either case

conclusion validity is used to determine the degree to which conclusions we reach about relationships in the data is reasonable. Conclusion validity is important whenever there is a relationship, even if the relationship is between a program, some type of treatment and some overall outcome. Conclusion validity also pertains to causal relationships. Unlike internal validity conclusion validity is only concerned with whether there is a relationship.

Threats to conclusion validity can lead the author to reach an incorrect conclusion about the relationship observed. There are two possibilities when considering errors with relationships:

1. Conclude there is no relationship when in actuality there is.
2. Conclude there is a relationship when in actuality there isn't.

Of the two the most common is the first, "finding no relationship when there is one." One cause is due to low reliability of measures. This is caused by many factors such as asking the wrong type of questions, utilizing an inaccurate questionnaire, or any other factor that could skew the data. Another such threat is poor reliability of treatment implementation. If the treatment or program is not implemented correctly it could prevent the researcher from seeing the relationship between the program and other factors like the outcome.

Another threat could be random irrelevancies in the setting. This can be caused by outside distractions that may distract the researcher or its participants. Finally, a threat can be caused by random heterogeneity of respondents. Since, the participant company is composed of a diverse group of respondents this could cause them to vary or have differing opinions that affect the measures or observations. This could be related to the

phenomenon the author is studying or individual differences that are irrelevant to the relationship being studied. Of all the threats to conclusion validity low statistical power is the greatest. It directly affects the amount of information the author collects and the level of risk the author is willing to take in making a decision about whether or not a relationship exists.

Statistical Power

There are four components that influence statistical power which in turn may affect the conclusions of any research study. The components are:

1. Sample size – or the number of units accessible to the study
2. Effect size – or the salience of the treatment relative to the noise in measurement
3. Alpha level – (significance level) or the odds that the observed result is due to chance
4. Power – or the odds that you will observe a treatment effect when it occurs

With statistical power the goal is to find a balance between all four components. This will allow the maximum level of power to detect an effect if it exists. With statistical power there are two mutually exclusive hypotheses, the null (H_0) and the alternative (H_1). The hypotheses describe all possible outcomes of the study. With statistical power it allows the researcher to decide or determine which hypotheses to accept and which to reject. The goal is to prove or accept the alternative hypothesis.

Most researchers use a probability of 0.05 (5%, 1 in 20), 0.01 (1%, 1 in 100), and 0.001 (0.1%, 1 in 1000). If the statistical significance is 0.05, the probability of disproving the null hypothesis must be less than 0.05. To increase the power of a test is to increase or weaken the significance level. The danger of doing this increases the chances

of rejecting the null hypothesis when the null hypothesis is false which reduces the risk of a Type II error. But it also increases the risk of obtaining a statistically significant result when the null hypothesis is in fact true; that is, it increases the risk of a Type I error.

Occasionally, when conducting research there may be times when the recommendations of power analysis regarding sample size are inadequate it does not sufficiently support the findings. When using power analysis the chief concern should be with the correct acceptance or rejection of the null hypothesis. This can be achieved by obtaining the correct estimate of the population effect size. The greater the sample size the more accurate the assumptions.

Violation of Assumptions

Multiple regression depends on specific assumptions about the variables used in the analysis or research. If the assumptions are not met the ending results may not be trustworthy this could result in a Type I or Type II error, or overestimation or underestimation of significance or effect size. Assumptions associated with the MLR are normality, linearity, reliability, and homoscedasticity.

Normality. When using regression it is assumed that all variables have normal distributions. Non-normally distributed variables could skew the results and distort relationships and significance tests. Normality can be checked visually by inspecting data plots, skew, kurtosis, and P-P plots which will give the researcher information about the normality of the variables. By using histograms or frequency distribution the researcher can also locate outliers. By removing univariate and bivariate outliers the researcher will reduce the probability of Type I or Type II errors and increase the accuracy of the results.

The researcher will use a combination of data plots and histograms to evaluate the assumption of normality.

Linearity. Osborne (2002) stated, "standard multiple regression can only accurately estimate the relationship between dependent and independent variables if the relationships are linear in nature" (p. 3). Since there are relationships in the world that exists that are not linear the researcher must be able to test for this nonlinearity. This nonlinearity will cause the relationship between the independent variable (V) and the dependent variable (DV) to be underestimated. "This underestimation carries two risks: increased chance of a Type II error for the independent variable, and, in the case of multiple regression, an increased risk of Type I errors (overestimation) for other independent variables share variance with that variable" (Osborne, 2002, p. 3).

The research can use three ways to detect nonlinearity as stated by Osborne (2002): the first method is to use theory or previous research to inform current analyses; the second is to examine residual plots (plots of the standardized residual as a function of standardized predicted values); the third method used to detect curvilinearity is to routinely run regression analyses that incorporate curvilinear components or use nonlinear regression options available in many statistical packages (p. 4). The researcher will use previous research to evaluate the assumption of linearity.

Homoscedasticity

"Homoscedasticity means that the variance of errors is the same across all levels of the independent variable (IV) when the variance of errors differs at different values of the IV, heteroscedasticity is indicated" (Osborne, 2002, p. 5). This type of error can increase the possibility of Type I errors. "This assumption can be checked by visual

examination of a plot of the standardized residuals (the errors) by the regression standardized predicted value" (Osborne, 2002, p. 5).

Normally residuals are distributed randomly around 0 on the horizontal line which provides an even distribution of residuals. With heteroscedasticity residuals are not evenly scattered around the line. This type of assumptions can produce patterns shaped like a bow-tie or a fan shape. "Possible test for this are Goldfeld-Quandt test when the error term either decreases or increases consistently as the value of the DV increases as shown in the fan-shaped plot, or the Glejser tests for heteroscedasticity when the error term has small variances at central observations and larger variance at the extremes of the observations as in the bow tie-shaped plot" (Osborne, 2002, p. 5). The researcher will use the Goldfeld-Quandt test to evaluate the assumption of homoscedasticity.

Reliability of Instrument

Reliability is a key concern of research "in simple correlation and regression, unreliable measurement causes relationships to be underestimated, increasing the risk of Type II errors" (Osborne, 2002, p. 4). "With multiple regression or partial correlation, effect sizes of other variables can be overestimated if the covariate is not reliably measured because the full effect of the covariate(s) would not be removed" (p. 4). To correct this researcher should test for low reliability. Anothayanon (2006) ensured the validity and reliability of the combined instrument utilizing Cronbach alpha to assess the consistency of the questionnaire items.

Participants Rights

The approval of the Walden University Institutional Review Board (IRB) was required before conducting the research to avoid conflicts of interest. The IRB

application form was submitted by the committee chairperson after the research was approved. All material was submitted to the committee and the university via electronic means. To protect the rights of the participants an email was sent explaining the rights and confidentiality of participants. The email further ensured all participants of their rights for anonymity. No identifying information was gathered during the survey.

The data collected will not have any identifying markers or codes to address the participant's identities. All data collected is stored in electronic and hard copy format. Within the researchers personal belongs in a locked box for the next 5 years.

Conclusion

Chapter three described the research method for this study. The survey method using an online self-administered questionnaire was used. The target population for this study was executives, first/mid level managers, and professionals from a small minority owned business located in Lanham, Maryland. To test the hypotheses, a multiple linear regression was used. To avoid any conflict of interest prior approval was obtained from the Walden University IRB. This insured that the rights of participants were protected. The following chapter, chapter four provides data analysis.

CHAPTER 4: RESULTS

Introduction

This chapter is arranged around the research question addressed in the study. The analysis of the survey data are presented, interpreted, and explained in consistency with the research questions and the underlying theoretical or conceptual framework of the study. The findings related to each research question are reported. The chapter is divided into two problem domains associated with this study. In the first section, the demographics of the participants of the survey presented and analyzed. The second section reports the results of the three problem domains: IT Governance, Budget Considerations, and Technology Utilization/Adoption, along with core IT technology usage as they relate to the research questions.

The survey data were collected and discussed clearly and with established procedures. Electronic mail with a hyperlink to the survey website to access the online questionnaire was sent to the targeted participants. Follow-up emails were sent as reminders to potential participants who had not responded. There were 49 respondents. The data were analyzed using quantitative descriptive statistical tools. Tables and figures are presented in proper titles, captions to show clear, self-descriptive, and informative displays of the results. The chapter concludes with a discussion of how the result of the study corresponds to the hypotheses presented in this study.

This chapter presents the results and findings as well as evidence for the approval or disapproval of the initial hypotheses. Chapter 4 is organized as follows: the first section descriptive statistics, addresses the sample. The second section Analysis of Regression Assumptions discusses multicollinearity, normality, linearity, and

homoscedasticity. The third section Data Analysis presents the data and findings; and finally, the Summary presents a summary of the chapter.

Descriptive Statistics

Description of the Sample

After the survey and reminders were sent, a total of 49 participants responded to the survey. The return rate was 84.48%. Table 2 depicts demographic information regarding sample gender, age, job titles, and years of work experience.

Table 2.

