The Impact Of Telework On Knowledge Creation And Management

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ABSTRACT:

This paper examines the dynamics of knowledge management in a virtual environment. It focuses on both, the ways telework alters knowledge creation and, the performance implications of this alteration. One of the main unintended consequences of telework is that it changes the dynamics of knowledge creation and knowledge sharing. Telework may hinder the creation of tacit knowledge as it eliminates the face-to-face communication and interactions that are found in a typical office setting. Members of an organization working in a telework environment spend most of their time creating and sharing explicit rather than tacit knowledge. This shift in the creation of knowledge has long-term implications on organizational performance and effectiveness. According to this study, there is evidence, albeit not conclusive, that virtual work arrangements contribute to the reduction of an organization's effectiveness, mainly through a reduction in the creation of tacit knowledge. There is a growing number of managers who realize that telework should be approached not as a narrow-scope innovation but as an initiative that impacts all aspects of an organization, including knowledge management.

Keywords: *Telework, Knowledge creation, Tacit knowledge, Virtual work arrangements*

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1. Introduction

Telework is a broad term that refers to substituting telecommunications for any form of work-related travel, thereby eliminating distance restrictions and problems associated with traditional commuting practices (Nilles, 1998; Watad & Will, 2003; Hunton & Norman, 2010). Technologies have dramatically changed the way employees access and share information and, ultimately, work. With the implementation of intranets and client-server networks over the last decade, the sharing of resources within an organization has become an almost-effortless endeavor. The rise of cloud computing technology and Wi-Fi availability has enabled access to remote servers via a combination of portable hardware and software. Teleworkers are linked to their corporate offices using groupware, virtual private networks, and similar technologies to collaborate and interact with co-workers.

The implementation of telework arrangements has an enormous impact on the whole organization and, consequently, demands adjustments in most organizational processes and policies. New skills must be developed throughout the entire organization in a very

short time, and significant capital expenditures are usually required to update the company's IT infrastructure (Watad & DiSanzo, 2000). Such implementations require a full understanding of all areas being impacted. Additionally, a host of factors must be considered when developing an IT infrastructure that supports telework arrangements. Setting up security and virtual networks increases the responsibilities and workload of the IT department. Telework projects that are not properly planned for may fail because the appropriate technology is not deployed.

In the last decade, a good number of companies have instituted telework programs and a substantial portion of the workforce is conducting its work away from the traditional office setting, without direct supervision. According to the 2006 Fortune Magazine's report of "Best Companies to Work for", 79 of the 100 top-ranked companies allow their employees to telecommute at least 20% of their time. By comparison, only 18 companies in the magazine's 1999 survey allowed employees to telecommute. Based on the figures included in the "Telework trendlines for 2006" report, about 15 million people in the US telework full time and more than 22 million telework at least once a week (Worldatwork, 2006). Companies opt for part time telework arrangements to reduce teleworkers' social isolation and to provide them access to advancement opportunities within the organization (Watad & Will, 2003)

Telework, as well as mobile and virtual work arrangements, alter organizational communication patterns, performance management, corporate culture, and the work itself. In addition to affording productivity gains, these work arrangements enable organizations to form strategic alliances through projects completed by distributed teams in global settings. However, there is a lack of reports on how it impacts the creation of knowledge and organizational effectiveness, as measured by enhancements in a firm's decision-making capabilities. This paucity of reports is particularly relevant when referring to the long term impacts of telework. This study focuses on the challenges that arise when managing virtual work environments, specifically on the challenge of creating and managing knowledge. It defines knowledge management (KM) as the practice of collecting, organizing, sharing and analyzing information to support the effective attainment of an organization's objectives.

