

24 Page Preview

**PUBLICATION
NUMBER** AAT 3207614

TITLE Knowledge management and characteristics

AUTHOR Anothayanon, Worapa

DEGREE PhD

SCHOOL WALDEN UNIVERSITY

DATE 2006

Walden University

SCHOOL OF MANAGEMENT

This is to certify that the doctoral dissertation by

Worapa Anothayanon

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee

Dr. Lee Lee, Committee Chairperson,
Applied Management and Decision Sciences Faculty

Dr. Raghu Korrapati, Committee Member,
Applied Management and Decision Sciences Faculty

Dr. Mark Gordon, Committee Member,
Applied Management and Decision Sciences Faculty

President and Provost

Paula E. Peinovich, Ph.D.

Walden University
2006

UMI Number: 3207614

Copyright 2006 by
Anothayanon, Worapa

All rights reserved.

UMI[®]

UMI Microform 3207614

Copyright 2006 by ProQuest Information and Learning Company.
All rights reserved. This microform edition is protected against
unauthorized copying under Title 17, United States Code.

ProQuest Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

ABSTRACT

KNOWLEDGE MANAGEMENT AND TASK CHARACTERISTICS

by

Worapa Anothayanon

M.B.A, Colorado Technical University, 2002
M.S., Iowa State University, 1998
B.Eng., Kasetsart University, 1994

Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy
Applied Management and Decision Science

Walden University
May 2006

ABSTRACT

This study investigates knowledge transfer types that are most frequently adopted by employees who have different tasks in an organization. As the context of contemporary organizations becomes extremely complicated, effective management of knowledge becomes critical in gaining and sustaining competitiveness. The importance of effectively transferring knowledge can help organizations gain knowledge capital, productivity, and performance. It is proposed that the four knowledge transfer types are effectively adopted by four different task situations: i.e., socialization by craft, externalization by nonroutine, combination by engineering, and internalization by routine.

The research was conducted at a local university using Quantitative Methodology along with a survey instrument. Data were collected from 157 college alumni, who represented various types of task situations. Results of the data analyses confirmed that the proposed knowledge transfer types were matched with the anticipated task situations with the exception of the nonroutine group. The findings also revealed that the socialization and internalization types significantly contributed to knowledge transfer and only the socialization type positively contribute to knowledge creation. Further research is needed to advance the area of the nonroutine task situation and to intensively investigate in an organization. For a crucial positive social impact, knowledge gained from this study will help organizations in planning effective knowledge transfer, which will result in gaining organizational knowledge wealth, increasing revenues, decreasing

budgets, improving human resources, and transforming organizations into knowledge-generation enterprises.

KNOWLEDGE MANAGEMENT AND CHARACTERISTICS

by

Worapa Anothayanon

M.B.A, Colorado Technical University, 2002
M.S., Iowa State University, 1998
B.Eng., Kasetsart University, 1994

Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy
Applied Management and Decision Science

Walden University
May 2006

DEDICATION

This work is dedicated to my parents, Thavorn and Chanprapa Anothayanon, and my grandparents.

ACKNOWLEDGMENTS

I would like to take this opportunity to express my sincere appreciation to a number of people who provided help, guidance, and support during my study.

First and foremost I would like to offer my deepest thanks to my major advisor, Professor Lee W. Lee, for his patience, guidance, encouragement, and support during my years of study. His generous advice and encouragement sustained me through some difficult times in this journey. I am very grateful for his willingness to read numerous drafts and countless email messages.

I would like to thank Dr. Raghu Korrapati and Dr. Mark Gordon for serving on my dissertation committee. Their expert comments have broadened my understanding in knowledge management and greatly contributed to my dissertation research.

In addition, I have many debts of gratitude to acknowledge to my dear parents, Thavorn and Chanprapa Anothayanon, and grandparents for giving me life, love, light, and everything that I have in my life. Last, but not least, I thank all my teachers, for teaching and guiding me; and my special friends, Muna Ashraf, for carefully proofreading my dissertation, and Kulwara Meksawan for being my role model.