Demographic and Job Data (*N* = 49)

Variable	Category	*n*	%
Gender			
	Male	27	55.1
	Female	22	44.9
Age [a]			
	24 to 29	4	8.2
	30 to 39	12	24.5
	40 to 49	15	30.6
	50 to 70	18	36.7
Job Title			
	Clerical	8	16.3
	Professional Individual	20	40.8
	Supervisor/Manager	16	32.7
	Executive	5	10.2
Experience [b]			
	1 year	9	18.4
	2 years	18	36.7
	3 years	13	26.5
	4 to 19 years	9	18.4

[a] Age: $M = 44.51$, $SD = 9.68$; [b] Experience: $M = 3.55$, $SD = 3.97$.

The results of the demographic information are as follows; there were a total of 49 respondents, of those respondents 27 or 55.1% were men, 22 or 44.9% were woman. The average age of the respondents was 44 years old. In addition, the average experience within the company was approximately 3.5 years.

Knowledge Conversion

Table 3 displays the opinions from respondents for knowledge conversion in relation to socialization was the greatest in regards to "Communicate by direct conversation" (M = 3.88, SD = 1.07) and "Gain expertise through practice, observation, and imitation of each other" (M = 3.65, SD = 1.03). Socialization involves the sharing of tacit knowledge between individuals. Through this direct contact knowledge is exchanged without the need for written communication (Table 3).

Table 3.

Means (SD) for Socialization Process Statements Sorted by Highest Mean Rating (N = 49)

Statement	*M*	*SD*
Communicate by direct conversation	3.88	1.07
Gain expertise through practice, observation, and imitation of each other	3.65	1.03
Share experiences with each other	3.55	1.19
Brainstorm to expand ideas and options	3.51	1.12
Use apprentices and mentors to train new hires	3.29	1.22
Come up with new ideas from spending time together and being	3.29	1.15

together		
Use job rotation to extract knowledge	2.90	1.26

Note. Ratings based on five-point Likert scale: 1 = *Very Seldom* to 5 = *Very Often.*

Table 4 respondents opinions for externalization showed that most respondents felt that "Document experts' knowledge" (*M* = 3.63, *SD* = 1.01) and "Use metaphors (e.g., examples, pictures, and images) to capture ideas" (*M* = 3.41, *SD* = 1.19) were most significant. This is consistent with the literature on externalization which involves converting tacit knowledge into explicit knowledge. This process involves the use of metaphors, analogies, or narratives, and visuals.

Table 4.

Means (SD) for Externalization Statements Sorted by Highest Mean Rating (N = 49)

Statement	*M*	*SD*
Document experts' knowledge	3.63	1.01
Use metaphors (e.g., examples, pictures, and images) to capture ideas	3.41	1.19
Perform deductive thinking (reasoning by analogy) to transfer knowledge into readable forms	3.27	1.15
Use decision support systems	3.27	1.17
Use analogies and/or metaphors (e.g., examples, pictures, and images) to develop creativity and innovation	3.22	1.10
Capture expert knowledge via expert systems or other	3.12	1.15

automated tools (e.g., yellow pages)

Use groupware and other team collaboration tools	2.92	1.15
Use a problem-solving tool based on a technology like case-based reasoning	2.86	1.12
Use chat groups/web-based discussion groups	2.71	1.21

Note. Ratings based on five-point Likert scale: 1 = *Very Seldom* to 5 = *Very Often.*

Table 5 combination elicited the greatest responses for "Use web pages (Intranet and Internet)" ($M = 3.76$, $SD = 0.88$) and "Use databases" ($M = 3.71$, $SD = 0.89$). Combination involves the conversion of explicit knowledge into more complex sets of explicit knowledge. In this stage, the key issues are communication and diffusion processes and the systemization of knowledge (Konno and Nonaka, 1998, p. 44). Konno et al, 1998 states that the combination phase relies on three processes.

The first process involves capturing and integrating new explicit knowledge. This process involves collecting externalized knowledge (e.g., public data) from inside or outside the company and then combining such data. Secondly, explicit knowledge can be spread throughout the company by transferring this form of knowledge directly by using presentations or meetings which will allow new knowledge to be spread among the organization. The third process involves the editing or processing of explicit knowledge by making it more usable (e.g., documents such as plans, reports, market data) (Table 5).

Table 5.

Means (SD) for Combination Statements Sorted by Highest Mean Rating (N = 49)

Statement	*M*	*SD*
Use web pages (Intranet and Internet)	3.76	0.88
Use databases	3.71	0.89
Use web-based access to data	3.61	0.86
Edit and modify existing documents (i.e. plans and reports)	3.45	1.16
Create new materials by gathering existing documentations	3.41	1.14
Use repositories of information, best practices, and lessons learned	3.41	1.15
Build presentations to share information	3.18	1.20
Articulate plans and strategies by using public data	3.10	1.14

Note. Ratings based on five-point Likert scale: 1 = *Very Seldom* to 5 = *Very Often.*

Table 6 responses for internalization were greater for "Learn by doing" (*M* = 4.10, *SD* = 0.85) and "Hold face-to-face meetings" (*M* = 3.71, *SD* = 0.96). Finally, internalization converts newly created explicit knowledge into the organization's tacit knowledge. By learning-by-doing, training, and exercises which allows the organizational members to exchange knowledge from one to another. Internalization relies on two dimensions. The first dimension embodies explicit knowledge into action and practice. The second dimension helps to embody the explicit knowledge using simulations or experiments to trigger learning by doing processes (Table 6).

Table 6.

Means (*SD) for Internalization Statements Sorted by Highest Mean Rating*

(N = 49)

Statement	*M*	*SD*
Learn by doing	4.10	0.85
Hold face-to-face meetings	3.71	0.96
Learn by observation	3.69	1.12
Search for ideas from existing materials	3.53	1.08
Discuss with each other to deepen our understanding of materials and documents	3.35	1.16
Attend on-the-job training	3.04	1.24
Conduct simulation or experiments to embody knowledge	2.53	1.19

Note. Ratings based on five-point Likert scale: 1 = *Very Seldom* to 5 = *Very Often.*

Task Characteristics

Task characteristics are composed of two-dimensions that describe the tasks performed by a unit, task domain and task orientation. Table 7 task domain describes the tasks associated with a unit. It captures the variety of tasks that a unit performs. This domain consists of broad task domain and focused task domain. This concept draws from an accepted thought regarding knowledge sharing and organizational task evaluation. Respondents for the study responded very highly to “Perform routine work” (*M* = 3.12, *SD* = 1.20) and “Perform the same task from day-to-day” (*M* = 3.12, *SD* = 1.09) (Table 7).

Table 7.

Means (SD) for Task Variety Statements Sorted by Highest Mean Rating (N = 49)

Statement	*M*	*SD*
Perform routine work	3.12	1.20
Perform the same task from day-to-day	3.12	1.09
Believe people in my unit perform repetitive activities while doing their jobs	3.10	1.01
Believe people in this unit do about the same job in the same way most of the time	3.08	1.00
Perform repetitious duties	3.04	1.12

Note. Ratings based on five-point Likert scale: 1 = *Very Seldom* to 5 = *Very Often.*

Table 8 task orientation in contrast consists of process-oriented and content-oriented. Task orientation is consistent with the literature on knowledge that distinguishes between know-what (content-oriented) and know-how (process-oriented). The responses for task analyzability showed that most respondents felt that "There is a clearly defined body of knowledge of subject matter which can guide me in doing my work" ($M = 3.84$, $SD = 0.96$) and "There is an understandable sequence of steps that can be followed in doing my work" ($M = 3.71$, $SD = 1.00$) (Table 8).

Table 8.

Means (SD) for Task Analyzability Statements Sorted by Highest Mean Rating ($N = 49$)

Statement	*M*	*SD*
There is a clearly defined body of knowledge of subject matter which can guide me in doing my work	3.84	0.96
There is an understandable sequence of steps that can be followed in doing my work	3.71	1.00
There is a clearly known way to do the major types of work I normally encounter	3.59	1.00
That I can actually rely on established procedures and practices to do my work	3.53	1.17
There is an understandable sequence of steps that can be followed in carrying out my work	3.49	0.96

Note. Ratings based on five-point Likert scale: 1 = *Very Seldom* to 5 = *Very Often.*

Inter-organizational satisfaction

Table 9 displays the knowledge transfer ratings sorted by the highest mean score. Highest ratings were for "Learn from each other ($M = 3.76$, $SD = 0.97$)," and "Regularly talk with each other to share knowledge ($M = 3.59$, $SD = 1.10$)" (Table 9).

Table 9.

Means (SD) for Knowledge Transfer Statements Sorted by Highest Mean Rating (N = 49)

Statement	*M*	*SD*
Learn from each other	3.76	0.97
Regularly talk with each other to share knowledge.	3.59	1.10
Regularly share knowledge and experience with each other.	3.57	1.15
Transform our individual knowledge to shared knowledge.	3.51	1.06
Offer and/or attended training	3.06	1.16

Note. Ratings based on five-point Likert scale: 1 = *Very Seldom* to 5 = *Very Often.*

Table 10 displays the knowledge creation ratings sorted by the highest mean score. Highest ratings were for "Suggest ways of accomplishing tasks more effectively and efficiently (*M* = 3.57, *SD* = 1.00)," and "Identify improvements to reduce inefficiencies (*M* = 3.41, *SD* = 1.02)" (Table 10).

Table 10.