A review of the literature revealed that the issue of knowledge creation and management in telework environment has not been explored systematically, although some authors have treated it theoretically (Raghuram, 1996). Moreover, the dynamics of KM in mobile and virtual environments, as well as its impact on organizational performance are not well understood (Griffith, 2003; Corso 2006; Wang & Haggerty 2009). A more in–depth study of the relationship between KM and telework is needed in order to examine patterns and trends in the ways knowledge is created and managed in these work arrangements. This study aims at improving our understanding in this important area. It also purports to highlight the interdependence between telework, knowledge management, and organizational performance (i.e., effectiveness). The results of this study will hopefully help organizations enhance their decision-making capabilities, specifically when both introducing telework programs, and investing in new IT tools to support the various virtual work arrangements.

2. Research Framework

The following questions frame this research project: (i) What factors need be considered when introducing telework, in order to prevent a reduction in the creation of knowledge? (ii) How should organizations manage the creation of knowledge, both tacit and explicit, in telework arrangements, so that they can enhance decision-making capabilities and, consequently, organizational performance? The principal method for collecting data consisted of interviews with thirty four managers working in virtual environments. The interview consisted of about twenty questions. Almost half of the questions were open-ended. Subjects were asked to describe (i) their efforts in creating or managing tacit knowledge offsite; (ii) how tacit knowledge was being captured in their firms; and, (iii) their experiences in managing employees in virtual environments. The fact that the key questions were open-ended ensured a "natural setting" of data collection which allowed managers to freely report on their practices. Other questions were structured, to yield specific information on tools they used for collaboration, content management, and communication.

The managers interviewed were from firms in the New York-New Jersey metropolitan area. The organizations and industries were varied: IT, finance, services, and pharmaceutical. The managers chosen had extensive experience involving the supervision of virtual work environments. Since the principles and strategies of effective IT/IS-based practices evolve from the experiences of practicing managers, these interviews were deemed paramount. There is some controversy in the literature regarding the usefulness of applying perceptual rather than objective measures. However, the perceptions of an organization's members are important in that, often, perceived elements are used in decision-making (Duncan, 1972). Most researchers and practitioners studying the impacts of IT on organizations apply self-assessment approaches wherein respondents themselves evaluate those impacts. Content analysis, a data-reduction process, is used to analyze the data (Krippendorff, 1980). Advantages of using content analysis include the ability to apply both qualitative and quantitative operations on texts, and the analyst's inability to manipulate the source of the data. Therefore, content analysis is considered to yield unobtrusive measures (Webb et al, 1966).

3. Knowledge Management And Performance

The purpose of KM is to add value to information already held by the organization, and to leverage human expertise, thus enhancing performance. Achieving and maintaining a competitive advantage involves not only using financial and physical capital, but also intellectual capital (Asprey & Middleton, 2003). Organizations are expected to manage their knowledge based on well-designed strategies (Paul, 2006; Thomas, 2007). Their ability to be effective is measured by their ability to make better choices. Better choices can be made if decision-makers are both knowledgeable and properly informed. Ultimately, KM efforts should aim at enhancing the decision-making capabilities of the organization. The creation of knowledge occurs through the development of skills, concepts, products, model bases, new processes, and the streamlining of procedures and standards (Nonaka, 1994). Organizational commitment to learning (Garvin, 1993; Ackoff, 1996) will facilitate the continuous cycle of knowledge creation.

Organizations need to manage two types of knowledge: explicit (EK), and tacit knowledge (TK). EK or static knowledge can be documented or stored in a database. TK is knowledge held by human beings (i.e., floating knowledge), and is based on experiences, emotions and interactions. Although TK is the underlying element or factor making EK possible, EK is more easily managed than TK. Managing TK entails nurturing and properly managing the people who possess this knowledge Davonport, 2005). It is through the interaction between people and their environment that knowledge is created.