TABLE OF CONTENTS

| | |
|---|-----|
| LIST OF TABLES | vi |
| LIST OF FIGURES | vii |
| CHAPTER 1: INTRODUCTION TO THIS STUDY | 1 |
| Statement of the Problem..... | 5 |
| Background of the Problem | 6 |
| Purpose of the Study | 10 |
| Theoretical or Conceptual Support for the Study | 11 |
| Organizational Technology..... | 11 |
| Knowledge Conversion..... | 13 |
| Assumptions..... | 14 |
| Scope and Delimitations | 16 |
| Limitations | 17 |
| Research Design..... | 18 |
| Hypotheses or Research Questions..... | 18 |
| Significance of the Study..... | 21 |
| Definitions of Terms | 25 |
| Summary and Conclusion | 26 |
| CHAPTER 2: LITERATURE REVIEW | 28 |
| Theoretical Background..... | 30 |
| Knowledge Management | 30 |
| Data, Information, and Knowledge..... | 30 |
| Types of Knowledge..... | 33 |
| Knowledge Conversion..... | 35 |
| Synthesis of Previous Studies | 36 |
| Knowledge Transfer and Creation | 43 |
| Organizational Technology..... | 46 |
| Technology Dimensions | 47 |
| Synthesis of Previous Studies | 49 |
| Types of Organizational Technology..... | 52 |
| Summary and Conclusion | 57 |
| CHAPTER 3: RESEARCH METHODOLOGY | 60 |
| Description of the Research Design..... | 60 |
| Target Population..... | 61 |
| Sample and Sampling Procedure | 62 |
| Instrumentation | 64 |
| Knowledge Conversion Process | 64 |

| | |
|---|-----|
| Operational Definitions of the Knowledge Conversion Process | |
| Construct..... | 65 |
| Task Characteristics..... | 70 |
| Knowledge Transfer and Creation..... | 72 |
| Data Collection Procedures..... | 73 |
| Conflict of Interest and Participants Rights Protection..... | 75 |
| Validity and Reliability..... | 76 |
| Data Analysis..... | 76 |
| Summary and Conclusion..... | 77 |
| CHAPTER 4: RESULTS..... | 79 |
| Description of the Sample..... | 79 |
| Reliability and Validity of the Measures..... | 82 |
| Data Analyses and Findings for the Research Hypotheses..... | 87 |
| Findings for the Research Hypotheses Using Analysis of Variance..... | 92 |
| Findings for the Research Hypotheses Using Regression Analysis..... | 94 |
| Hypothesis 1..... | 98 |
| Hypothesis 2..... | 100 |
| Hypothesis 3..... | 100 |
| Hypothesis 4..... | 101 |
| Summary..... | 103 |
| CHAPTER 5: SUMMARY, CONCLUSION, AND RECOMMENDATIONS..... | 105 |
| Summary..... | 105 |
| Interpretation of Findings..... | 108 |
| Conclusion..... | 112 |
| Implications for Social Change..... | 112 |
| Recommendations for Action..... | 114 |
| Recommendations for Future Research..... | 115 |
| Concluding Remarks..... | 117 |
| REFERENCES..... | 118 |
| APPENDIX A: Survey Instrument..... | 124 |
| APPENDIX B: Data Response Summary Form..... | 130 |
| APPENDIX C: Information to the Participants Prior to Participating in the Survey..... | 131 |
| APPENDIX D: Authorizing letter for task characteristics questionnaire..... | 132 |
| APPENDIX E: Authorizing letter for knowledge sharing and creation questionnaire..... | 135 |

| | |
|--|-----|
| APPENDIX F: Authorizing letter for the knowledge conversion process questionnaire | 136 |
| APPENDIX G: Research Assistant's Consent Form..... | 138 |
| APPENDIX H: Curriculum vitae..... | 139 |