Means (SD) for Knowledge Creation Statements Sorted by Highest Mean Rating (N = 49)

Statement	*M*	*SD*
Suggest ways of accomplishing tasks more effectively and efficiently.	3.57	1.00
Identify improvements to reduce inefficiencies.	3.41	1.02
Generate new ideas.	3.37	0.95

Create innovative processes.	3.27	0.97
Launch new products and services.	2.92	1.06

Note. Ratings based on five-point Likert scale: 1 = *Very Seldom* to 5 = *Very Often*

Reliability of the Measures

Cronbach's alpha coefficient was calculated to assess the internal consistency of the questionnaire items. Task characteristics were measured using the variables task variety and task analyzability; knowledge conversion was measured consisting of the variables socialization, internalization, externalization, and combination variables; and inter-organizational knowledge satisfaction was measured utilizing knowledge transfer and knowledge creation variables. Cronbach's alpha coefficients ranged from .85 to .95, with a median coefficient of .89 (Table 11).

Table 11.

Psychometric Characteristics for Summated Scale Scores (N = 49)

Scale Score	Number of Items	*M*	*SD*	Cronbach's Alpha
Socialization	7	3.44	0.84	.85
Externalization	9	3.16	0.90	.92
Combination	8	3.45	0.81	.90
Internalization	7	3.42	0.80	.86
Knowledge Conversion [a]	31	3.36	0.72	.95
Task Variety	5	3.09	0.90	.89

Task Analyzability	5	3.63	0.83	.87
Task Characteristic [b]	10	3.36	0.68	.85
Knowledge Transfer	5	3.50	0.94	.91
Knowledge Creation	5	3.31	0.81	.86
Inter-Organizational Knowledge Satisfaction [c]	10	3.40	0.77	.90
Total Score [d]	51	3.37	0.55	.94

Note. Ratings based on five-point Likert scale: 1 = *Very Seldom* to 5 = *Very Often.*

[a] Scale based on aggregated items from scales Socialization, Externalization, Combination, and Internalization.

[b] Scale based on aggregated items from scales Task Variety and Task Analyzability.

[c] Scale based on aggregated items from scales Knowledge Transfer and Knowledge Creation.

[d] Scale based on aggregated items from all items.

Analysis of Regression Assumptions

The three variables used in the regression analysis were inter-organizational knowledge satisfaction, knowledge conversion and task characteristics. These variables were examined to determine whether they met the assumptions of normality, linearity and homoscedasticity. The discussion of each will follow below.

Multicollinearity

A key test in regression models is the test for multicollinearity, which tests for the correlation of two independent variables. The idea is if two independent variables are highly correlated, they will both present the same information, which could indicate that neither variable contributes significantly to the model after the other one is included. But

together they may contribute significantly. The overall affect is that the model fits the data well, but neither independent variable makes a significant contribution when it is added to the model last. This is means that the independent variables are collinear, which indicates the results show multicollinearity.

The researcher tested for multicollinearity and the current regression model indicated that the variables knowledge conversion and task characteristics were not significant, r = -.08, p = .61. Therefore, given that the independent variables were not correlated with each other multicollinearity was not a concern.

Normality

For normality, the Kolmogorov-Smirnov tests were not significant for inter-organizational knowledge satisfaction (p = .20), knowledge conversion (p = .17), and task characteristics (p = .20) (Table 12). Further examination of box plots, histograms, z scores for skewness and kurtosis plus Q-Q plots found a moderate negative skews for inter-organizational knowledge satisfaction (z_{skew} = -1.84), knowledge conversion (z_{skew} = -1.99, but not task characteristics (z_{skew} = 0.00); "for moderately non-normal distributions the approximation is good with as few as 10 or 20 observations" (Stevens, 2002, p. 262). Given the sample of 49 respondents, normality was deemed to be adequate.

Table 12.

Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Inter-organizational	.102	49	.200*	.969	49	.229

knowledge satisfaction						
Knowledge Conversion	.112	49	.167	.956	49	.062
Task Characteristic	.073	49	.200*	.983	49	.682

[a] Lilliefors Significance Correction

* This is a lower bound of the true significance

Linearity

Linearity was diagnosed based on the examination of the residual plot for the regression model, see figure 6. According to Tabachnick and Fidell (1989), "in plots where residuals are plotted against predicted values, nonlinearity is indicated when most of the residuals are above the zero line on the plot at some predicted values and below the zero line at other predicted values (*p*. 79)." Inspection of the relevant residual plot found an acceptably even distribution of residuals to suggest that the assumption of linearity was met.

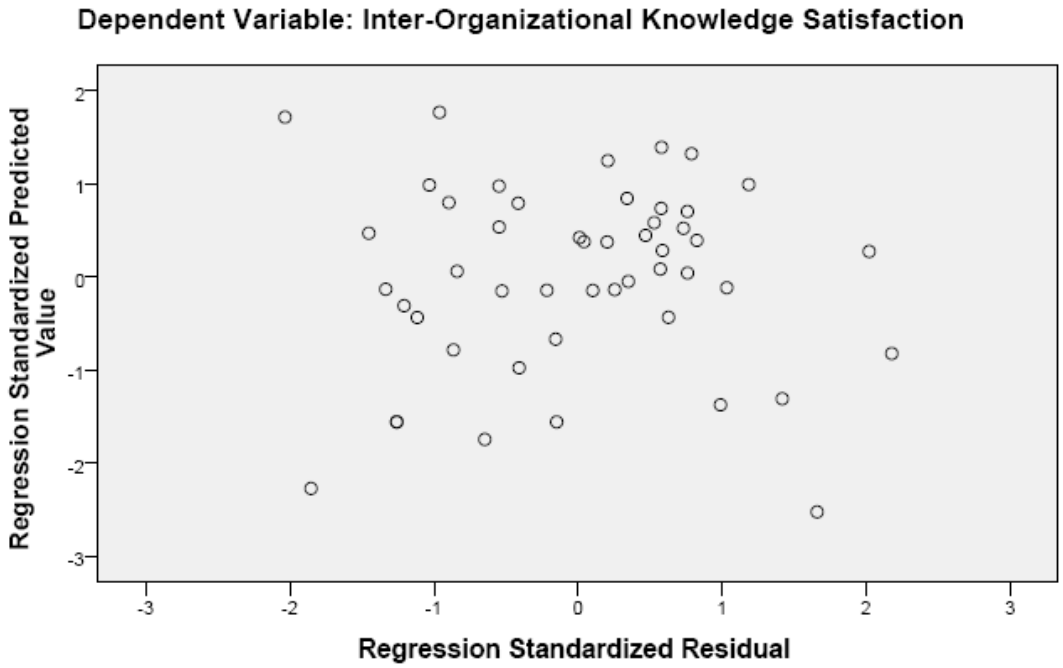

Figure 6. Inter-Organizational Knowledge Satisfaction.

Homoscedasticity

Homoscedasticity was examined based on inspection of bivariate scatter plots see figure's 7 and 8. Demonstration of this assumption is met according to Tabachnick and Fidell (1989), "when the bivariate scatter plots between two variables or of residuals are of roughly the same width all over (*p*. 82)." Inspection of the relevant scatter plots adequately met this assumption.

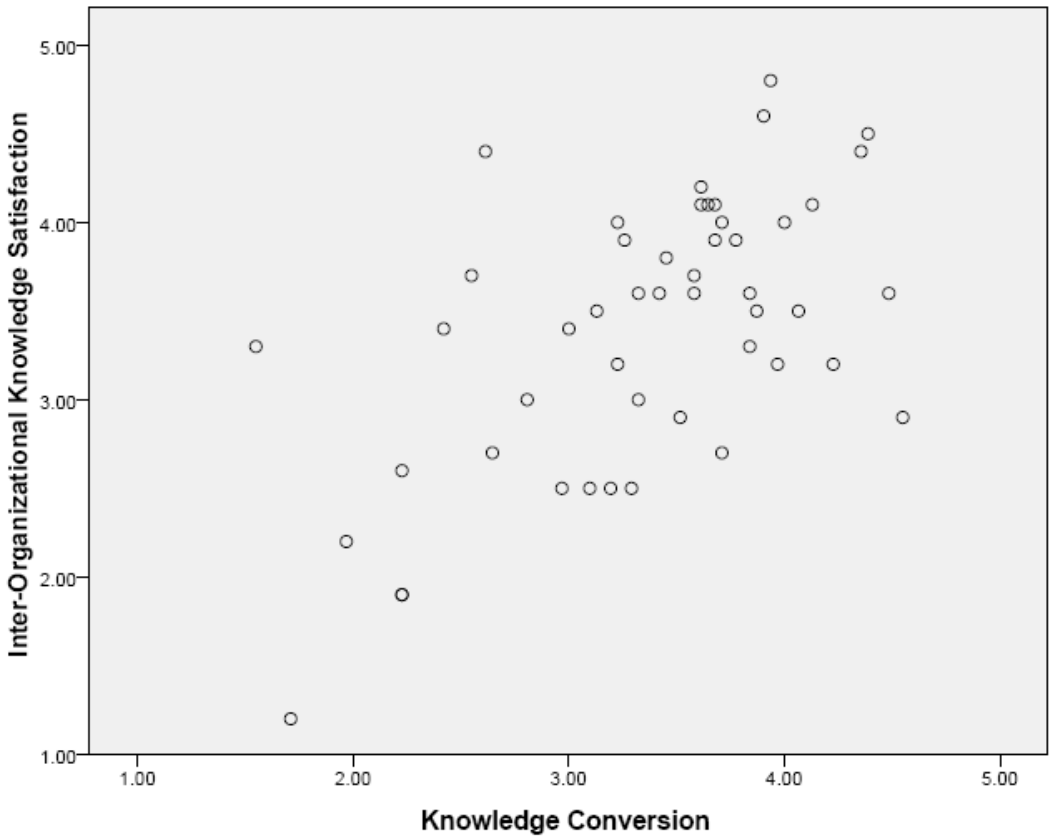

Figure 7. Knowledge Conversion.

