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AN EMPIRICAL STUDY OF FACTORS AFFECTING SUCCESSFUL IMPLEMENTATION OF KNOWLEDGE MANAGEMENT

by

Yong Suk Choi

A DISSERTATION

Presented to the Faculty of

The Graduate College at the University of Nebraska

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Major: Interdepartmental Area of Business

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An Empirical Study of Factors Affecting Successful Implementation of Knowledge Management

BY

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GRADUATE COLLEGE
UNIVERSITY OF NEBRASKA

AN EMPIRICAL STUDY OF FACTORS AFFECTING SUCCESSFUL IMPLEMENTATION OF KNOWLEDGE MANAGEMENT

Yong Suk Choi, Ph.D.

University of Nebraska, 2000

Advisor: Sang M. Lee

Knowledge management (KM) is a formalized, integrated approach to identifying and managing an organization's knowledge assets. The impact of KM implementation in terms of performance improvement and related benefits are still elusive. This ambiguity comes largely from the absence of empirically-based assessment of KM implementation.

The main purpose of this study is to develop a better understanding of the critical factors affecting the successful implementation of knowledge management. To achieve this objective, the study developed and tested a variety of variables. A cross-sectional field survey was used as research methodology. Multiple research methods were utilized to provide a broad basis for interpreting and validating the data. From the results of statistical analysis, important generalizations were suggested.

First of all, many responding organizations were aware of the importance of KM in terms of their organization's current and future performance. Most

organizations view their business as knowledge intensive. Also, information technology was the most commonly implemented area of KM. However, most organizations did not believe strongly that a KM specialist such as a Chief Knowledge Officer (CKO) or an external consultant is needed for effective management of knowledge.

Secondly, the study found that top management leadership/commitment and fewer organizational constraints were critical to KM success in terms of the degree of importance. Regarding the degree of implementation, information systems infrastructure was considered as critical to KM success.

Finally, KM factors based on the degree of importance were not affected by type of organization, annual revenue, number of employees, and investment time on KM. On the other hand, KM factors based on the degree of implementation were significantly affected by different types of organizations and investment time on KM. However, annual revenue and number of employees did not affect KM factors significantly.

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TABLE OF CONTENTS

ABSTRACT..... i

ACKNOWLEDGEMENT..... iii

LIST OF FIGURES..... vii

LIST OF TABLES..... viii

CHAPTER 1. INTRODUCTION..... 1

1.1 Background..... 1

1.2 Research Objective..... 3

1.3 Research Questions..... 5

1.4 Organization of the Dissertation..... 6

CHAPTER 2. LITERATURE REVIEW 8

2.1 Knowledge Management (KM)..... 8

2.1.1 Definition of Knowledge..... 8

2.1.2 Definition of KM..... 9

2.2 KM vs. Organizational Learning..... 12

2.3 KM Framework..... 14

2.4 Measurement of KM Success..... 22

2.5 KM Success Factors..... 28

CHAPTER 3. RESEARCH DESIGN AND METHODOLOGY..... 30

3.1 Research Approach..... 30

3.2 Description of the Survey Instrument..... 31

3.3 Data Collection Procedures 32

3.4 Data Analysis..... 33
3.5 Dependent Variable..... 34
3.6 Independent Variables and Hypotheses..... 35
3.6.1 Employee Training..... 36
3.6.2 Employee Involvement..... 38
3.6.3 Teamwork..... 39
3.6.4 Employee Empowerment..... 41
3.6.5 Top Management Leadership and Commitment..... 43
3.6.6 Organizational Constraints..... 45
3.6.7 Information Systems Infrastructure..... 46
3.6.8 Performance Measurement..... 49
3.6.9 Egalitarian Culture..... 51
3.6.10 Benchmarking..... 53
3.6.11 Knowledge Structure..... 55
CHAPTER 4. ANALYSIS AND RESULTS..... 59
4.1 Demographic Characteristics of Respondents..... 59
4.2 Overall Attitude Toward KM..... 67
4.3 Perception of the Degree of Importance and Implementation..... 69
4.3.1 The Degree of Importance..... 69
4.3.2 The Degree of Implementation..... 73
4.4 Comparison of the Degree of Importance and Implementation..... 77
4.5 KM Factors..... 82

4.5.1 Importance Factors of KM..... 82
4.5.2 Implementation Factors for KM..... 87
4.6 Reliability Test..... 91
4.7 Construct Validity Test..... 92
4.8 Multiple Regression Analysis..... 92
4.8.1 Hypothesis Test of Importance Factors..... 93
4.8.2 Hypothesis Test of Implementation Factors..... 94
4.9 Multivariate Analysis of Variance..... 97
4.9.1 Importance Scale..... 98
4.9.2 Implementation Scale..... 103
CHAPTER 5. DISCUSSION AND CONCLUSIONS..... 109
5.1 Managerial Implication of the Study Results..... 109
5.1.1 Respondents' Perception of KM..... 110
5.1.2 Comparison between Importance and Implementation of KM Factors..... 112
5.1.3 The Effects of CSFs on KM Implementation..... 116
5.1.4 The Effects of Organizational Characteristics on KM Factors..... 116
5.2 Contributions of the Study..... 118
5.3 Limitations of the Study..... 119
5.4 Recommendations for Further Study..... 120
REFERENCES..... 122
APPENDIX..... 133

LIST OF FIGURES

Figure	Title of Figure	
2-1	Knowledge Management Pillars	15
2-2	Spiral of Organizational Knowledge Creation	16
2-3	Core Capabilities and Knowledge Building Activities	17
2-4	Intangible Assets Model	18
2-5	Model of the Knowing Organization	20
4-1	Scatter Graph for the Degree of Importance and Implementation	81

LIST OF TABLES

Table	Title of Table	
3-1	Summary of Research Hypotheses	58
4-1	Respondents' Organization Type	60
4-2	Total Annual Revenue of the Responding Organizations	61
4-3	Number of Employees of the Responding Organizations	61
4-4	KM Investment Time	62
4-5	KM Development Progress	63
4-6	Implemented Areas of KM	64
4-7	KM Technology	65
4-8	Profiles of Respondents	66
4-9	Attitudes Toward KM	68
4-10a	Mean Scores of Degree of Importance	70
4-10b	Mean Scores of Degree of Implementation	74
4-11	Comparison of the Degree of Importance and Implementation	78
4-12	Factor Analysis of Degree of Importance	84
4-13	Factor Analysis Supplement of Degree of Importance	86
4-14	Factor Analysis of Degree of Implementation	88
4-15	Factor Analysis Supplement of Degree of Implementation	90
4-16	Effect of Six Factors of Importance on the Success of KM	96
4-17	Effect of Five Factors of Implementation on the Success of KM	96

4-18 Perceived Importance of KM Factors among Different Types of Organizations..... 99

4-19 Perceived Importance of KM Factors among Organizations with Different Annual Revenues..... 100

4-20 Perceived Importance of KM Factors among Organizations with Varying Numbers of Employees..... 101

4-21 Perceived Importance of KM Factors among Organizations with a Different Amount of Time Investment for KM..... 102

4-22 The Degree of Implementation Affected by KM Factors among Different Types of Organizations..... 105

4-23 The Degree of Implementation Affected by KM Factors among Organizations with Different Annual Revenues..... 106

4-24 The Degree of Implementation Affected by KM Factors among Organizations with Varying Numbers of Employees..... 107

4-25 The Degree of Implementation Affected by KM Factors among Organizations with a Different Amount of Time Investment for KM..... 108

CHAPTER 1

INTRODUCTION

1.1 Background

The increasing globalization of business, explosion of information technology, erosion of corporate hierarchies, and dispersion of business activities are important characteristics of today's business environment. Thus, the issue of more efficient and effective operation of an organization's knowledge assets has become extremely important as numerous organizations have moved from information age to knowledge age. The rapidly changing environment requires every organization to master fundamentally important principles such as organizational learning and exploitation of new knowledge (Drucker, 1992; Lee, 1994). In addition, the impact of new developments and change in demographics, information technology, and life style on the organization is significant. Information technology, especially, provides significant challenges for many organizations to compete in the knowledge age.