LIST OF TABLES

| | |
|---|----|
| Table 1 Operational Definitions of the Knowledge Conversion Process Construct..... | 65 |
| Table 2 Questionnaire Items of the Knowledge Conversion Process Construct. | 68 |
| Table 3 Operational Definitions of the Task Characteristics Construct. | 70 |
| Table 4 Questionnaire Items of the Task Characteristics Construct..... | 71 |
| Table 5 Questionnaire Items of the Knowledge Transfer and Creation Construct..... | 73 |
| Table 6 The demographic information of the sample. | 81 |
| Table 7 Statistics for Reliability and Validity Tests. | 83 |
| Table 8 Rotated Component Matrixes. | 83 |
| Table 9 Correlations for the Research Variable..... | 87 |
| Table 10 A Regression Analysis of the Knowledge Conversion Process and Knowledge Transfer..... | 88 |
| Table 11 A Regression Analysis of the Knowledge Conversion Process and Knowledge Creation..... | 88 |
| Table 12 A One-Way Analysis of Variance for Task Characteristics and Knowledge Conversion Process. | 93 |
| Table 13 A Simple Linear Regression Analysis of the Knowledge Conversion Process and Knowledge Transfer and Creation for each Task Characteristic Category..... | 95 |
| Table 14 Correlations for the Research Variables in Each Task Characteristic Categories. | 97 |

LIST OF FIGURES

| | |
|---|----|
| <i>Figure 1.</i> The overall research model. | 6 |
| <i>Figure 2.</i> Organizational technology consisting of craft, nonroutine, routine, and engineering. Based on Perrow (1967, p. 196). | 13 |
| <i>Figure 3.</i> Knowledge conversion process consisting of socialization, externalization, internalization, and combination. Based on Nonaka (1994, p. 19). | 15 |
| <i>Figure 4.</i> The overall research model. | 19 |
| <i>Figure 5.</i> The hypothesized research model. | 20 |
| <i>Figure 6.</i> Research models from previous literature of Nonaka's (1994) theory. | 37 |
| <i>Figure 7.</i> Research models from previous literature of Perrow's (1967) theory. | 50 |
| <i>Figure 8.</i> Four task characteristic groups consisting of craft, nonroutine, routine, and engineering. | 90 |
| <i>Figure 9.</i> Four task characteristic groups separated by the medians of task variety and Task Analyzability. | 92 |
| <i>Figure 10.</i> The hypothesized research model with the results of a simple linear regression and correlation. | 99 |

CHAPTER 1: INTRODUCTION TO THIS STUDY

Due to the pressures of powerful global competition and a demanding customer marketplace, traditional brick-and-mortar organizations are seeking innovative tools and new strategies to compete and thrive in a contemporary business environment. In order to survive in today's turbulent business world, no one can neglect that the advancement of technology extensively facilitates the delimitations of this globally networked world and helps organizations arrive at a successful stage. Most organizations are placing a focus on enhancing the advancement of technology to help accelerate their enterprise performance, productivity, and success and transform themselves into state-of-the-art organizations. Generally, technology is greatly recognized as technological machines or equipments, such as computers, electronic devices, or the Internet. However, the term technology does not represent only technological forces; it has a broad range of meaning addressing different areas of interest and its characteristics can be described from multiple perspectives.

Perrow (1967, pp. 194-195) defines the term *technology*, "considered the defining characteristic of organizations," as a process of accomplishing jobs. Perrow's definition of organizational technology is influenced by two dimensions: the degree of task analyzability, ranked from unanalyzable tasks to analyzable tasks, and the number of task exceptions, positioned from few exceptional tasks to many exceptional tasks (pp. 195-196). Within these two dimensions, he further distinguishes organizational technology

into four categories: *craft technology* (unanalyzable and few exceptional tasks), *nonroutine technology* (unanalyzable and many exceptional tasks), *routine technology* (analyzable and few exceptional tasks), and *engineering technology* (analyzable and many exceptional tasks) (pp. 195-196). To avoid the confusion over the terminology of technology as a common technological definition and Perrow's definition, the term task characteristics will be used throughout this study instead of the term organizational technology when referencing Perrow's terminology.