It is beneficial for organizations to have content-management policies and procedures that facilitate both managing these two types of knowledge, and storing them into a knowledge repository or warehouse. Over time, these repositories are expected to grow to become a substantive source of relevant data and expertise. Both EK and TK are necessary in the creation of knowledge. Knowledge is created through a dynamic interaction between tacit and explicit knowledge, rather than from either one alone (Nonaka & Konno, 1998). As such, the creation of knowledge is non-linear; it is interactive and iterative. When explicit information is accessed and acted upon, it turns itself into tacit knowledge. When that tacit knowledge is captured and stored in such a way that others can access it, it becomes explicit knowledge, ready to be used by others. It is a continuous cycle that results in a growing spiral flow of knowledge (Alavi & Leidner, 2001).

There are three critical factors that impact the creation and management of knowledge in organizations. The first factor is related to the growing pressure to find ways to improve both decision-making process and the accuracy of decisions. This factor requires improving the communication and collaboration infrastructure of the organization. In today's global markets, many organizations disperse employees and talents throughout multiple regions. This practice makes almost impossible for firms to have all the required expertise and knowledge in one single location. When organizations form strategic alliances, the needed knowledge may reside outside of the organizational boundaries. In these instances, virtual, networked teams and virtual work arrangements become a necessity. Moreover, one or more individuals facing a complex problem may have neither enough nor the relevant knowledge to make good decisions. Under such circumstances, teams are formed and members expected to share their knowledge without any reservations, often in virtual settings. To facilitate this process, organizations resort to the development of web-based, collaborative decision support systems, combined with, or on top of a KM platform (Becerra, 2006).

The second factor affecting both the creation and management of knowledge deals with complexity issues. IT and KM tools are changing rapidly and their capabilities are diverse and advanced, thus providing multiple choices and strategies for building an organization's knowledge infrastructure. However, this fast-paced stream of innovations in IT tools tends to be complex and daunting, and creates difficulties for managers, IT personnel, and users to stay current. Users are not comfortable with frequent changes in their systems, user interfaces, and workflows. Considering that the organizational context of IT applications is also becoming very complex (Watad & Ospina, 1996), it is easy to understand why decision makers experience additional pressure when

pursuing novel IT-based strategies and business models. The speed of innovations in IT leaves them frequently exposed to vendor's manipulations and sales pitches.

The last factor relates to an organizational inclination to adopt virtual work arrangements as a business strategy. In doing so, firms change the traditional way works are completed and, consequently, they affect the balance needed in the creation of both TK and EK. In general, virtual work arrangements such as telework are considered to be more conducive to the creation and management of explicit, rather than of tacit knowledge. One reason might be that most of the existing IT applications and IT-enabled business solutions, such as enterprise resources planning (ERP), supply chain management (SCM), KM Systems, and groupware technologies are designed to support the management of explicit knowledge. Consequently, these systems do not necessarily capture tacit knowledge.

Due to the lack of economies of scale, vendors tend to shy away from developing tacit knowledge management tools. Although TK-specific tools are context related and commonly developed in-house, by members of the organization, most organizations don't have the resources or the commitment to do so. Investing in IT tools that solely support the creation of explicit knowledge may negatively impact the overall performance of the organization in the long term, as the creation of TK, an important condition for performance, is neglected.

4. Telework And Knowledge Management

Knowledge is created through the synthesis of thinking and actions of individuals who interact with one other, usually within the boundaries of an organization. These interactions also become enablers for the sharing of knowledge.

According to Nonaka & Konno (1998), organizations can create knowledge dynamically by incorporating a number of processes, as explained in their SECI Model. The model presents four types of knowledge-creation processes, namely: s*ocialization, externalization, combination, and Internalization.* *Socialization* is a type of "tacit to tacit" creation process, a means of sharing knowledge directly. *Externalization* deals with a "tacit to explicit" creation process, and occurs when individuals share their codified knowledge with others in the organization. *Combination* is an "explicit to explicit" creation process, which occurs when various types of explicit knowledge are combined. *Internalization* is the "explicit to tacit" creation process. It involves a "learning by doing" approach, in which the explicit knowledge is internalized in an employee's mind as tacit knowledge and is represented by mental models. When practiced, it broadens the learning spiral of knowledge creation (for more details, see also Nonaka, 1991; Nonaka & Takeuchi, 1995).