Many leading organizations recognize the value of intangible assets, such as know-how, relative to tangible assets, such as manpower, buildings, and equipment. The measurement of intangible assets (e.g. expertise, experience, patents) is increasing in importance because these assets are more permanent than the tangible assets by which organizations' values have traditionally been evaluated (Drucker, 1995). Whether the specialty is manufacturing or service,

many organizations are beginning to investigate how these intangible knowledge assets or intellectual assets can serve as the basis for competitive advantage (Stewart, 1994).

According to a recent survey (Covin et al., 1997), top executives of both Canadian Financial Post 300 firms and US Fortune 500 firms view knowledge resource as critical for organizational success. Respondents indicate that information systems, employee know-how, company and product reputation, and database are expected to contribute significantly to a firm's success in the new millennium. Moreover, most executives (87%) define their organization's business as knowledge-intensive according to a 1998 survey by Ernst & Young (Ruggles, 1998).

To compete effectively, an organization must adapt to the changing rules of the corporate arena for long-term success (Porter, 1990). Effective utilization of knowledge can contribute to the development of an organization's new capabilities, such as design of new products/services and improvement of business processes. That is why knowledge management (KM) has become a currency in management circles even though the field of KM is only about 10 years old (Liebowitz and Beckman, 1998).

Moreover, many organizations, such as Coca-Cola, Sequent, Hewlett-Packard, Coopers and Lybrand, and others have established new positions within their companies to oversee and better manage knowledge in their organizations. This new position, often called the Chief Knowledge Officer (CKO), has the

responsibility of leveraging knowledge, enabling knowledge, and making knowledge visible (Liebowitz and Beckman, 1998). As Peter Drucker (1995) predicted, knowledge has become the key economic resource and the dominant source of competitive advantage.

1.2 Research Objective

How knowledge can best be captured, codified, and shared as a corporate asset can be the focus of academic research as well as practical interest. In order to have successful knowledge acquisition, sharing, codification, and utilization, we need to define the effective organizational environment that would help organizations innovate and build knowledge assets. In other words, it is necessary to identify factors that contribute to the success of KM in terms of its implementation.

Knowledge management, however, is a very difficult mechanism to define because it contains multiple representations and concepts. As many researchers agree, KM requires a total organizational transformation including organizational culture, structure, and management style (Buckman, 1998; Davenport and Prusak, 1998; Sveiby, 1997). Depending on the purpose of study, research in the area can focus on different aspects of KM. For example, management information systems (MIS) emphasize the technological aspect of KM efforts while behavioral theorists oversee the organizational/managerial aspects. In addition, recent surveys and researches (Davenport et al., 1998; Reynolds, 1998; Ruggles, 1998)

have also pointed out that KM is not a management tool that has uniformly brought success to organizations adopting it even though it has become a very important issue in management.

Thus, it is clear that the factors affecting the success of KM implementation should be those that have been researched by various disciplines. Since KM is an emerging field, there has been no single set of widely recognized and empirically validated criteria for evaluating the success of KM implementation. However, many KM experts such as Boisot (1998), Choo (1998), Davenport (1998), Leonard-Barton (1995), Ruggles (1998), Steward (1994), Sveiby (1997), and Wiig (1993) have proposed factors that contribute to the success of KM. They posit a variety of organizational and technical variables, including the changes in organizational culture and leadership, employee education, and utilization of information technology as important factors.

The factors proposed by these experts and other researchers (Allee, 1997; Demarest, 1997; Greengard, 1998; Gordon, 1999; Greco, 1999; King, 1999; McCune, 1999; Rossett, 1999; Sunoo, 1998; Van Buren, 1998) could be categorized by the following critical implementation factors: organizational culture, knowledge structure, performance measurement, benchmarking, information systems infrastructure, management support, and human resource management. Liebowitz and Beckman (1998) believe that organizational culture and information systems infrastructure are especially critical factors. Since there is no statistical evidence that the proposed factors affect the success of KM implementation,

these factors need to be tested systematically and empirically. In addition, the understanding of overall perception about KM needs to be investigated since KM is very much a new paradigm in business world. Also, KM implementation needs to be assessed based on different organization type, revenue, number of employees, and time of investment in KM.

1.3 Research Questions

Knowledge management involves employees at all levels and qualitative as well as technical methods to improve an organization's sustainable competitiveness. There have been numerous studies about KM. However, there is paucity of empirically based studies to suggest or prove the factors and perceptions of KM implementation. There have been only a handful of surveys done by KM experts and consulting companies. Furthermore, these surveys provide only a general guideline to identify the success factors of KM implementation.

In order to pursue KM implementation systematically, success factors must be developed and then tested statistically. Thus, the primary objective of this study is to empirically identify and examine the factors affecting the success of KM implementation. Also, this study investigates the overall perception of KM and the assessment of KM implementation based on organizatons' demographic characteristics.

The following are this study's research questions:

1) What are the overall perceptions about KM?
2) What are the differences between perceived importance and actual KM implementation?
3) What are the critical success factors for KM implementation?
4) What are the effects of the demographic characteristics (e.g., organization type, number of employees, revenue, and time of investment in KM) on KM success factors?

1.4 Organization of the Dissertation

This dissertation consists of five chapters: Introduction, Literature Review, Research Design and Methodology, Analysis and Results, and Discussion and Conclusions.

Chapter 1 of this dissertation has provided a general introduction and a brief overview. It has discussed KM in general and recent changes in the business environment. Also, the research objective and the primary research questions are previewed.

Chapter 2 provides a review of KM literature including definitions, frameworks for KM, and differences between organizational learning and KM. This chapter also suggests possible measurement scales and factors for successful KM implementation.

Chapter 3 presents the research design and methodology. As a field experiment, this study is based on a questionnaire survey mailed to the Gallup Organization's various clients. It covers a description of research approach and a survey instrument as well as data collection procedures and data analysis. Also, this chapter describes a number of hypotheses to be tested in this study based on numerous previous studies.

Chapter 4 presents the results of data analysis. The data collected from the structured questionnaires are analyzed and hypotheses are tested through several statistical methods including paired t-test, multiple regression analysis, and multivariate analysis of variance (MANOVA). Also, a few methodological issues concerning data verification that include reliability and validity issues are reviewed and discussed.

Finally, Chapter 5 presents discussion and conclusions. The implications of study results and recommendations for future study are discussed. The contributions of this study and some limitations are also presented in this chapter.

CHAPTER 2

LITERATURE REVIEW

In this chapter, the relevant literature for this study is reviewed. The literature review consists of the following subject areas: (1) definition of knowledge; (2) definition of KM; (3) KM versus organizational learning; (4) KM framework; (5) measurement of KM success; (6) KM success factors; and (7) summary of literature review

2.1 Knowledge Management (KM)

2.1.1 Definition of Knowledge

To understand KM, knowledge should be defined first. Webster's dictionary (1953) defines knowledge as "the fact or condition of knowing something with familiarity gained through experience or association." Data and information are closely related to knowledge. Data consists of facts that occur in business transactions, while information is a group of facts organized for obtaining additional insights. Data can be transferred into information in the organization. On the other hand, knowledge is a collection of expertise and experiences among members of the organization and is created through the learning process in which the organization creates and shares information from its internal and external customers, suppliers, and partners. Galagan (1997) defined knowledge as "unlike traditional raw material, knowledge usually is not coded, audited, inventoried, and

stacked in a warehouse for employees to use as needed. It's scattered, messy, and easy to lose."