As previously described, the term technology has conveyed on a much broader meaning than just technological machines or equipments. If organizations are certain of only the advancement of information technology in terms of technological perspectives for their path to success, they are vulnerable to failures in competing in a constantly changing marketplace. Even though information technology advancement has extensively enabled organizations to serve the rapidly expanding needs and demands of customers, stakeholders, and shareholders and to provide and ensure reliable, robust, and timely services and solutions to customers, information technology alone is not adequate to fully drive the success of organizations (McDermott, 1999). Information technology itself cannot sufficiently deliver the success of knowledge management development, but can definitely serve as a significant motivator and facilitator in the process of knowledge sharing and transfer (Hendriks, 1999; Roberts, 2000). Equivalently in enriching the development of information technology, McDermott addresses that organizations must consider enhancing organizational procedures, changing cultures, and especially

increasing knowledge to be able to position themselves competitively and successfully in a dynamic marketplace.

In order to remark, defend, and maintain a position of global competitiveness, many organizations desire to become a leader, pioneer, or first entrant in the marketplace to gain the advantages of their new products and services (Gilbert, 1993; Mellahi & Johnson, 2000). However, Gilbert argues that speed is not the only solution to sustain the dynamics of today's competition due to the elegant reactions of competitors. Organizations must seek alternative sustainable resources or approaches that can enable them to perform at their highest capacity. Knowledge, which is considered to be intellectual asset and capital for organizations, can be an excellent alternative resource. Unlike the advantages of new products and services, which are difficult to sustain, the advantages of knowledge are maintainable and can help knowledge-enabled organizations successfully remain in the intensive marketplace (Davenport & Prusak, 2000, pp. 16-17; Lubit, 2001).

Knowledge is extensively recognized as a key success factor in achieving competitive advantages for many organizations, such as Xerox and British Petroleum (BP) (Davenport & Prusak, 2000; Nonaka, 1994; Venkatraman & Henderson, 1998, p. 45). According to Nonaka (pp. 16-17), knowledge can be distinguished into two categories: tacit knowledge and explicit knowledge. 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; in contrast, explicit knowledge is defined as codified knowledge, which is usually captured and documented in transmittable forms

(Nonaka, pp. 16-17). Nonaka further articulates the transformation within and between these two types of knowledge, which possibly creates 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) (pp. 18-20).

Regardless of the forms of knowledge or the patterns of knowledge conversion, the importance of effectively and efficiently utilizing, leveraging, and transferring knowledge can help organizations achieve desired organizational objectives. Therefore, organizations most likely invest their human and financial resources in state-of-the-art technological and nontechnological techniques to increasingly gain knowledge wealth. However, they mistakenly assume that modern technological and well-known nontechnological techniques will universally serve as effective knowledge transfer and creation tools for the entire organization. Normally, each organization consists of different departments or work units that have unique task characteristics and methods of knowledge transfer. The confusion and mistake of using the same technology and tools in universally enhancing knowledge transfer and creation for the entire organization can cause vast devastation and enormous financial casualty for them. It is therefore necessary to arrive at a clear understanding of how different task characteristic groups transfer and create their knowledge in order to determine the proper technological and nontechnological techniques and tools for each task characteristic group, which is the main objective of this study.

The organization of chapter 1 is as follows. The first section will address the statement of the problem of this study. The next section will describe the background of the problem. The next two sections will state the purpose of the study followed by the theoretical and conceptual support for the study. The assumptions, scope and delimitations, limitations, research design, definitions of terms, hypotheses and research questions will be addressed in the following sections. Finally, the last section will address the significance of the study.

Statement of the Problem

The problem to be addressed in this study is to determine whether or not different task characteristic groups, distinguished by Perrow's (1967) theory, will most frequently adopt different patterns of the knowledge conversion process, proposed by Nonaka's (1994) knowledge conversion theory, for the accomplishment of knowledge transfer and creation. To be able to effectively and efficiently create and transfer knowledge, it is necessary to understand the relationships between the knowledge conversion process, the task characteristics, and the success of knowledge transfer and creation. The focus of this study is placed on a question related to the task characteristics and the knowledge conversion process: How does the impact of the knowledge conversion process on the accomplishment of knowledge transfer and creation differ depending on task characteristics? This study argues that different patterns of the knowledge conversion process (socialization, internalization, externalization, and combination) can contribute varying effects on different task characteristic groups, consisting of craft, nonroutine,

routine, and engineering for the accomplishment of knowledge transfer and creation.