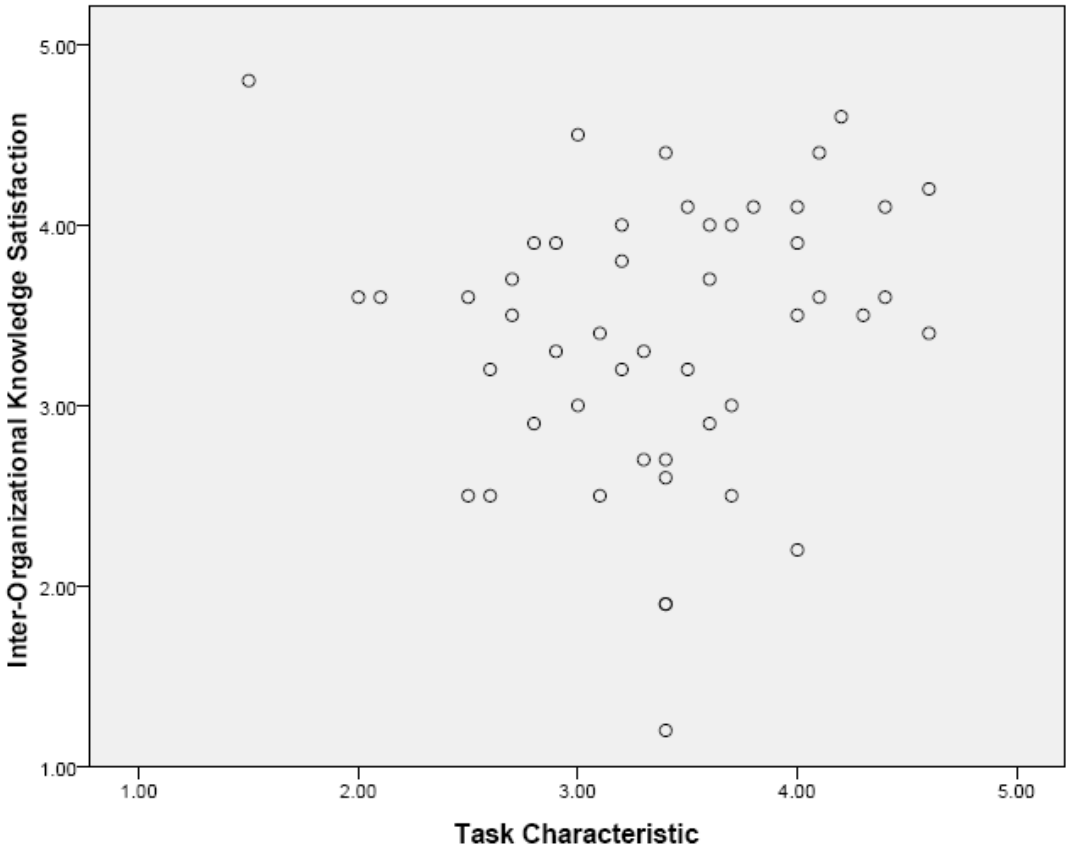

Figure 8. Task Characteristic.

Data Analysis

The purpose of the survey was to collect data used to measure inter-organizational knowledge satisfaction utilizing Nonaka (1994) knowledge conversion and Becerra-Fernandez's and Sabherwal's (2001) task characteristics. The data collected further answered the primary research question: How does task characteristic and knowledge conversion predict inter-organizational knowledge satisfaction? As well as, the related research hypotheses:

H_0: Task characteristics and knowledge conversion will not significantly predict inter-organizational knowledge satisfaction.

H_1: Task characteristics and knowledge conversion will significantly predict inter-organizational knowledge satisfaction.

Generalizability

Stern's formula (see below) was used to cross-validate how well the regression model would predict IOKS from an entirely different set of data (e.g. different company). In Stern's formula, R^2 is the unadjusted value from the study sample (.353), n = sample size (49), and k = the number of predictor variables (2). The adjusted R^2, using Stern's formula was .29, suggesting the model will account for 29% of the variance in IOKS, when applied to a different data set. This indicates only a slight loss of predictive power (from .35 to .29) when all other factors are equal.

$$\text{Adjusted } R^2 = 1 - \left[\left(\frac{n-1}{n-1-k}\right)\left(\frac{n-2}{n-k-2}\right)\left(\frac{n+1}{n}\right)\right]1- R^2$$

Figure 9, Stern's formula

Findings

Inspection of the beta weights for the knowledge conversion scale was determined to be significant (β = .59, p = .001). Knowledge conversion (p = .001) does seem to predict inter-organizational knowledge satisfaction. Thus, the results of the findings supported the alternative hypothesis:

H_1: Task characteristics and knowledge conversion will significantly predict inter-organizational knowledge satisfaction.

In contrast, the beta weights for task characteristics was not significant (β = .11, p = .34). The independent variable task characteristic (p = .34) did not support the alternative hypothesis. It instead supported the null hypothesis:

H_0: Task characteristics and knowledge conversion will not significantly predict inter-organizational knowledge satisfaction.

To understand further the relationship between knowledge conversion and inter-organizational knowledge satisfaction (IOKS), a multiple linear regression model was constructed (Table 13). This model used IOKS as the dependent variable with the knowledge conversation and task characteristics scales as the independents. The overall model was significant, F (2, 46) = 12.52, p = .001. The effect size, measured by R^2, was .353, indicating the predictor variables accounted for 35.3% of the variance in the IOKS score. From these numbers, the formula (using standardized weights) to determine the predicted value of inter-organizational knowledge satisfaction is:

IOKS(predicted) = .59 (knowledge conversion) + .11 (task characteristics)

Although, knowledge conversion did partial support the alternative hypothesis the independent variable task characteristic did not. It supported the null hypothesis. Thus, the overall findings of the study supports are inconclusive and further research must be done.

Table 13.

Multiple Linear Regression Model Predicting Inter-Organizational Knowledge Satisfaction (IOKS) (N = 49)

Source	*B*	*SE*	β	*p*
Intercept	0.86	0.65		.19
Knowledge Conversion	0.63	0.13	.59	.001
Task Characteristics	0.13	0.13	.11	.34

Summary

An online questionnaire was developed to measure the inter-organizational knowledge satisfaction for a contract company located Lanham, Maryland. The questionnaire collected data based on Nonaka's (1994) knowledge creation (socialization, externalization, internalization, and combination); and Becerra-Fernandez and Sabherwal (2001) task characteristics (task orientation and task domain). The potential participants of this study were 58 including all executives, first- and mid-level managers, and professionals from a sample of 99 possible participants. There were a total of 49 respondents which gave the questionnaire an 84.48% response rate. Of those respondents 27 or 55.1% were male, 22 or 44.9% were female. The average age of the respondents was 44 years old. In addition, the average experience within the company was approximately 3.5 years.

The reliability and validity assessments of the measures for this study were performed indicating that the assessment tool is valid and reliable. The data was collected and analyzed, using multiple regression analysis and the assumptions for multicollinearity, normality, linearity, and homoscedasticity were tested. The assumptions for multicollinearity indicated that the Pearson Product-Moment Correlation between the two independent variables knowledge conversion and task characteristics was not significant, $r = -.08$, $p = .61$.

Normality was also tested and the findings of the study indicated that normality was not a concern. The assumptions for linearity were met, indicated by an acceptable distribution of residual. Homoscedasticity was also examined and found that the data adequately met this assumption. Inspection of the beta weights for the knowledge

conversion scale was determined to be significant (β = .59, p = .001). Knowledge conversion (p = .001) does predict inter-organizational knowledge satisfaction. In contrast, the beta weights for task characteristics was not significant (β = .11, p = .34). Further examination of the independent variable was accomplished.

The independent variable task characteristic (p = .34) did not support the alternative hypothesis. A multiple linear regression model was constructed. This model used inter-organizational knowledge satisfaction (IOKS) as the dependent variable with the knowledge conversation and task characteristics scales as the independents. The overall model was significant, F (2, 46) = 12.52, p = .001. The effect size, measured by R^2, was .353, indicating the predictor variables accounted for 35.3% of the variance in the IOKS score. The summary, conclusion, and recommendations of this study will be discussed in chapter 5.

CHAPTER 5:

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Introduction

The focus of this study was on inter-organizational knowledge satisfaction. The study argued that different patterns of knowledge transfer can contribute varying effects on different task characteristic groups for the accomplishment of inter-organizational knowledge satisfaction. Knowledge management encompasses two types of knowledge: tacit knowledge and explicit knowledge. Nonaka (1994) states that tacit knowledge is personal knowledge that resides in an individual's head and is difficult to share, transfer, and communicate from one individual to another and explicit knowledge is defined as codified knowledge, which is usually captured and documented in transmittable forms (p. 16).