In the business literature, many researchers divide knowledge into two types. Nonnaka and Takeuchi (1995) state that "an organization possesses two kinds of knowledge: tacit knowledge embedded in the expertise and experience of individuals and groups; and explicit knowledge codified in organizational rules, routines, and procedures." Actually, Polanyi (1966) was the first researcher who distinguished between tacit and explicit knowledge, and his distinction has appeared in KM literature. Boisot (1995) classifies knowledge as codified and uncodified knowledge. Codified knowledge can be captured, codified, and shared in organizations. On the other hand, uncodified knowledge cannot be captured, codified, and shared. Choo (1998) adds one other type of knowledge, called "cultural knowledge," which represents organizational culture as a part of organizational knowledge.

2.1.2 Definition of Knowledge Management

In the literature, different terms have been used to describe knowledge management: " intellectual asset management," " knowledge asset management," "intellectual capital management," and "corporate IQ or brain-power." However, "knowledge management" is the most widely accepted term in academic literature as well as trade literature.

Defining KM is difficult because it has multiple interpretations. Moreover, KM is still new and evolving in that many academic researchers as well as practitioners have yet to fully grasp what it is and does. Moreover, different perspectives on the definition of KM have emerged in part because researchers in various fields as well as practitioners tend to define the concept of knowledge based on their fields and interests. For example, MIS researchers and practitioners tend to define knowledge as an object that can be recognized and controlled in computer-based information systems. Management theory researchers address knowledge as processes based on individual and organizational competencies such as skills and know-how (Nonaka and Takeuchi, 1995; Davenport and Prusak, 1998; Sveiby, 1997; Winter, 1998). Different perspectives on the concept of knowledge can lead to different meaning of KM definitions. After all, KM is necessary for organizations because what worked yesterday may or may not work tomorrow. The following sample definitions of KM illustrate the varying views of many researchers and practitioners.

"Knowledge management is the explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation. It requires turning personal knowledge into corporate knowledge that can be widely shared throughout an organization and appropriately applied." (Skyrme, 1997)

"Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms" (Davenport and Prusak, 1998).

" Knowledge management caters to the critical issues of organizational adoption, survival and competence in face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings" (Malhahotra, 1998).

"Knowledge management is a conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organizational performance" (American Productivity & Quality Center, 1999).

2.2 KM vs. Organizational Learning

To have a clearer picture of KM, it is necessary to recognize the fundamentals of organizational learning. The conceptual picture of organizational learning is similar to that of KM. Comprehensive understanding of organizational learning is essential since both share the common ground of conceptual background and characteristics.

In the literature, the two terms "organizational learning" and "learning organizations" are used interchangeably. It is difficult to distinguish clearly between organizational learning and learning organization (Richards and Goh, 1995; Slater and Narver, 1995; Solomon, 1994). Since the focus of both terms is on how important it is for organizations to learn continuously, the two terms are indistinguishable (Redding and Catalanello, 1994).

The concept of organizational learning was introduced into organization and management more than 30 years ago and is relevant to KM today, given the complexity and uncertainty of the global business environment. Organizational learning can be defined as "the ability of an organization to gain insight and understanding from experience through experimentation, observation, analysis and a willingness to examine both successes and failures" (McGill et al., 1992). Organizational learning expert Senge (1990) proposed five characteristics of organizational learning as primary components of a framework: "systemic thinking," "shared vision," "personal mastery," "team learning," and "creative

tension." These characteristics are integrated from fields such as statistics, psychology, cybernetics, physics, and engineering.

Interestingly, organizational learning researchers seem to classify KM as a subset of organizational learning (Fulmer et al., 1998). On the other hand, KM researchers claim that the KM paradigm lies beyond the organizational learning boundary (Nevis et al., 1998). Moreover, the increasing importance of knowledge assets or intellectual capital suggests an intensifying need for individuals and organizations to increase their stores of knowledge. To increase stores of knowledge, organizations need to learn continuously as Aubrey and Cohen (1995) pointed out. Thus, the concept of organizational learning is the essential element of KM.

Even though there are similarities and differences between these two organizational competencies, their ultimate goals are the same: business success in unpredictable market conditions. Organizational learning focuses on learning and adaptive processes, while KM concentrates on knowledge creation and diffusion processes in which all levels of employees are involved in learning, building, and sharing organizational knowledge. Without the endless learning process and process changes to adapt to the internal and external business environments, organizational knowledge would be obsolete. Thus, the concept of KM is much broader and deeper. Unlike organizational learning, KM involves an intelligent organization utilizing organizational knowledge effectively through information technology.

2.3 KM Framework

The framework consents to researchers as well as practitioners to measure the current state of KM effectively and systematically. Thus, the KM frameworks should provide not only a unified view of KM phenomena but also help investigators study the field of KM in an organized way. There have been few efforts to develop a framework of knowledge management. However, none of the frameworks can provide a complete and generalized frame for KM by defining fundamental attributes of KM and their interrelationships because KM can be viewed differently based on one's background and interests.

Wiig (1993) is one of the pioneers in developing a KM framework. He framed KM based on three pillars. As Figure 2-1 shows, the first pillar represents the nature and appropriateness of knowledge containing the following attributes: (1) surveying and categorizing knowledge, (2) analyzing knowledge and related activities, and (3) eliciting, codifying, and organizing knowledge. The second pillar concerns the appraisal and assessment of knowledge value and knowledge related actions. The final pillar involves managing, organizing, and controlling KM activities. This pillar's attributes are (1) synthesizing knowledge-related activities, (2) handling, using and controlling knowledge, and (3) leveraging, distributing and automating knowledge. All three pillars are based on the understanding of the creation, manifestation, use, and transfer of knowledge.