Socialization plays a critical part in the process of knowledge creation. Telework arrangements remove or reduce an employee's ability to experience the corporate culture, as they do not participate actively in socializing activities. A close relationship between the employees and their managers no longer exists under these work arrangements. In a telework environment, most of the communication between employees is virtual and relies on IT tools, such as email and online chatting, rather

than on personal contacts. Physical contact is eliminated, when not kept at a minimum level. Knowledge may not be produced as the information being read is just accepted and not acted upon. Physical separation makes sharing of tacit knowledge difficult (Leonard & Sensiper, 1998).

For an employee to incorporate new knowledge, social bonding must occur. Learning to do a job is largely achieved by means of interacting with others, watching body-language, and discussing issues with fellow co-workers. As Hislop (2005) states, project teams create and develop specialized knowledge during the process of completing their work. When knowledge is shared with others, the firm benefits from the competitive advantage this specialized knowledge creates. If tacit knowledge is captured, it can be stored as explicit knowledge in a repository. Then, it can both be increased over time, and lead to establishing a knowledge conversion cycle, which is as important as the process itself of creating knowledge.

Telework may create a barrier to accessing organizational knowledge. To overcome this barrier, employees who telework should incorporate knowledge management activities into their daily work routine. When employees face questions or problems, they should seek out knowledge by finding and using existing knowledge rather than reinventing the wheel; by sharing their knowledge with others; and, by learning from other employees' experiences. However, for employee's behavior to change in a sustained way there needs to be an organizational culture conducive to the creation and sharing of knowledge (Bennett, 2009).

Organizations can tap into tacit knowledge by encouraging knowledge sharing in the virtual work environment, and by supporting this through the deployment of IT enablers (e.g., groupware, email, video conferencing and bulletin boards). Managers need to provide incentives for tacit knowledge sharing, such as rewarding employees who share their ideas with their co-workers. They also need to facilitate the process and make possible to store the knowledge created by groups. This can be done through the creation of daily summaries, updates, and by the categorization, and the distribution of knowledge to the entire organization. Organization with ~~a~~ knowledge management strategies that foster strong interactions among all units will experience a positive, constant, and logical flow between all the different stages of knowledge conversion.

5. Findings And Analysis

Managers participating in this study were asked to assess the impacts of telework on knowledge creation and management. All mangers asserted that telework had no impact on the *internalization* dimension of knowledge creation. Since socialization is not important for the process of *internalization,* both teleworkers and non-teleworkers have similar experiences. After attaining explicit knowledge through, for example, formal training programs or summary reports, an employee can experiment with this new knowledge in actual settings, and then convert this EK into TK.

Managers also reported that telework arrangements had a negative impact on the *socialization* dimension of knowledge creation. Teleworkers have very limited

opportunities to be around their co-workers and their work community. As a consequence, tacit knowledge creation is hampered. In an office environment, converting TK to TK takes place through observation, imitation, and practice. An organization's culture and polices (e.g., encouraging and promoting socialization) can facilitate this flow of conversion. By means of promoting constant interactions and exchanges of ideas among users of information, a company can create an effective knowledge life cycle. This process becomes difficult for teleworkers as they lack socialization opportunities with other members of the organizations. The problem compounds when, as some managers indicated, the lack of socialization leads to reduced levels of trust in teleworkers' tacit knowledge.

To lessen the negative impacts, managers stressed the importance of having a facilitator trained to recognize problems, and help teleworkers develop effective interaction patterns. As such, the most important task of a telework facilitator is to continuously monitor actions amongst teleworkers and, when necessary, take steps to correct behavior, sometimes through the use of soft skills, such as persuasion, and the changing of interaction procedures. Formal orientation is extremely necessary at the beginning of a telework arrangement, especially when the endeavor includes members from various units or organizations.