This quantitative research study was conducted to determine the level of inter-organizational knowledge satisfaction for the employee's of Data Solution & Technology (DS&T). The study suggested that Nonaka's (1994) knowledge creation (socialization, externalization, internalization, and combination); and Becerra-Fernandez and Sabherwal (2001) task characteristics (task orientation and task domain) must be used to enhance the inter-organizational knowledge satisfaction of the organization. The results and findings of this study are summarized as follows.

The research question that was addressed in this study is:

How does task characteristic and knowledge conversion predict inter-organizational knowledge satisfaction?

The study was conducted using the survey method of inquiry utilizing an online questionnaire. The target population for this study included executives, first- and mid-level managers, and professionals from Data Solutions & Technology (DS&T). The sampling design for this study was purposive sampling. Once the data collection process began, the participants received an official notice from the CEO and President of DS&T. After this notice was sent out, an introductory letter from the researcher which provided a link to the online survey. After a week passed, an email was sent out from DS&T to remind the participants of their participation in the study. The data collection process was approximately two weeks. A total of 49 participants responded to the survey.

The reliability of this study was evaluated using Cronbach alpha. A factor analysis was performed to examine the validity assessments of the measures. The findings indicated a relatively high reliability and validity showed support for the measurement of this study. Collected data were analyzed, using a one-way analysis of variance, multiple linear regression analysis, and correlations, to test the hypotheses.

Chapter 5 is organized into five sections the summary, the interpretation of findings, conclusion, recommendations for future action and future research. The first section will address data interpretation and theoretical relevance and include a brief summary of the findings. The second section will include conclusions that address the research questions and limitations of this study. The third section will address the implications for social change. The fourth section will discuss the recommendations future action. Last, recommendations for future research will be discussed.

Data Interpretation and Theoretical Relevance

Two theories were used as the basis for this study. Nonaka's (1994) knowledge conversion (socialization, externalization, internalization, and combination); and Becerra-Fernandez and Sabherwal (2001) task characteristics (task orientation and task domain). The theories were used to support the research question. How does task characteristic and knowledge conversion predict inter-organizational knowledge satisfaction?

Knowledge Conversion

Knowledge is transferred and created within and between two types of knowledge—tacit and explicit—by four patterns of knowledge conversion: socialization (tacit knowledge to tacit knowledge), externalization (tacit knowledge to explicit knowledge), internalization (explicit knowledge to tacit knowledge), and combination (explicit knowledge to explicit knowledge) (Nonaka, 1994, pp. 18). This study proposed that each of these four knowledge conversion patterns were essential to answering the research question.

Opinions from respondents for knowledge conversion in relation to socialization was the greatest in regards to "Communicate by direct conversation" (M = 3.88, SD = 1.07) and "Gain expertise through practice, observation, and imitation of each other" (M = 3.65, SD = 1.03). Socialization involves the sharing of tacit knowledge between individuals. "Socialization is exchanged through joint activities—such as being together, spending time, living in the same environment—rather than through written or verbal instructions" (Konno & Nonaka, 1998, p. 42). Through this direct contact knowledge is exchanged without the need for written communication.

The responses for externalization showed that most respondents felt that "Document experts' knowledge" (M = 3.63, SD = 1.01) and "Use metaphors (e.g., examples, pictures, and images) to capture ideas" (M = 3.41, SD = 1.19) were most significant. This is consistent with the literature on externalization which involves converting tacit knowledge into explicit knowledge. This process involves the use of metaphors, analogies, or narratives, and visuals.

Combination elicited the greatest responses for "Use web pages (Intranet and Internet)" (M = 3.76, SD = 0.88) and "Use databases" (M = 3.71, SD = 0.89). Combination involves the conversion of explicit knowledge into more complex sets of explicit knowledge. In this stage, the key issues are communication and diffusion processes and the systemization of knowledge (Konno and Nonaka, 1998, p. 44). Konno et al., (1998) states that the combination phase relies on three processes the first process involves capturing and integrating new explicit knowledge. The first phrase involves collecting externalized knowledge (e.g., public data) from inside or outside the company and then combining such data. Secondly, explicit knowledge can be spread throughout the company by transferring this form of knowledge directly by using presentations or meetings which will allow new knowledge to be spread among the organization. The third process involves the editing or processing of explicit knowledge by making it more usable (e.g., documents such as plans, reports, and market data).

Responses for internalization were greater for "Learn by doing" (M = 4.10, SD = 0.85) and "Hold face-to-face meetings" (M = 3.71, SD = 0.96). Finally, internalization converts newly created explicit knowledge into the organization's tacit knowledge. This can be accomplished via learning-by-doing, training, and exercises this allows the

organizational members to exchange knowledge from one to another. Internalization relies on two dimensions. The first dimension embodies explicit knowledge into action and practice. Thus the process of internalizing explicit knowledge actualizes concepts or methods about strategy, tactics, innovation, or improvement (Konno and Nonaka, 1998, p. 45). The second dimension helps to embody the explicit knowledge using simulations or experiments to trigger learning by doing processes.

The findings of the study indicated after inspecting the beta weights for the knowledge conversion scale it was significant ($\beta = .59$, $p = .001$). Knowledge conversion ($p = .001$) does seem to predict inter-organizational knowledge satisfaction. Thus, the results of the findings supported the alternative hypothesis:

H_1: Task characteristics and knowledge conversion will significantly predict inter-organizational knowledge satisfaction.

Task Characteristics

Sabherwal and Becerra-Fernandez (2003) posited that knowledge does not exist independent of human experience; instead, it develops through social creation of meanings and concepts. “The subjective and context-sensitive nature of knowledge implies that its categories and meanings depend on individual perception” (Davenport & Prusak, 1998). Sabherwal and Becerra-Fernandez (2003) theory on task characteristics answers the question: How do the knowledge management (KM) processes experienced by an individual influence the individual's perceptions regarding the perceived effectiveness of KM at individual, group, and organizational levels?

To answer this question Sabherwal and Becerra-Fernandez (2003) attempted to tie into the theories for knowledge conversion established by Nonaka's (1994) four KM

processes-internalization, externalization, socialization, and combination. Task characteristics focus on KM effectiveness as perceived by individuals that experience the consequences of the KM efforts. This theory was key to further proving the alternative hypothesis:

H_1: Task characteristics and knowledge conversion will significantly predict inter-organizational knowledge satisfaction.

Task characteristics are composed of two-dimensions that describe the tasks performed by a unit, task orientation and task domain. Task orientation consists of process-oriented and content-oriented. Task orientation is consistent with the literature on knowledge that distinguishes between know-what (content-oriented) and know-how (process-oriented). The responses for task analyzability showed that most respondents felt that "There is a clearly defined body of knowledge of subject matter which can guide me in doing my work" (M = 3.84, SD = 0.96) and "There is an understandable sequence of steps that can be followed in doing my work" (M = 3.71, SD = 1.00).

Task domain in contrast describes the tasks associated with a unit. It captures the variety of tasks that a unit performs. This domain consists of broad task domain and focused task domain. This concept draws from an accepted thought regarding knowledge sharing and organizational task evaluation. Respondents for the study responded very highly to "Perform routine work" (M = 3.12, SD = 1.20) and "Perform the same task from day-to-day" (M = 3.12, SD = 1.09).

The findings of the study indicated after inspecting the beta weights for task characteristics it was not significant (β = .11, p = .34). The independent variable task

characteristic (p = .34) did not support the alternative hypothesis. It instead supported the null hypothesis:

H_0: Task characteristics and knowledge conversion will not significantly predict inter-organizational knowledge satisfaction.

The overall model was significant, F (2, 46) = 12.52, p = .001, which indicates that task characteristics and knowledge conversion together are able to predict a model for inter-organizational knowledge satisfaction.

Recommendation for Action

Knowledge has been recognized as the greatest asset in organizations. To successfully utilize knowledge, organizations like DS&T must begin investing their human and financial resources in knowledge management. This focus on knowledge management must extend outside the organization to its partners or contract sites. Companies such as DS&T must fully capture the knowledge that is obtained at these remote sites and bring it back to the parent organization. It is therefore necessary to understand how different organizations can work together to successfully transfer their knowledge.

The results and findings of this study suggest that organizations must develop a strategic plan for capturing, retaining, and utilizing inter-organizational knowledge. Different contracts provide differing opportunities for inter-organizational knowledge satisfaction. Thus, the organization must take advantage of these opportunities and utilize the knowledge gained within this cooperation as a means to enhance the strategic position of the organization. For example, the organization could develop weekly, bi-weekly, or monthly training session. The session could be designed around the specific task

characteristics of the employee's (i.e., Information Technology or Human Resource). These training sessions would provide an opportunity for the employees to utilize Nonaka's (1994) four modes of knowledge transfer and creation to transfer the knowledge they gained into the parent organization. While ensuring that the correct task characteristic group as outlined by Becerra-Fernandez and Sabherwal (2001) task characteristics (task orientation and task domain) is utilized to effectively adopt the correct knowledge transfer technique.