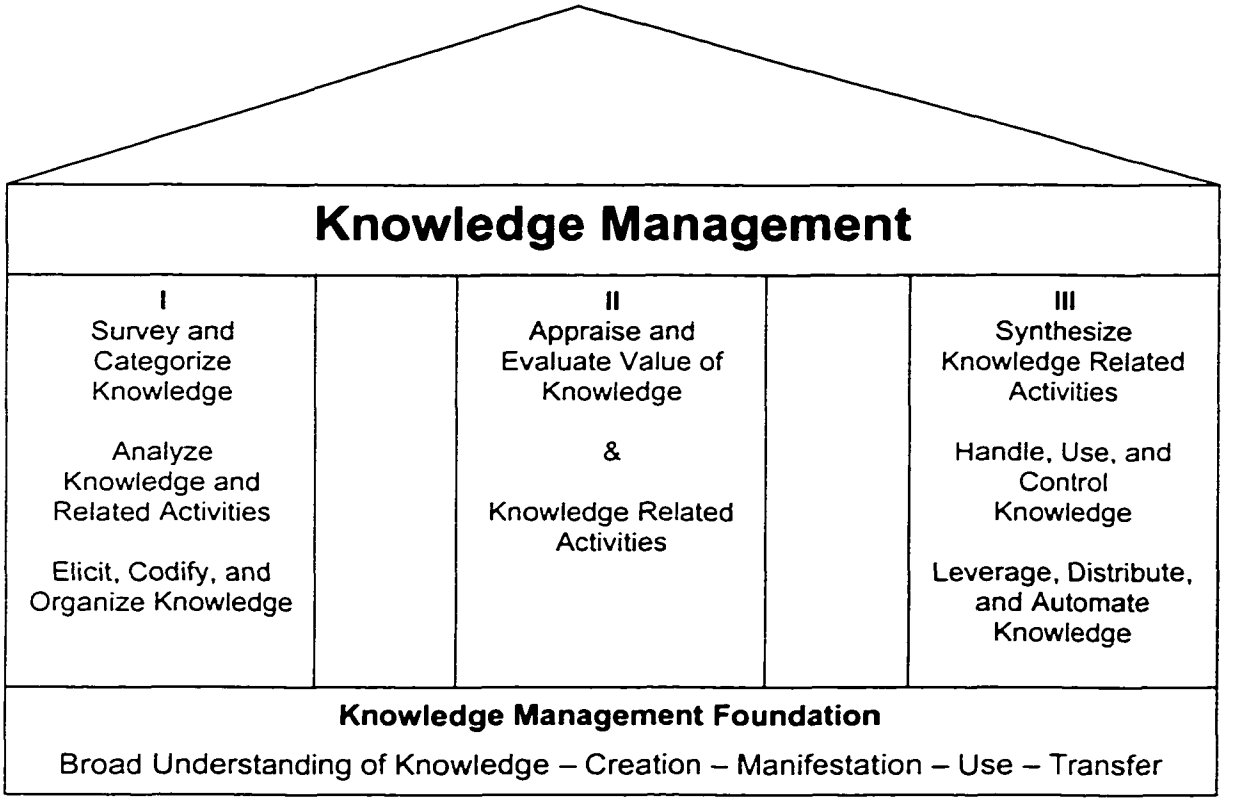


Figure 2-1. Knowledge Management Pillars
[Adapted from Wiig 1993]

Nonaka (1994) suggested a KM framework in terms of a knowledge creation perspective based on four kinds of knowledge conversions: (1) socialization – the process of creating knowledge based on tacit knowledge; (2) externalization – transforming tacit knowledge into explicit knowledge; (3) internalization – transforming explicit knowledge into tacit knowledge; and (4) combination - creating a process of explicit knowledge based on existing explicit knowledge. Through these four conversion interactions and processes, and

through transfer of knowledge from individual, group, and organizational levels, an organization can create knowledge. Nonaka's perspective of KM framework as a knowledge process conversion is presented in Figure 2-2.

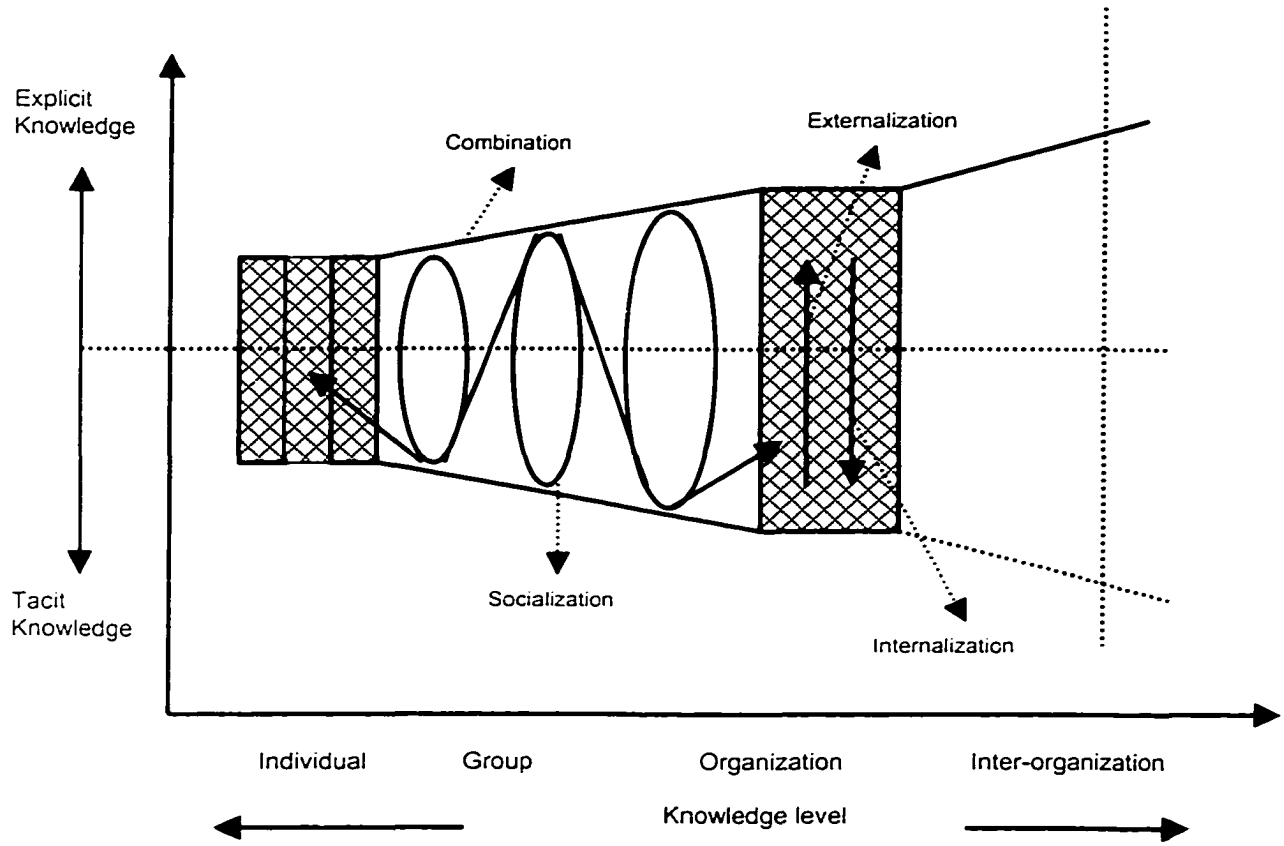
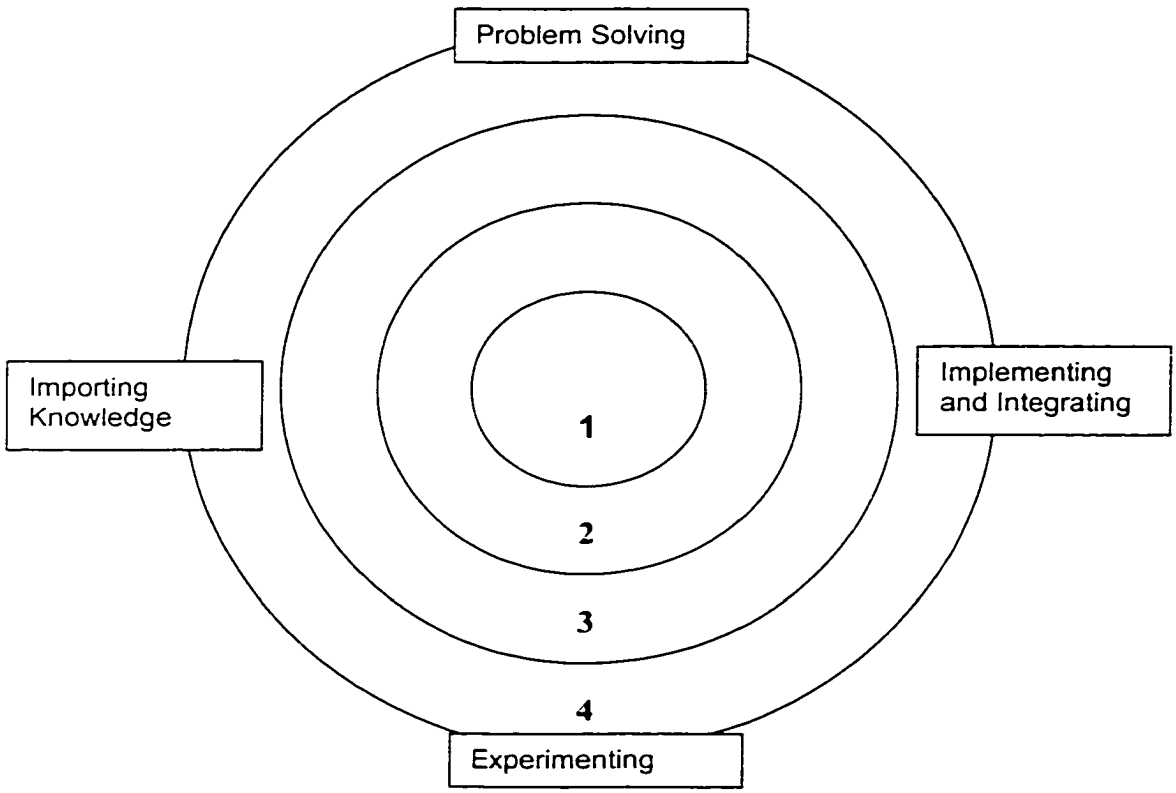