Figure 1 illustrates the overall research model of this study.

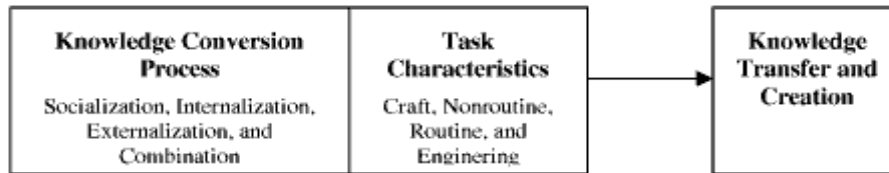


Figure 1. The overall research model.

For example, individuals who perform primary tasks that are classified in the craft category may most frequently adopt the socialization (tacit to tacit) pattern of the knowledge conversion process as a learning tool compared to the other patterns when they transfer knowledge among themselves to maximize their knowledge transfer and creation process. The reason may be that the craft functional group mainly requires and is rich in personal intuition, which is defined as tacit knowledge. Therefore, the most frequently adopted pattern of the knowledge conversion process may be socialization for the craft category in accomplishing knowledge transfer and creation.

Background of the Problem

In this rapidly changing business world, organizations are facing challenges in seeking innovative and more effective approaches to enhance organizational performance and productivity in order to achieve the leading industry position. Many organizations such as Honda, Hewlett-Packard, General Electric, Motorola, and Xerox have realized the importance of knowledge creation and have enhanced their processes of knowledge creation to improve their products, decrease time to market, and enhance collaboration

(Nonaka, Byosiere, Borucki & Konno, 1994, p. 337). Even though many organizations have successfully enhanced knowledge management practices, some organizations are struggling with developing a knowledge management concept, especially in the areas of knowledge transfer and creation. Therefore, it is important for organizations to determine how to arrive at the success of knowledge transfer and creation practices.

The process of knowledge creation can be accomplished through pattern(s) of the knowledge conversion process, consisting of socialization, externalization, internalization, and combination (Nonaka, 1994, pp. 19-20). According to Nonaka, organizations can adopt different individual patterns of the knowledge creation process or different collective patterns of the knowledge creation process to create new organizational knowledge. Since one or more patterns of the knowledge conversion process can create new knowledge, it raises the specific question of whether or not organizations as a whole or different task characteristic groups in an organization can employ or emphasize a specific pattern of the knowledge conversion process to maximize their knowledge transfer and creation.

Due to the nature of the task characteristics described by Perrow (1967), each task characteristic group primarily performs specific tasks, according to the degree of task analyzability and the number of task exceptions, and therefore should most frequently adopt one pattern of the knowledge creation process that is the most suitable approach in accomplishing effective knowledge transfer and creation. Therefore, it is important for organizations to determine the proper pattern of the knowledge creation process for each task characteristic group so that knowledge will be effectively and efficiently created and

transferred. This analysis would help organizations avoid devastating pitfalls of utilizing improper or mistaken techniques and tools in promoting learning (Hansen, Nohria & Tierney, 1999, p. 115).

In 1994, Nonaka theorized an organizational knowledge creation model, which is a spiral process of interacting between tacit and explicit knowledge from the individual level to the inter-organization level (p. 20). He explained that this organizational knowledge creation process could be accomplished through four patterns of knowledge conversion: socialization, externalization, combination, and internalization (pp. 18-19). These four patterns of the knowledge conversion process can possibly relate to established organizational theories, such as organizational culture, information processing, and organizational learning (Nonaka, p. 19). Since Nonaka proposed the concept of knowledge conversion theory, there have been many research studies conducted to substantiate the connection between the patterns of the knowledge conversion process and organizational theories, such as task characteristics, information technology, training, *ba* – a shared place for facilitating knowledge creation, and perceived knowledge management effectiveness at different levels (Becerra-Fernandez & Sabherwal, 2001; Kostiainen, 2002; Lee, Chae & Suh, 2004; Mann, 2001; Sabherwal & Becerra-Fernandez, 2003).