By utilizing the appropriate knowledge-transfer techniques will help organizations to avoid gaps in their knowledge base and prevent harm in various areas, such as budgets, resources, and time to market. This study demonstrates the need for organizations to understand the need for inter-organizational knowledge satisfaction. The results and findings of this study will help the organization to effectively and efficiently capture knowledge within the organization and the knowledge within the cooperation. Effectively capturing knowledge will allow the organizations to properly utilize the knowledge of its employees and efficiently maximize knowledge transfer and creation; thus, transforming the organization into a learning organization.

Recommendation for Future Research

Organizations and companies alike must make better use of its employees and the knowledge they posses. Organizations must establish a sound foundation for intra- and inter-organizational knowledge by developing a solid foundation for their knowledge management strategies and employing sound theoretical and benchmark techniques for promoting a knowledge-sharing environment.

Through the development of sound knowledge management techniques the organization can position itself as a force to reckon with. This research study shows a need for organization to successfully capture the inter-organizational knowledge that is available via the cooperation. Inter-organizational learning or knowledge must be the focus of future research to include research on cultural barriers of inter-organizational learning and the mechanisms and impacts of self-organization to overcome those barriers (Hülsmann, Lohmann, & Wycisk, 2006). The following are some recommendation to enhance future studies on inter-organizational knowledge satisfaction.

1. Purposive sampling was chosen for this research study which determined the target population of the participants. Further research can be done by utilizing other sampling means to obtain a greater target population. Thus allowing for a greater measure of employee inter-organizational satisfaction.

2. Since this study was conducted at a small company, the generalizing may be limited. The survey sample size can be further increased by conducting the research at a larger company to obtain a more generalization of the study.

3. Further research can also be done to design a survey tool better suited for measuring inter-organization knowledge satisfaction. The tool used in this research was initially designed to measure intra-organizational knowledge satisfaction and may not fully capture the inter-organizational prospective.

Implication for Social Change

The social impacts of this research study will be discussed as follows: First, this research study contributes to the existing overall body of knowledge in the area of knowledge management specifically, inter-organizational knowledge. The results and

findings of this study revealed the inter-organizational knowledge satisfaction of utilizing Nonaka's (1994) knowledge creation (socialization, externalization, internalization, and combination); and Becerra-Fernandez and Sabherwal (2001) task characteristics (task orientation and task domain). The existing body of literature is primarily focused on intra-organizational knowledge. However, the need to increase the awareness of how knowledge can be transferred and created organization to organization is critical in achieving the highest organizational potential of knowledge satisfaction. Therefore, this study will add more dimensions to the body of knowledge in the knowledge management field for inter-organizational knowledge.

Another implication for social change of this study will be addressed within the organization. In today's declining markets and economic upheaval knowledge plays a major role for organizations to achieve a strategic advantage over their competitors and to survive at a time when business from every sector have filed bankruptcy or required a government bailout. An effective knowledge-sharing environment must be developed within the company to transform traditional organizations into learning organizations. Lack of trust, time, and the fact that knowledge management cannot be easily measured has caused managers to not invest in knowledge because they cannot see a direct cause and effect on the bottom-line of the organization. This mindset presents a barrier and causes difficulties to implementing a successful learning organization. It is essential for organizations to develop effective knowledge-sharing and knowledge-transferring methods that will allow the organization to overcome knowledge-sharing barriers and learning organizations difficulties.

The results and findings of this study suggest that different task situations in an organization frequently adopt different patterns of knowledge conversion in accomplishing knowledge transfer and creation. Therefore, the implications for social change can be quantified in terms of employee improvement (job satisfaction and enhanced knowledge or skill) at the individual level which can relate to an overall improvement for the organization at the organizational level. Knowledge gained from this study will help organizations develop effective inter-organization knowledge methods that can lead to inter-organizational knowledge satisfaction. Thus gaining organizational knowledge wealth, increased revenue, improved employee knowledge and skill, and providing the organization with a strategic advantage over its competitors.

Conclusion

The purpose of this quantitative, correlational research study was to measure inter-organizational knowledge satisfaction for a contract company that specialize in contract work for federal, state, and local governments, as well as the private sector. A review of previous literature revealed that there is a lack of research on the relation between Nonaka's knowledge conversion process and Becerra-Fernandez's and Sabherwal's task characteristics, in regards to inter-organizational knowledge satisfaction. The nature of this study was based on correlation research utilizing Multiple Linear Regression (MLR) as the preferred data analysis method.

The research question this study attempted to answer was: How does task characteristic and knowledge conversion predict inter-organizational knowledge satisfaction? The theoretical framework for the study was based on Nonaka's (1994) knowledge transfer and creation theory and Becerra-Fernandez and Sabherwal's (2001)

task characteristics. An online questionnaire was administered to all executives, first- and mid-level managers, and professionals from a sample of 99 possible participants.

The data were collected and analyzed, using multiple regression analysis and the assumptions for multicollinearity, normality, linearity, and homoscedasticity were tested. The overall model was significant, $F(2, 46) = 12.52$, $p = .001$, which indicates that task characteristics and knowledge conversion together are able to predict a model for inter-organizational knowledge satisfaction. The findings of this research could have important implications for social change. It can help bridge the gap in knowledge management and inter-organizational knowledge by helping organizations accurately predict and measure the level of inter-organizational knowledge satisfaction gained within the cooperation.

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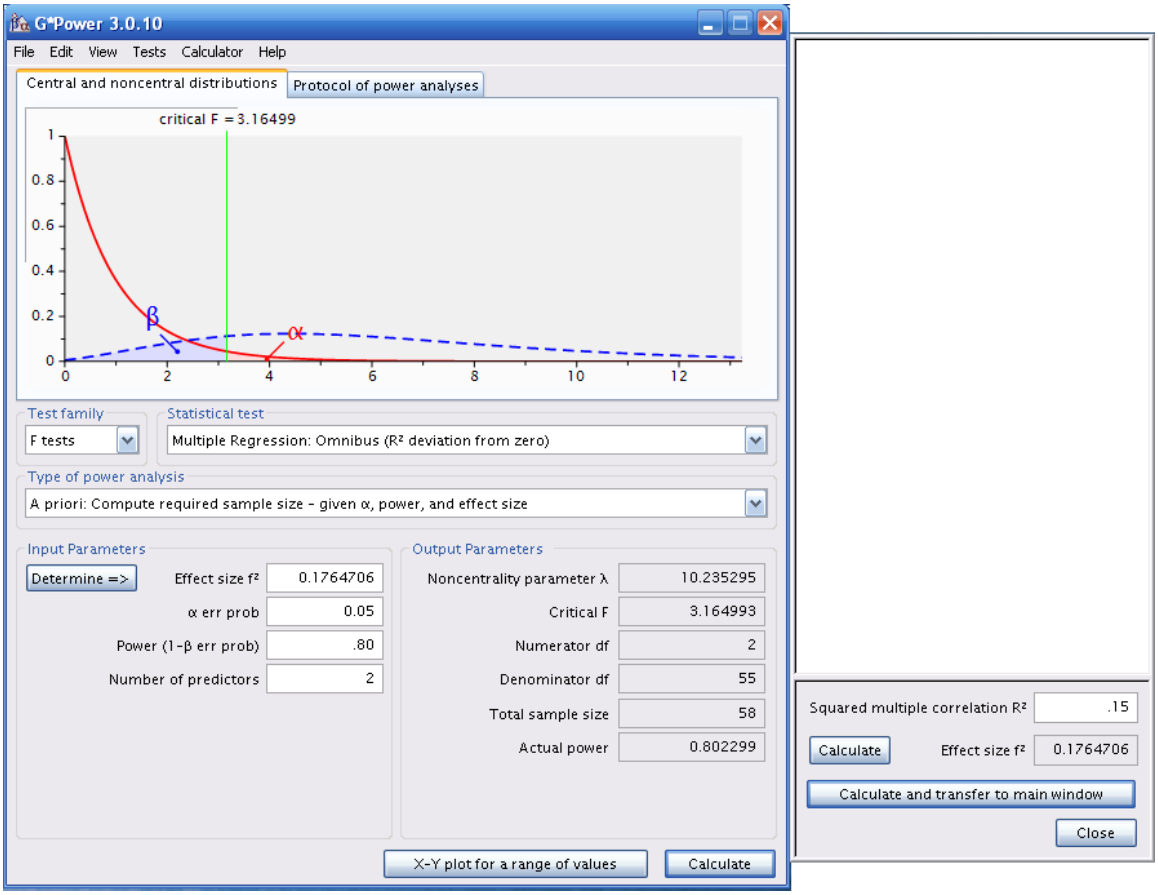
APPENDIX A: G*POWER 3 POWER ANALISYS



APPENDIX B: INTER-ORGANIZATIONAL KNOWLEDGE SATISFACTION QUESTIONNAIRE

Please indicate how frequently you perform each of the following activities by writing your response on the space to the left of each statement.