Figure 2-2. Spiral of Organizational Knowledge Creation
[Adapted from Nonaka, 1994]

Leonard-Barton (1995) proposed four core capabilities and four knowledge-building activities as building blocks for a KM framework, presented in Figure 2-3.



1. Physical Systems
2. Managerial Systems
3. Employee Skills and Knowledge
4. Values and Norms

Figure 2-3. Core Capabilities and Knowledge Building Activities [Adapted from Leonard-Barton, 1995]

The four capabilities are physical systems (e.g., machinery and software), managerial systems (e.g., training, incentive systems, and rewards), employee skills and knowledge, and value and norms. The physical systems and employee knowledge and skills involve dynamic knowledge reservoirs and the capability to manipulate them. On the other hand, managerial systems and organizational values and norms are concerned with control of knowledge and channeling.

Sveiby (1997) identified knowledge as one of the intangible assets in an organization. Intangible assets consist of three components as shown in Figure 2-4.

Intangible Assets		
External Structure (Brand names, customer and supplier relationship)	Internal Structures (The organization: R&D, management, legal structure, manual systems, and attitudes, software)	Employee Competence (Employee skills, education, experience)

Figure 2-4. Intangible Assets Model
[Adapted from Sveiby, 1997]

His approach to accounting for intangible assets takes into account both an organization's physical assets and its increasingly important intangible assets.

He divided the intangible assets into employee competence, internal structure, and external structure.

Employee competence means employees' capacity to act or accomplish a task. Internal structure pertains to the firm's organization. External structures point to such aspects as brand names, customer relations, and supplier relations. By directing employees to work on internal issues, managers can create intangible internal structures, such as better processes or new product designs. On the other hand, managers develop intangible external structures such as brand names, customer loyalty, and supplier relationships when they look at external issues.

Choo (1998) proposed three processes – sense making, knowledge creation, and decision making – as building blocks for his framework. As Figure 2-5 illustrates, Choo identified these three processes as interconnected activities generating an organization's information and knowledge bases.

The sense making phase identifies how information and knowledge are disseminated based on the understanding of environmental changes. The knowledge creation phase is concerned with how collected information is transformed to create new tacit and explicit knowledge. The final phase, decision making, involves analyzing and selecting knowledge based on available information to form a knowledge creation phase that resolves task uncertainty.

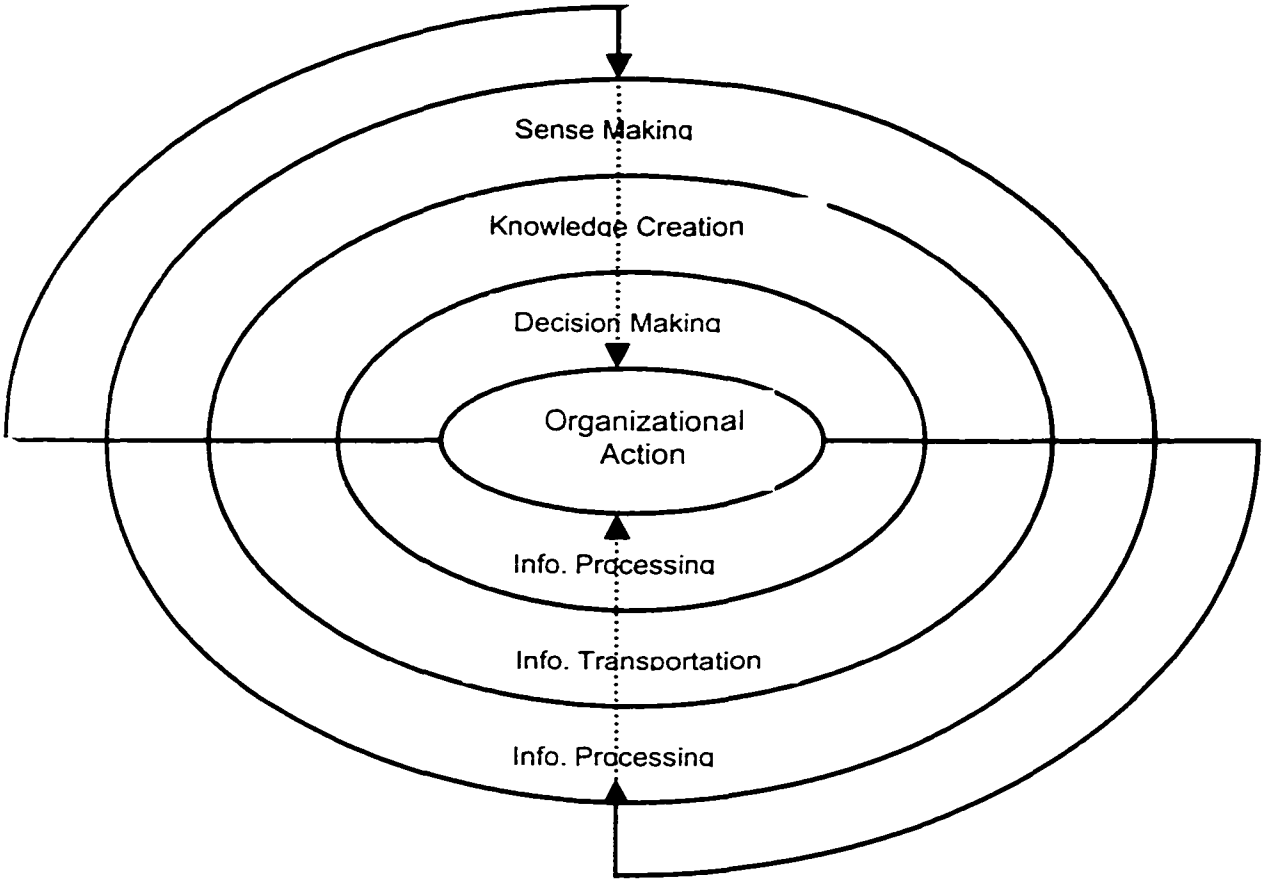


Figure 2-5. Model of the Knowing Organization
[Adapted from Choo, 1998]

Zack (1999) provided a strategic perspective framework for KM. He argued, "effective KM requires an organization to understand its strategic knowledge needs, develop a knowledge strategy that is aligned to its business strategy, and put into place the organizational and technical architecture to support knowledge processing requirements." First, an organization needs to

analyze what Zack calls "strategic knowledge needs." Second, an organization should create a strategy combining both knowledge needs and its own business strategy. Third, an organization must have both the organizational and technical structure to implement its knowledge-processing needs. He further noted that KM uses four main resources, namely, repositories of explicit knowledge; refineries for accumulation, refining, management, and distribution of knowledge; organization roles to execute and manage the refining process; and information technologies to support the repositories and processes.