In regards to the *combination* and *externalization* dimensions of knowledge creation, managers reported positive impacts. Teleworkers have an advantage over workers in traditional office environments as both processes rely heavily on IT tools, which teleworkers use constantly. For the c*ombination factor,* that is, the transformation of EK into EK, organizations rely on advanced IT applications and data mining tools. *Externalization*, or the conversion of TK into EK occurs through the use of models, metaphors, and analogies, a process that facilitates the dissemination of knowledge from individuals to the entire organization. By getting employees to document their TK, organizations are able to share it effectively with the rest of the employees. The process continuously moves between tacit and explicit and escalates from the individual level to the group level and, finally, to the organizational level (Alavi & Leidner, 2001). Organizational learning can occur if an employee's tacit knowledge becomes available to the rest of the organization in an explicit fashion. However, this conversion is extremely difficult if employees do not have the resources and IT tools to help them in the conversion process, specifically, tools that have the capability of discovering new patterns and associations. Such discoveries give teleworkers an advantage in performing their work.

Managers reported they have used a range of IT applications to support virtual work arrangements. These include Sharepoint™, Lotus Notes™, Groove™, and a variety of calendaring and intelligent searching tools. Instant messaging, discussion threads, and telephone conferences have also been used. The functions of these tools overlap and commonly cover a wide range of features, such as workflow management, collaborative space, discovery, search, messaging, knowledge organization, access, etc. Managers stressed that information and communication technology (ICT) tools, such as email, groupware, web portal, must be user friendly and have an intuitive interface to be useful.

Managers stressed that it is important that teleworkers feel comfortable with the use of IT tools. Teleworkers should be trained to reach an adequate level of mastery of IT tools. This will minimize stress, improve morale and, most importantly, lead to timely knowledge exchanges and collaboration among employees. Data-mining, knowledge systems, collaborative and web tools allow users to access and manipulate data in a visually compelling format. Advanced technologies, such as search engines, mining and discovery tools are still evolving. However, to be useful to users, they must be context-specific (Majchrzak, 2005). Indeed, managers interviewed in this study observed that when teleworkers have high level of IT skills they were able to customize some of these tools to fit the context of their work environment.

An important finding of this study relates to the fact that the interface between users and the knowledge or collaborative platform needs to be intuitive, seamless, and context-based. Managers complained that their organizations often did not pay attention to the user interface but focused instead more on the system as being a part of the business process. However, organizations and IT vendors are slowly acknowledging the importance of this interface issue. As a matter of fact, new tools such as XML (eXtensible Markup Language) allow the creation and manipulation of content in context. User understanding improves when content is organized base on the relevant context, and documents are managed accordingly. This understanding also allows instant access to themes within a document, and helps users filter the relevant documents needed to meet their objectives quickly. Only 15% of those managers interviewed reported that by using such tools they did not experience any loss in tacit knowledge creation. About 65% indicated they had such tools but did not take advantage of them. The rest did not use such tools. The authors of a study of IS projects in virtual environments (Thomas et al, 2007), argue that even though most knowledge workers spend large amounts of time working virtually by using ICT tools, they do not seem to be taking advantage of the benefits afforded by these tools.

To be effective, an organization can either decrease the time spent making specific decisions or increase the quality of the analysis performed in a fixed time period. Almost 80% of the managers interviewed said that the tools they used were useful for routine decision-making and simple problem-solving. However, when faced with more complex problems, they indicated that teleworkers took more time to formulate the problem and find an appropriate solution compared to their office-based counterparts, who had direct access to human experts.

6. Conclusions

According to the findings of the study, it is recommendable that, in order to minimize losses in knowledge creation, organizations focus on locating, formulating and articulating employee task-centered problems. That said, for telework and virtual work arrangements to be successful, the issue of problem-solving capabilities of the organization has to be addressed from the employees' points of view. In addition to the tools mentioned above, there is a need to build user context-based knowledge support tools, or personal knowledge support interface (PKSI) tools. PKSI will help the user formulate and better understand problems, and locate the resources needed for enhanced comprehension. In developing PKSI, a precise picture of what employees do

must be mapped through the development of models that capture their work. Then, these models should be automated with the aim of getting the work done with minimal cost and time.