Besides previously stated research studies on the concept of the knowledge conversion theory, there are a number of research studies contributing to the body of empirical research in the area of organizational theories, especially on the subject of Perrow's (1967) task characteristics theory. Perrow's task characteristics theory is

associated with the aspect of technological routineness, which involves task exception and task analyzability. According to Perrow (pp. 195-197), task exception and task analyzability are used as keys to distinguish tasks into four categories: craft, nonroutine, routine, and engineering. Since Perrow's theory was proposed, the concept of task characteristics has interested many researchers. Examples include the investigations of the relationship between technological routineness and social structure, perceived environmental uncertainty, work group structure, and work group effectiveness (Hage & Aiken, 1969; Leifer & McDomough, 1979). The reason that Perrow's theory is considered to be a suitable method in distinguishing different task characteristics for this study will be described in chapter 2.

There have been many research studies conducted concerning the theories of Nonaka's (1994) knowledge conversion process and Perrow's (1967) task characteristics independently (e.g., Becerra-Fernandez & Sabherwal, 2001; Draft & MacIntosh, 1978; Draft & MacIntosh, 1981; Hage & Aiken, 1969; Sabherwal & Becerra-Fernandez, 2003; Van de Ven & Delbecq, 1974). However, a review of previous literature discloses that there is a lack of research on the relation between the theories of Nonaka's knowledge conversion process and Perrow's task characteristics. The most practical research studies that intimate the research question of this study are conducted in the areas of Nonaka's knowledge conversion process and task characteristics distinguished by task orientation and task domain (Becerra-Fernandez & Sabherwal, 2001) and in the areas of Nonaka's knowledge conversion process at individual, group, and organizational levels (Sabherwal & Becerra-Fernandez, 2003).

Therefore, a considerable gap between the four patterns of the knowledge conversion process and the four categories of organizational technology is noted. Since knowledge has become the primary vehicle in driving organizational productivity, performance, and profits, positioning the knowledge conversion process must be a priority for organizations. Not only is the spiral process of knowledge conversion as a whole at the heart of organizational knowledge creation, but each pattern of the knowledge conversion process individually and independently also creates new knowledge (Nonaka, p. 20). Therefore, it is necessary and important for organizations to recognize the most frequently adopted pattern of the knowledge conversion process for each task characteristic group in order to properly support the needs of their employees and enhance the accomplishment of knowledge transfer and creation. This study will be mainly based on Nonaka's (1994) theory and Perrow's (1967) theory and additionally will be built on the study of Becerra-Fernandez and Sabherwal (2001).

Purpose of the Study

The main propose of this study was to provide opportunities in identifying, accelerating, and expanding the drive toward becoming knowledge-era organizations. In addition, this study provided a better understanding of the knowledge conversion process and the knowledge transfer and creation associated with task characteristics and added to the knowledge base of knowledge management especially in the area of the knowledge conversion process. The results of this study can help organizations understand the impact of the knowledge conversion process on the accomplishment of knowledge transfer and creation. 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.

The reason why this research study is necessary is because organizations have limited time to react to changing demands and needs in a dynamic marketplace since today's business environment is changing rapidly. Organizations are constantly performing the following improvements, which include but are not limited to, enhancing their information technology, improving organizational infrastructure, increasing productivity of knowledgeable employees, promoting a knowledge-sharing environment, and sustaining knowledge (Davenport & Prusak, 2000; Drucker, 1999; Lubit, 2001; McDermott, 1999). In order to accomplish these improvements, especially promoting a knowledge-sharing environment and sustaining knowledge, organizations must understand and recognize the meaning and importance of knowledge, especially how knowledge is effectively created and transferred among employees. In a restricted context, it is important for organizations to improve understanding of the impact of the knowledge conversion process on the accomplishment of knowledge transfer and creation according to task characteristics.

Theoretical or Conceptual Support for the Study

Organizational Technology

Perrow (1967) conducted a study of the comparative analysis of organizations and defined another meaning of the term *technology* as "the work done on raw materials" or "the actions that an individual performs upon an object, with or without the aid of tools or