Nissen et al. (2000) argued, "the key to integrated KM methodology is that such systems must be explicitly analyzed, selected, and combined to help manage knowledge for a particular process design and set of contextual factors." The key contextual elements in the integrated framework include organizational memory, organizational structure, organizational incentives, and nature of knowledge.

Different types of industries or organizations can adopt different implementation factors for their own KM framework. It maybe possible, however, to develop a universal KM model that will fit every type of organization although each organization needs to develop its own KM model to meet competitive global markets.

2.4 Measurement of KM Success

Although KM experts such as Davenport, Prusak, Stewart, and Sveiby, have developed the basic concept and ideas of KM since the late 1990s, the research stream of KM is still emerging. There has been no study that clearly defines boundaries and frameworks of KM. Because KM involves almost every field of business (e.g., Management Theory, Marketing, and MIS), proposed success factors are fragmented and diversified. Moreover, many studies are narrowly scoped although they identify some critical success factors.

The critical success factor is useful for structuring environmental analysis because there is an important link between environmental analysis and critical success factor analysis leading to organizational success (Digman, 1999). The critical success factor analysis provides an important meaning to KM through the identification of the core processes that are critical in KM implementation. Thus, a KM program needs to identify critical performance indicators of success factors to gauge its performance. Critical success factors, however, can be changed based on the long-range vision of top management and the goals of the organization.

Recently, several studies have proposed several key variables for successful implementation of knowledge management. The findings from leading KM researchers and recent survey evidence are major sources that can be used to identify the critical success factors of KM. There appear to be two types of research that identify critical factors for the success of KM implementation. One

tends to provide comprehensive lists of success factors; the other suggests factors based on the researcher's background and interests.

Allee (1997) identified twelve KM principles. The twelve principles can be used as a general guideline to define success factors. First, knowledge cannot be isolated or analyzed out of context. Second, knowledge is self-organizing. Third, knowledge seeks community. Fourth, knowledge is transmitted or acquired through language. Fifth, codifying knowledge could limit one's creativity. Sixth, tight controlling knowledge may result in wasted resources and energy. Seventh, managing knowledge requires constant change while keeping an eye on other possibilities. Eighth, knowledge growth requires abandoning old ways of thinking. Tenth, organizational constraints should be removed in order for knowledge to be self-organizing. Eleventh, there is no one best practice to advance knowledge. Twelfth, how one defines knowledge affects KM.

Although the study by Davenport et al. (1998) used a small sample size (n=31), their study revealed the most comprehensive list of success factors. In detail, they identified key success factors consisting of the following eight categories of KM project success: (1) a technology infrastructure including desktop computing and communications; (2) an organizational infrastructure including the development of roles for people and groups to act as resources; (3) a balance of flexibility, evolution, and ease-of-accessibility to knowledge; (4) shared knowledge; (5) KM that supports culture; (6) workers who are motivated to develop, share, and use knowledge; (7) knowledge transfer through means like

the Internet, Lotus Notes, global communications systems, and face-to-face communication; and (8) senior management support and commitment.

According to Greco (1999), a successful KM program is made of the following key components: (1) a strong knowledge-sharing culture; (2) measures to track that sharing; (3) technology to allow for knowledge transfer; (4) leadership and senior management commitment; and (5) established practices for the capture and sharing of knowledge. In addition, incentives, job promotions, and evaluations were also considered success factors.

On the other hand, KM projects may fail if employees are not satisfied with the type or format of the information they receive. Other obstacles to the proper implementation of KM project include employees' unwillingness to share information, the difficulty involved in selecting the best way to store corporate information, and the language differences in computer networks (McCune, 1999).

Management theorists claim that the human resource plays a key role in successful KM implementation. Successful knowledge creation and sharing activities and processes would not be possible without appropriate training. Thus, timely and appropriate employee training is one of the key success factors for KM implementation (Cohen and Backer, 1999; Gordon, 1999; Greengard, 1998; Rossett, 1999). In addition, it is not surprising that one of the most recent and popular KM training programs is providing education through a corporate university - educational organizations established and run by companies to ensure their workforce's total education (Sunoo, 1998). By the same token,

employee involvement is also an important factor because it is one of the hidden reasons for the failure of KM implementation. Since employees must share the nature of knowledge creation and sharing, many KM activities are unthinkable without employee involvement (McLagan, 1999; O'Brien and Crauise, 1995; Silos, 1999; Wilson and Asay, 1999).

The transformation to a knowledge-based organization requires peer-to-peer collaboration. Creating a team allows organizations to apply diverse knowledge, skills, and experiences towards its processes and problem-solvings. Thus, fostering a spirit of teamwork based on trust is an essential factor for successful KM (Dixon, 2000; Geraint, 1998; Greengard, 1998).

On the other hand, effective creation and sharing of knowledge can be failed if employees do not have a sense of ownership in the overall aim of the organizational KM system. After all, most organizational knowledge comes from employees' expertise, learning, and experience. Thus, researchers recognize empowerment as one of the critical implementation factors for KM success as well (Duval, 1999; Martinez, 1998; Ulrich, 1998; Verespej, 1999; Ward, 1997).

Promoting innovation in an organization is very difficult because it is risky and often confronted by resistance from employees. It is impossible to make appropriate progress without strong top-management leadership and commitment (Pickering and Matson, 1992). Thus, the visible leadership and commitment of top management must be sustained throughout a KM effort (Davenport et al., 1998; Dess and Picken, 2000; Goh, 1998; Greengard, 1998; Picken, 2000; Van Buren,

1998). On the other hand, one of the most important aspects of KM implementation success is the elimination of organizational constraints. Organizational constraints can impede perception and/or attitudes necessary for KM success (Bonaventura, 1997; Demarest, 1997).

The distinct difference between organizational learning and KM is that KM utilizes information systems as an enabling tool while organizational learning views information systems as a technical tool. For example, one enabler of Buckman Lab's KM implementation was an information systems based KM system (Buckman, 1998). In order to pursue effective KM, information systems must be reliable, user-friendly, compatible with other platforms, and accurate (Boisot and Griffiths, 1999; Bourdreau and Couillard, 1999; Davis and Riggs, 1999; Ghilardi, 1997; King, 1996; King, 1999; Savary, 1999).

Regardless of the type of knowledge (tacit or explicit), its contribution must be measurable not only by traditional financial measures but also by other performance measurements. Knowledge must be measured because an organization's intellectual capital includes the brains of its employees, their know-how, the processes and customer knowledge that they create. Thus, it is clearly necessary to include the performance measurement system as a key factor for the successful KM implementation (Bassi and Van Buren, 1999; Barsky, 2000; Bukowitz and Petrash, 1997; Martinez, 1998; Pearson, 1999).

Numerous studies have pointed out the importance of culture in KM. An essential element of success in KM is creating an organizational culture that can

motivate, support, and encourage, capture, create, share, codify, and reuse of knowledge at an individual, group, and organizational level.

KM cannot be established and implemented without support of knowledge friendly culture. That is, transformation to a knowledge-centered organization is possible only when organizational culture becomes conducive for KM because the basic assumptions norms, and values that guide employees' behavior are encompassed by the culture of an organization. As Buckman (1999) pointed out, creating and sharing knowledge are intangible activities that cannot be forced. Only when a culture of trust and openness is formed and felt by organizational members, KM can give birth to core competencies. In addition, the cooperation, coordination, and empowered teamwork of employees should be supported as the standard attitudes in the KM environment. (Abernathy, 1999; Boisot, 1998; Galagan, 1997; Larson, 1999; Wah, 1999). Also, benchmarking has been one of the most effective tools for developing and improving KM and the measurement of organizational KM performance against leading KM organizations (Davis, 1996; Day and Wendler, 1998; Drew, 1997; O'Dell and Grayson, 1997).