1 Very seldom 2 Seldom 3 Sometimes 4 Often 5 Very Often

Regarding Socialization process, transferring one's knowledge to others, in my team, we:

1. _____ share experiences with each other
2. _____ communicate by direct conversations
3. _____ come up with new ideas from spending time together and being together
4. _____ gain expertise through practice, observation, and imitation of each other
5. _____ use apprentices and mentors to train new hires
6. _____ brainstorm to expand ideas and options
7. _____ use job rotation to extract knowledge

Regarding Externalization, transforming implicit knowledge (e.g., ideas) to explicit knowledge (e.g. manuals), in my team, we:

8. _____ perform abductive thinking (reasoning by analogy) to transfer knowledge into readable forms
9. _____ use metaphors (e.g., examples, pictures, and images) to capture ideas
10. _____ use analogies and/or metaphors (e.g., examples, pictures, and images) to develop creativity and innovation
11. _____ document experts' knowledge
12. _____ use decision support systems
13. _____ use a problem-solving tool based on a technology like case-based reasoning
14. _____ capture expert knowledge via expert systems or other automated tools (e.g., yellow pages)
15. _____ use chat groups/web-based discussion groups
16. _____ use groupware and other team collaboration tools

Regarding Combination, converting one form of explicit knowledge to another form, in my team, we:

17. _____articulate plans and strategies by using public data
18. _____edit and modify existing documents (i.e. plans and reports)
19. _____ create new materials by gathering existing documentations
20. _____ build presentations to share information
21. _____use repositories of information, best practices, and lessons learned
22. _____use web pages (Intranet and Internet)
23. _____use databases
24. _____use web-based access to data

Regarding internalization, internalizing knowledge into personal knowledge, in my team, we:

25. _____conduct simulation or experiments to embody knowledge
26. _____search for ideas from existing materials
27. _____discuss with each other to deepen our understanding of materials and documents
28. _____learn by doing
29. _____attend on-the-job training
30. _____learn by observation
31. _____hold face-to-face meetings

Please indicate the degree of variety and analyzability of your daily primary responsibilities at your company by writing your response on the space to the left to each statement.

1 Very seldom 2 Seldom 3 Sometimes 4 Often 5 Very Often

Regarding Task Characteristics, I:

1. _____ perform the same task from day-to-day
2. _____ perform routine work
3. _____ believe people in this unit do about the same job in the same way most of the time
4. _____ believe people in my unit perform repetitive activities while doing their jobs
5. _____ perform repetitious duties?

1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree

Regarding Task Characteristics, I:

6. _____ there is a clearly known way to do the major types of work I normally encounter
7. _____ there is a clearly defined body of knowledge of subject matter which can guide me in doing my work
8. _____ there is an understandable sequence of steps that can be followed in doing my work
9. _____ that I can actually rely on established procedures and practices to do my work
10. _____ there is an understandable sequence of steps that can be followed in carrying out my work

Please indicate how frequently you perform each of the following activities by writing your response on the space to the left of each statement.

1 Very seldom 2 Seldom 3 Sometimes 4 Often 5 Very Often

Regarding Knowledge Transfer, transferring knowledge from an individual to another, in my team, we

1. _____ regularly share knowledge and experience with each other.
2. _____ transform our individual knowledge to shared knowledge.
3. _____ regularly talk with each other to share knowledge.
4. _____ learn from each other
5. _____ offer and/or attended training

Regarding Knowledge creation, creating new knowledge, in my team, we:

6. _____ generate new ideas.
7. _____ create innovative processes.
8. _____ launch new products and services.
9. _____ identify improvements to reduce inefficiencies.
10. _____ suggest ways of accomplishing tasks more effectively and efficiently.

APPENDIX C: DS&T - LETTER OF COOPERATION

9901 Business Parkway, Suite R
Lanham, Maryland 20706-1887
Tel: 301-583-3500 • Fax: 301-583-3509
Website: www.dstincorporated.com

October 30, 2008

Terrence Ward
6116 Sea Lion Place
Waldorf, MD 20603

Dear Mr. Ward:

Based on my review of your research proposal, I give permission for you to conduct the study entitled "The Effect of Socialization in Knowledge Management Systems; A Correlational Analysis of Retention and Training" within Data Solutions & Technology Incorporated. As part of this study, I authorize you to invite members of my organization, whose names and contact information will be provided by the Human Capital Management Department, to participate in the study as interview subjects. Their participation will be voluntary and at their own discretion. We reserve the right to withdraw from the study at any time if our circumstances change.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,

Deborah Scott Thomas
President & CEO
Data Solutions & Technology Incorporated

APPENDIX D: RESEARCH INTRODUCTORY LETTER

Subject: Proposal Research

Dear fellow DST Employee,

My name is Terrence L. Ward I am a DST employee working at the Defense Intelligence Agency (DIA). I'm also a Ph.D. candidate working on my degree in Applied Management and Decision Science. I want to thank you at this time for this opportunity to explain my research. The research I want to accomplish focuses on knowledge management and how the knowledge conversion process can be predictive from task characteristics, and knowledge transfer and creation.

I greatly appreciate your willingness to participate in my research and I especially, want to thank Mrs. Scott Thomas for her support in this matter. Her commitment to education has made this research possible.

Please complete the online questionnaire (http://www.surveymonkey.com/s.aspx?sm=i3o4aGu8qEKxMU_2fjNsDwHA_3d_3d) prior to _____. It will take approximately 10-15 minutes of your time and your participation is again critical for success of this study.

Be assured of complete anonymity: no information is intended to identify who you are, and collected data will be used only for academic purposes.

If you have any question pertaining to this survey, feel free to contact the primary researcher, Terrence Ward, at Terrence.Ward@waldenu.edu. You may also contact the supervising faculty member, Professor Walter McCollum, Ph.D., at Walter.McCollum@waldenu.edu.

I thank you in advance for your participation.

Sincerely,

Terrence Ward
Primary Researcher

APPENDIX E: RESEARCH FOLLOW UP LETTER

Subject: Follow up: Proposal Research

Hello again fellow DST Employee,

I wanted to thank everyone again for their willingness to participate in my research study. In order to have a valid survey I need at least 58 respondents. I have extended the response date for my study to _____. This will give everyone ample time to respond.

I truly appreciate your support in this matter and the support of Mrs. Scott Thomas.

Please complete the online questionnaire (http://www.surveymonkey.com/s.aspx?sm=i3o4aGu8qEKxMU_2fjNsDwHA_3d_3d). It will take approximately 10-15 minutes of your time and your participation is again critical for success of this study.

Be assured of complete anonymity: no information is intended to identify who you are, and collected data will be used only for academic purposes.

If you have any question pertaining to this survey, feel free to contact the primary researcher, Terrence Ward, at Terrence.Ward@waldenu.edu. You may also contact the supervising faculty member, Professor Walter McCollum, Ph.D., at Walter.McCollum@waldenu.edu.

Again, thank you in advance for your participation.

Sincerely,

Terrence Ward
Primary Researcher

APPENDIX F: IKUJIRO NONAKA – LETTER OF PERMISSION

Terry Ward (Home)

From: keiko murai [kmurai@ics.hit-u.ac.jp]
Sent: Monday, October 27, 2008 1:33 AM
To: TwardOne@comcast.net; Terrence.Ward@waldenu.edu
Cc: inonaka@ics.hit-u.ac.jp
Subject: Re: [Fwd: Letter of permission - Ikujiro Nonaka]

Dear Terrence Ward,

Thank you very much for your mail and sorry to delay the reply.
This is Keiko Murai of Assistant of Prof.Nonaka.

Itis no problem to use Nokana's article and graphs.

If you have any question,please let me know.

Best regards,
Keiko Murai

Hitotsubashi University ICS さんは書きました:
>
> ----------
> --
>
> Subject:
> Letter of permission - Ikujiro Nonaka
> From:
> "Terry Ward \(Home\)" <twardone@comcast.net>
> Date:
> Sun, 19 Oct 2008 11:58:34 -0400
> To:
> <info@ics.hit-u.ac.jp>
>
> To:
> <info@ics.hit-u.ac.jp>
>
>
> I am a Ph.D. candidate in Applied Management and Decision Sciences
> (AMDS) attending Walden University. I am sending this email to request
> use of past research conducted by Ikujiro Nonaka in my dissertation on
> Knowledge Management. I am requesting permission to use graphs,
> tables, and questionnaires found in the following articles:
>
> · Nonaka, I. & Johansson, J. (1985). Japanese management: What about
> the 'hard' skills. /Academy of Management Review, 10/ (2), pp. 181-191.
>
> · Nonaka, I. (1994). A dynamic theory of organizational knowledge

> creation. /Organization Science, 5/ (1), pp. 14-37.
>
> · Nonaka, I. & Konno, N. (1998). The concept of "ba": building a
> foundation for knowledge creation. /California Management Review, 40/
> (3), pp. 40-54.
>
> I would like to thank you in advance for all of your assistance
> regarding this matter. I am looking forward to hearing from you.
>
> Sincerely,
>
> Terrence Ward
>
> TwardOne@comcast.net <mailto:TwardOne@comcast.net>
>
> Terrence.Ward@waldenu.edu <mailto:Terrence.Ward@waldenu.edu>
>

APPENDIX G: BECERRA-FERNANDEZ AND SABHERWAL – LETTER OF PERMISSION

Terry Ward (Home)

From: Rajiv Sabherwal [sabherwal@umsl.edu]
Sent: Monday, October 29, 2007 12:42 AM
To: Terry (Home) Email
Cc: Irma Becerra-Fernandez
Subject: Re: Letter of Permission

Dear Terry,

Yes, please go ahead and use the questionnaire, and cite us. The following two other papers have also been published from this study:

"The Effectiveness of Alternative Knowledge Integration Processes for Three Types of Specific Knowledge: Some Insights from the NASA-Kennedy Space Center," by R. Sabherwal and I. Becerra-Fernandez, IEEE Transactions on Engineering Management, 52(3), 2005: 301-315.