If an IT-based intervention such as telework or mobile work arrangements is to be effective (i.e., enhance decision-making capabilities of the organization), it has to be guided by the following goals: (a) reduce the time needed to formulate the problem, and find the needed resources in a timely fashion, (b) reduce the time gap from the moment outputs are produced with the KM-based discovery process to the moment when the user reaches a decision, and (c) close the time gap that lapses between making decisions and fully executing them and assessing their implications.

Ultimately, organizations need to build intelligent IT platforms that connect knowledge sources and assets (i.e., records, documents and people) to effectively support their teleworkers. In addition to the basic functions of creating, capturing, organizing, and distributing knowledge assets, such platforms should provide tools to:

- speed-up the process of finding information teleworkers need to accomplish their tasks
- help employees/teleworkers get the essence of the underlying data from the sources they have access to
- help employees/teleworkers understand and formulate solutions to problems in a timely fashion
- ensure that newly created decisions and solutions are accessible to all parts of the organization

One issue became evident and clear from the interviews, organizations have responded differently to competitive pressures and technological innovations. As such, they have attempted to improve performance through the development of different ways of organizing *virtual* work settings, as well as managing their human and knowledge resources. Therefore, practitioners shouldn't expect precise guidelines to help them in advancing an optimal IT infrastructure to support managing knowledge in a virtual environment. However, the starting point must be one of assessing the skills of employees and their readiness to cope with change.

7. Summary

This paper addresses the relationship between telework and knowledge management. Telework may compromise knowledge management because the creation of knowledge may not be as effective as it is in traditional office settings and, therefore, can impact organizational performance and effectiveness. There is evidence, albeit not conclusive, that virtual work arrangements contribute to the reduction of an organization’s effectiveness, mainly in the area of tacit knowledge creation and, consequently, hinder an organization’s ability to improve its decision-making capabilities.

The first line of defense in preventing the negative consequences of telework is for the organization to become aware of this problem and, then, implement some of the remedies outlined in this study, such as investing in appropriate collaborative and context-based KM technology that will enable the creation and sharing of both EK and TK. Ultimately, organizations need to rethink their long term operations and structural arrangements and design new organizational processes and jobs that take into consideration the reality that entails both the removal of work spatial barriers and a new division-of-labor between humans and machines.

There is growing number of managers who realize that telework should be approached not as a narrow-scope innovation but as an initiative that impacts all aspects of an organization including knowledge creation and management. Enhancing organizational capabilities to create and acquire new knowledge in virtual work environments is not a passive activity. It is an active process that should be closely integrated with the organization's business strategy and supported by the daily operational activities.

8. References

Ackoff, R. (1996). On Learning and the Systems that Facilitate it. *Center for Quality of Management Journal,* Vol. 5(2), pp. 27-35.

Alavi, M. & Leidner, D. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *Knowledge Management: Critical Perspectives on Business and Management*, Vol. III (44), pp. 163-202.

Asprey, L. & Middleton, M. (2003). *Integrative Document and Content Management: Strategies for Exploiting Enterprise Knowledge*. Hershey, PA: Idea Group Publishing.

Becerra-Fernandez, I., Del Alto, M., & Stewart, H. (2006). A Case Study of Web-Based Collaborative Decision Support at NASA. *International Journal of e-Collaboration,* Vol. 2(3), pp. 50-64.

Bennett, E. (2009). Virtual HRD: The Intersection of Knowledge Management, Culture, and Intranets. *Advances in Developing Human Resources,* Vol. 11(3), pp. 362

Corso, M. (2006). What Knowledge Management for Mobile Workers. *Knowledge & Process Management,* Vol. 13(3), pp. 206-217.

Davenport, R. (2005). Why does Knowledge Management Still Matters? *Training & Development*, February Issue.