Reliable, useful, up-to-date, and timely knowledge can be created and shared not only internally but also externally. That is, knowledge should be captured and created by sharing knowledge with other members of work groups, suppliers, and customers. In other words, there must be a well-established knowledge structure, which includes knowledge about internal and external customers, suppliers as well as organizational work groups in order to implement

KM successfully (Buckman, 1999; Davenport and Klahr, 1998; Greco, 1999; Hickins, 1999; Tynan, 1999; Wenger, 2000; Ulrich, 1998).

2.5 KM Success Factors

Throughout this chapter, the definitions of knowledge and KM, knowledge management versus organizational learning, KM framework, and numerous KM elements are reviewed. The preceding discussion provides a recipe for the fundamental ingredients to successfully implement KM.

This study proposes eleven critical success factors for KM implementation. These critical factors are not merely specified as the principles of KM, but also summarized and categorized from many KM principles suggested by researchers, practitioners, and consultants. In addition to the analysis of these eleven success factors for KM success, this study also attempts to assess the following: (1) the difference in the degree of importance and the degree of implementation on KM; (2) the difference between factors perceived as important and factors actually implemented by organizations; and (4) the differences in degrees of importance and implementation factors among organizations with different demographic characteristics based on the type of organization, annual revenue, number of employees, and time of investment in KM.

The selected eleven critical success factors are as follows:

1. Employee training
2. Employee involvement
3. Teamwork
4. Employee empowerment
5. Top-management leadership and commitment
6. Organizational constraints
7. Information systems infrastructure
8. Performance measurement
9. Egalitarian climate
10. Benchmarking
11. Knowledge structure

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

This chapter describes the research approach used and the rationale for selecting specific procedures and analysis techniques. The research variables and hypotheses are also presented. All the items are presented in the following order: research approach, description of the survey instrument, data collection procedures, data analysis, independent variables, and independent variables with research hypotheses.

3.1 Research Approach

Van Horn (1973) identified four methods most commonly used in the management information system fields: case studies, field studies, field tests, and experimental designs. This study involved a field study with a questionnaire-based mail survey.

Field study seemed most appropriate for this study because investigating KM implementation success within the organizational context would be best served in a real setting. Realism is one strength of field study. Among the different types of research methodologies, a questionnaire-based mail survey method was selected. Because the subject of KM, especially the investigation of success factors of implementation, is a relatively unexplored area, a data acquisition method that could cover a wide variety of organizations was needed.

Moreover, the mail survey would allow the researcher to explore a significant number of issues.

According to Huck et al. (1974), an incorrect unit of analysis may influence the researcher to select erroneous research tools, distorting the results and confounding the conclusions of the research. Since this study focuses on critical success factors that may affect an organization's decision to implement KM, the unit of analysis is an organization.

The time dimension of research can be divided into two dimensions: (1) cross-sectional and (2) longitudinal. This research employs a cross-sectional study approach. There are two reasons for selecting this approach. First, it is an exploratory study of the relatively new field of KM. Secondly, it is extremely difficult to conduct a longitudinal study for a wide variety of organizations.

3.2 Description of the Survey Instrument

The questionnaire was composed of four sections. The first section asked about the respondent's overall perception of KM in general. The second section of the questionnaire asked 39 questions about the degree of perceived importance and the degree of actual KM implementation based on the proposed eleven success factors. The executives and managers, the primary respondents in this study, were expected to provide accurate information for this part because they are likely to be the most knowledgeable about KM operations in their organizations. Organizations that were not engaged in any KM arrangement did

not complete the degree of actual implementation part. The third section asked whether the respondents' perceived KM would be a way to increase organizational competitiveness. The final section asked for respondents' demographic and organizational information.

3.3 Data Collection Procedures

There is no comprehensive list of organizations that have implemented or are implementing KM extensively. The sampling frame for this research consisted of the U.S. firms listed in the Gallup Organization's client database. This database has names and addresses of senior managers in various U.S. organizations. According to the Gallup Organization, this database is frequently utilized in business research. Some public organizations (schools, local government agencies, etc.) were deleted from the sample. Before the questionnaire was administered, several researchers reviewed and refined an initial questionnaire.

Although the Gallup Organization would not allow direct access to its list of clients, it did distribute the questionnaires to its clients. Participants were assured of complete confidentiality. No follow-up mailing was used in this study. Each respondent was requested to fill out the survey questionnaire and to send it back directly to the Gallup Organization. A total of 1000 questionnaires was distributed. The number of returned questionnaires was 220, a response rate of 22%, which is higher than the typical response rate of 10% in unsolicited organizational surveys. This relatively high rate of return should be attributed to the direct

involvement of the Gallup Organization. Among the returned questionnaires, three responses were unusable because too many values were missing. Thus 217 responses were used for the data analysis.

3.4 Data Analysis

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS ® Base 7.0 for Windows, 1995, SPSS Inc., Chicago). Descriptive statistics were calculated for all variables. Paired t-tests were used to identify significant differences between the degree of importance and the degree of implementation. Factor analysis of the 39 KM attributes was conducted to identify underlying factors. Multiple regression analysis was conducted to determine the relationship between KM factors and organization's competitive advantage.

Three questions in section IV of the questionnaire were used as the dependent variables, and respondents' perceptions of importance and actual implementation of KM factors were the independent variables. A series of multivariate analysis of variance (MANOVA) were also performed to investigate the relationship between the KM factors and organizational characteristics.

Respondents' perceptions of importance and actual implementation of KM factors was the independent variable, and annual revenue, number of employees, and time of investment in KM were the dependent variables. Organizations' annual revenue figures were reclassified into four groups and number of

employees into three groups to facilitate MANOVA. For all statistical tests, the level of significance (alpha) was set at 0.05.

3.5 Dependent Variables

To measure the impact of independent variables, having well identified dependent variable(s) is very important. For the measurement of the dependent variable for successful KM implementation, three statements were developed in the questionnaire. Since there is no universally developed and proposed dependent variable to measure the success of KM implementation, the measurement of the dependent variable for this study was developed based on literature reviews. Question items for the dependent variable are presented in section IV of the questionnaire.

According to articles, researchers constantly insist that the source of competitive advantage in the 21st century is an organization's knowledge assets (Bassi and Ven Buren, 1999; Brown, 1998; Davis, 1998; Lei et al., 1999; Teece, 2000; Whitehill, 1997; Zack, 1999; Zackerman and Buell, 1998). Most recently, Teece (2000) stated that knowledge and how companies create it, protect it, and develop it provides a competitive advantage that can be sustained. By the same token, Zack (1999) insisted, "organizations should strive to use their learning experiences to build on or complement knowledge positions that provide a current or future competitive advantage."

Whitehill (1997) argued an organization can sustain a competitive advantage by understanding, building, and maintaining its knowledge advantage. Davis (1998) also insisted that KM should be viewed as a process that enhances an organization's ability to execute its business in a way that gives it a competitive advantage.

Lei et al. (1999) stated "organizations must learn, develop, and share new forms of knowledge that facilitate a capability for managing environmental changes in order to develop and sustain new sources of competitive edge." Bassi and Ven Buren (1999) argued that as KM becomes a critical element in competition, companies must better use the intellectual capital of their employees.

Brown (1998) claimed the knowledge and understanding of employees could benefit a firm only if it could be properly assessed and utilized. Zackerman and Buell (1998) also pointed out that many major companies are using KM to gain a competitive advantage because KM is the strategic use of collective knowledge for construction of profits and market share. From these viewpoints, the proposed study employs competitive advantage as a dependent variable.