"An Empirical Study of the Effects of Knowledge Management Tools at Individual, Group, and Organizational Levels," by R. Sabherwal and I. Becerra-Fernandez, Decision Sciences, 34(2), 2003: 225-261.

Best wishes,
Rajiv

On Oct 27, 2007, at 1:24 PM, Terry (Home) Email wrote:

Dear Dr. Becerra-Fernandez & Dr. Sabherwal

I am pursuing a Ph.D. in Applied Management and Decision Science (AMDS) at Walden University. I am sending this email to request your permission to use your past research in my dissertation on Knowledge Management. I would appreciate your permission to use your original questionnaire that you designed for your research study "Organizational Knowledge Management: a Contingency Perspective" published in the Journal of Management Information Systems in 2001. I would also like to publish and modify this questionnaire for use in my dissertation.

I want to thank you in advance for your assistance in this matter

Terrence Ward
twardone@comcast.net

APPENDIX H: SCOTT BRYANT – LETTER OF PERMISSION

Terry Ward (Home)

From: Scott Bryant [bryant@montana.edu]
Sent: Sunday, July 13, 2008 11:26 AM
To: Terry (Home)
Subject: Re: Letter of Permission

Terrence,
That would be great. Just give me appropriate credit in the cites and we're all set. I'd be very interested in your project and what you're up to. Let me know if I can be helpful in any way for you.
Cheers,
Scott

Scott Bryant
Assistant Professor of Management
Executive Director, Center for Entrepreneurship for the New West
320 Reid Hall
Bozeman, MT 59717
PH: 406-994-6191
EM: bryant@montana.edu

Pray as though everything depended on God. Work as though everything depended on you. ~Saint Augustine

On Jul 13, 2008, at 6:02 AM, Terry (Home) wrote:

Dear Dr. Bryant

I am pursuing a Ph.D degree in Applied Management and Decision Science (AMDS) at Walden University. I am sending this email to request your permission to use your past research in my dissertation.

If possible I would like to use your original questionnaire that was published in your research study "The Impact of Peer Mentoring on Organizational Knowledge Creation and Sharing" published in the Group & Organizational Management Journal in 2005. I would also like your permission to modify the questionnaire for my research and publish it in my dissertation.

I want to thank you in advance.

Terrence Ward
twardone@comcast.net

APPENDIX I: MICHAEL WITHEY – LETTER OF PERMISSION

Terry Ward (Home)

From: Withey,Michael [mwithey@mun.ca]
Sent: Sunday, July 13, 2008 8:14 AM
To: Terry (Home)
Subject: RE: Letter of Permission

Hi Terry. You certanly may use my research on knowledge work and the Perrow measure, adapted as you need to, in your research, assuming of course that the material is referenced.

Michael Withey.

Michael Withey, PhD
Faculty of Business Administration
Memorial University of Newfoundland
St. John's NL Canada A1B 3X5
Tel. 709 737 8513
Fax 709 737 7680
mwithey@mun.ca

From: Terry (Home) [mailto:twardone@comcast.net]
Sent: Sun 13/07/2008 9:33 AM
To: Withey,Michael
Cc: 'Terry (Home) Email'
Subject: Letter of Permission

Dear Dr. Withey,

I am a Ph.D. candidate in Applied Management and Decision Sciences (AMDS) attending Walden University. I am sending this email to request use of your past research in my dissertation on Knowledge Management. I would like to request you permission to utilize the questionnaire you designed for your research study "Measures of Perrow's work unit technology: an empirical assessment and a new scale," published in the Academy of Management Journal in 1983. I would also like your permission to modify the questionnaire for use in my study.

I would like to thank you in advance for all of your assistance regarding this matter. I am looking forward to hearing from you.

Sincerely,

Terrence Ward
twardone@comcast.net

APPENDIX J: CURRICULUM VITAE

Terrence L. Ward

EDUCATIONAL EXPERIENCE:

- Ph.D., Applied Management and Decision Science (est. 2008)
- Walden University, Minneapolis, Minnesota
- M.B.A., Technology Management (2003)
- University of Phoenix, Metairie, Louisiana
- B.S., Computer Networking (2000)
- University of Maryland University College, College Park, Maryland
- A.A.S., Information Systems Technology (2002)
- Community College of the Air Force, Montgomery, Alabama
- A.S., Information Systems Technology (1995)
- Butler County Community College, El Dorado, Kansas

PROFESSIONAL EXPERIENCE:

February 2008 to Present: Data Solutions & Technology (DS&T), Lanham, MD
IT Specialist (contracted to the Defense Intelligence Agency)

- Web developer.
- Utilize Microsoft Visio to develop Use Cases for intelligence systems as specified by the contract.
- Serve as assistant Project Manager for intelligence systems specified in the contract.
- Participated in coordinating and monitoring the overall current DoD intelligence production effort in assigned area of responsibility.
- Personally served as the action officer for the planning, preparation, coordination, and publication of web based intelligence assessments.

August 2007 to February 2008: Defense Intelligence Agency (DIA), Washington, DC
Intelligence Analyst, Threat Analyst Division (CCO-5)

- Performed all-source analyst of full-spectrum Information Computer Network Operations (CNO).
- Performed analytical functions related to CNO threat actors at the transnational, national, or sub-national level.

- Researched, reviewed, interpreted, evaluated, and integrated all-source data in order to produce all-source intelligence assessment articles, papers and studies for DoD or other intelligence consumers.
- Identified significant intelligence trends within CNO and proposed new or revised analytical efforts to alert policy makers to developments and to meet customer requirements.
- Participated in coordinating and monitoring the overall current DoD intelligence production effort in assigned area of responsibility.
- Personally served as the action officer for the planning, preparation, coordination, and publication of intelligence assessments with short suspense and high level attention.

June 2007 to August 2007: Trend Western Technical Corporation, Andrews AFB, MD
Computer Operator IV, Lead

- Supervised, trained and evaluated performance of six team members.
- Directed operations and support of Unisys-based supply systems.
- Provided training on system use and troubleshooting.
- Delivered daily updates to senior management on information system status.
- Coordinated interfaces between internal supply systems and outside organizations.
- Analyzed root source and determined/implemented solutions to system issues.
- Worked with system engineers to resolve problems related to switch, router, and firewalls in efforts to enhance system performance.
- Designed and coordinated distribution of daily, monthly and quarterly reports.
- Conducted regular database-integrity assessments and performed database recoveries.
- Created data retrieval requests for report generators and structure query language programs.
- Provided on-call support during off duty hours on weekdays, weekend and holidays; extended after-hour support as needed.
- Served as Security Manager, with accountability for maintenance and updating of user-id security file supporting 215 employees on Andrews AFB and 3 Defense Financial Centers.
- Installed, troubleshoot and managed DoD Public Key Infrastructure Common Access Card readers and middleware for maximum access control and authentication on 75 client workstations.

October 2006 to June 2007: Children's Hospital, Inc., Columbus, OH
Systems Analysis, Behavioral Health

- Utilized Crystal Reports, MS Word, Excel, and PowerPoint to create graphs, charts, ad hoc reports and listings for the Behavioral Health department.
- Administered, maintained, developed and implemented policies and procedures for ensuring the security and integrity of departmental databases as they are created.
- Resolved database performance issues, database capacity issues, replication, and other distributed data issues.
- Oversaw the installation of PC's and application software.
- Assisted the Database Manager (DBM) with implementation of new database systems utilizing Microsoft Access.
- Met with the Financial and Billing Manager's to implement and develop various financial reports.
- Developed user requirements while interviewing Psychologists and Counselors to develop analytical reports that depict productivity and patient demographic data.

<u>December 1986 to July 2006: U.S. Air Force, United States of America</u>
Supply Systems Analysis

- Progressed through multiple levels of technical and management accountability in the oversight of logistics processes and sophisticated computerized supply systems.
- Plan, assign, direct, review and evaluate performance of computer operations members, monitoring the overall functioning of the operations area, managing supplies, and training subordinate specialists.
- Provide computer support 24/7 to all logistics organizations in the state of Louisiana.
- Direct operation and support of Unisys-based supply systems.
- Perform system and application upgrades.
- Apply security patches on server/workstations.
- Review completion and implementation of system additions and/or enhancements, and recommend corrections in technical application and analysis to management.
- Detailed oriented: reviewed new system software documentation; coordinated changes; evaluated impact; assessed performance and effectiveness.
- Inventory hardware and software installed on servers and workstations.
- Troubleshoot and resolve hardware and software problems associated with the server, workstations, Unisys Standard Base Supply System database and/or applications.
- Developed, implemented and debugged several Unisys mainframe programs including local retrieval programs using Query Language Processor.
- Devised installation and configuration of 200 workstations including all network components and peripherals.

- Reviewed database integrity checks and made necessary corrections.
- Performed Helpdesk functions to repair, configure and troubleshoot all IT equipment within the squadron.
- Developed and wrote three Visual Basic .Net software programs to enhance the performance of the squadron.