Duncan, R.B. (1972). Characteristics of Organizational Environments and Perceived Environmental Uncertainty. *Administrative Science Quarterly*, Vol. 17: pp. 313-327.

Garvin, D. (1993). Building a Learning Organizations. *Harvard Business Review,* Vol. 71(4), pp. 78-91.

Griffith, T., Sawyer, J., & Neale, M. (2003). Virtualness and Knowledge in Teams: Managing the Love Triangle of Organizations, Individuals, and Information Technology. *MIS Quarterly,* Vol. 27(2), pp. 265-287.

Hislop, D. (2005). *Knowledge Management in Organizations: A Critical Introduction*. New York: Oxford University Press.

Hunton, J. E. & Norman, C. S. (2010). The Impact of Alternative Telework Arrangements on Organizational Commitment: Insights from a Longitudinal Field Experiment. *Journal of Information Systems,* Vol. 24(1), pp. 67.

Krippendorff, K. (1980). *Content analysis: An Introduction to its Methodology*. Beverly Hills, CA: Sage.

Leonard, D. & Sensiper, S. (1998). The Role of Tacit Knowledge in Group Innovation. *Knowledge Management: Critical Perspectives on Business and Management*, Vol. II (25), pp. 195-215.

Majchrzak, A., Malhotra, A., & John, R. (2005). Perceived Individual Collaboration Know-How Development Through IT-Enabled Contextualization: Evidence from Distributed Teams. *Information Systems Research,* Vol. 16(1), pp. 9-27.

Nilles, J.M. (1998). *Managing Telework: Strategies for Managing the Virtual Workforce*. New York: John Wiley & Sons.

Nonaka, I. & Konno, N. (1998). The Concept of "Ba': Building Foundation for Knowledge Creation. *California Management Review,* Vol. 40(3), pp. 40-54

Nonaka, I. & Takeuchi, H. (1995). *The Knowledge-Creating Company.* New York: Oxford University Press.

Nonaka, I (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organizational Science,* Vol. 5(1), pp. 14-37.

Nonaka, I (1991). The Knowledge Creating Company. *Harvard Business Review*, November-December, pp. 96-104.

Paul, D. (2006). Collaborative Activities in Virtual Settings: A Knowledge Management Perspective of Telemedicine. *International Journal of Management Information Systems,* Vol. 22(4), pp. 143-176.

Raghuram, S. (1996). Knowledge Creation in the Telework Environment. *International Journal of Technology Management,* Vol. 11(7/8), pp. 859-870.

Thomas, D., Bostrom, R., & Gouge, M. (2007). Making Knowledge Work in Virtual Teams. *Communications of the ACM*, Vol. 50(11), pp. 85-90.

Watad, M. & Will, P. (2003). Telecommuting and Organizational Change: A Middle Managers' Perspective. *Business Process Management Journal*, Vol. 9(4), pp. 459-472

Watad, M. & DiSanzo, F. (2000). The Synergism of Telecommuting and Office Automation. *Sloan Management Review,* Winter, Vol. 41(2), pp. 85-95.

Watad M. & Ospina S. (1996). Information Technology and Organizational Change: The role of Context in Moderating Change Enabled by Technology. in *Diffusion and Adoption of Information Technology*. Edited by Kautz K. and Pries-Heje J. London, UK: Chapman & Hall.

Wang, Y. & Haggerty, N. (2009). Knowledge Transfer in Virtual Settings: the Role of Individual Virtual Competency. *Information Systems Journal,* Vol. 19(6), pp. 571

Webb, E.J., Campbell, D.T., Schwartz, R.D., & Sechrist, L. (1966). *Unobtrusive Measures: Nonreactive Research in the Social Sciences*. Chicago: Rand McNally.

WorldatWork. (2007). Telework Trendlines for 2006. *http://www.worldatwork.org/waw/adimLink?id=17182&nonav=yes.* February, 2007.

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