3.6 Independent Variables and Hypotheses

To determine which measurement scales could be used as independent variables, thirty-nine questions were selected based on literature review and surveys by two consulting companies (Ernst & Young and Delphi Group) and then

analyzed by factor analysis. Based on the factor analysis, six measurement factors for the degree of importance and five measurement factors for the degree of implementation were proposed. The following is description of each independent variable along with hypotheses.

3.6.1 Employee Training

Numerous studies point out the importance of training in KM. Training should provide employees and managers the skills and information to fulfill their responsibilities. One of the reasons for the failure in effective work behaviors would be insufficient training to support KM principles.

Cohen and Backer (1999) claimed the process of successful knowledge creation would not be possible without appropriate training procedures. They define knowledge creation process training in three stages; (1) inquire and infer, (2) invent and inspire, and (3) install and inspect. First, after a training needs or a problem are recognized, a trainer must research those needs or problems and interpret the information. In the second stage, a trainer develops training solutions based on the information gathered and inferred. Finally, training solutions developed in stage two must be implemented and assessed for appropriateness.

Rossett (1999) pointed out five ways that KM perspectives can influence training: (1) join ongoing efforts and collaborating with other organizational people involved in KM initiatives; (2) repurpose existing knowledge bases and training materials; (3) use many strategies to support people at work; (4) head a pilot

effort aimed at seeking opportunities to use KM perspectives and systems; and (5) increase the "learningfulness" of the KM system.

Gordon (1999) insisted that training professionals should play an important role in the success of KM initiatives. He suggested two training strategies: codification and personalization. Under the codification approach, organizations use computer databases to classify, store, and retrieve information. Personalization requires sharing knowledge employee-to-employees.

Greengard (1998) argued that companies should support or even require sharing knowledge in a climate conducive to doing so. Ultimately, HR (human resource) department should take the responsibility for teaching the change in mind set required to implement KM. Employees need to know how sharing knowledge benefits them. Therefore, HR should play a vital role by offering news, updates, and training.

Ernst & Young LLP (NY), an audit, tax, and consulting company, has implemented a training initiative largely via the Internet, training employees in various US cities in areas of company knowledge and career management. "Making the training available to all 80,000 Ernst & Young employees across the globe is the ultimate goal of the program. The program's main goal is to develop a learning environment that will expedite performance. Its strategy is to provide learning solutions to employees to help them do their jobs better and provide solutions to the company's clients faster" (Alonzo, 1998).

In addition, a more recent training tool for KM is a corporate university ---- educational organizations established and run by companies to ensure their workforce's total education. Forty percent of Fortune 500 companies have implemented such programs. Corporations such as Motorola and the Bank of Montreal are providing KM training through corporate universities (Sunoo, 1998). Based on the literature, we hypothesize:

H1: A higher level of employee training is positively associated with the success of KM.

3.6.2 Employee Involvement

Employee involvement describes how all employees can contribute effectively to meeting the organization's objectives. Kaufman (1992) pointed out that employee involvement is important for organizational success. In fact, one of the hidden reasons for the failure of many management improvement programs is not using participative management where workers use their problem-solving and self-management abilities. Employee involvement is a key factor in successful KM implementation because the nature of knowledge creation and sharing is unthinkable without employee involvement.

According to McLagan (1999), the workforce is in better position to bargaining employees because of the change to knowledge work. That is, as we go into a knowledge-based economy, economic pressures and demands for

higher quality products and services means that employees are becoming more involved in control of their work because of the advantages of shared knowledge.

O'Brien and Crauise (1995) pointed out that when employees are more creative, more team oriented, more willing to share ideas, KM is more effective. Beers et al. (1996) also found in their study, an investigation of knowledge work process of 30 US organizations, knowledge workers were involved in their own job design and evaluation.

Employee involvement has been a focal point of other management fields as well. Employee involvement has been viewed as one of the most effective problem-solving and process improvement principles of total quality management (TQM) (Silos, 1999). Since both fields share common perspectives on employee involvement, quality professionals are in a unique position to assist KM implementation (Wilson and Asay, 1999). The above findings lead to the following hypothesis:

H2: A high degree of employee involvement is positively associated with the success of KM.

3.6.3 Teamwork

The transformation to a knowledge-based organization requires peer-to-peer collaboration. That is, teamwork is an essential source of the knowledge generation process. Creating teams allows organizations to apply diverse skills

and experiences towards its processes and problem-solving.

Nadkarni (1995) suggested that an organization's members must work together and build on each other's ideas and strengths. Anyone who has knowledge and interest in a problem should be included on the team. Geraint (1998) also pointed out that technology is not the primary issue in KM. Organizations with team oriented employees who trust one another are more successful at sharing knowledge than those who are merely technologically superior.

Dixon (2000) stated that matching type of knowledge to the correct method of transfer helped companies be more successful at sharing knowledge internally. In order to achieve this, companies need to determine the types of knowledge that they wish to transfer, the nature of the knowledge, and how the team originating the knowledge differed from those receiving it. By the same token, Greengard (1998) also claimed that one of the most important tasks in successful KM is to organize cross-functional groups to seize the right knowledge and present it in an easily accessible format. These findings suggest following hypothesis:

H3: A higher level of teamwork is positively associated with the success of KM.

3.6.4 Employee Empowerment

"Empowerment means eliminating the bureaucratic controls and creating a sense of freedom so that people can commit all their talents and energies to accomplishing their shared goals" (Pickering and Matson, 1992). Employee empowerment is also a key factor for KM success because true empowerment can give the employees a sense of ownership in the overall aim of the organizational KM system. Researchers recognize empowerment as one of the critical implementation factors for KM success.

Senge (1991) examined two different levels of empowerment to be examined. One is the dynamics of individual relationship, and the other is structural. On the individual level, managers who empower their employees reveal an implicit understanding that the employees are weak. Removing this barrier requires a fundamental shift in management's understanding of employees. Biased superiority must be removed. On the structural level, empowerment is everything but resource allocation.

Verespej (1999) claimed that the real advantages of KM implementation couldn't be realized without truly empowering the employees. Martinez (1998) also argued, through empowerment, employers can value their employees' expertise. Further, employers can tape into employees' knowledge and help them communicate their knowledge by creating ways to capture, organize, and share knowledge.

Ulrich (1998) pointed out that companies should ensure the development and growth of intellectual capital to bring about employee commitment and competence. The following elements for employee empowerment are needed to increase employee commitment and competence: (1) reducing in the demands on employees through the prioritization of work; (2) increasing in resources by providing employees with control over their own work; (3) providing means to support teamwork; (4) sharing information on the firm's long-term strategy; (5) assisting employees in coping with demands on their time; (6) providing new technologies; (7) training workers on how to use it; and (8) allowing employees to join in decision-making.

Duval (1999) stated that when employees are empowered, they begin to think about how they work, making choices and accepting responsibility to other portion of the business. Thus, the bureaucratic problems that waste time and energy are banished, and employees are free to purse quality, value, and service, as well as searching for ways to make a difference.

According to Ward (1997), "it is impossible to empower employees until they have been equipped with the knowledge and tools to act effectively within established organizational processes and procedures." In addition, Ward also insisted that employees should finances and accounts to make empowerment work throughout an organization.

From this, we arrive at the following hypothesis:

H4: A higher degree of employee empowerment is positively associated with the success of KM.

3.6.5 Top Management Leadership and Commitment

For successful KM implementation, the visible leadership and commitment of top management must be sustained throughout a KM effort. That is, a fundamental paradigm change is required in top management's philosophy. Primarily, management must foster employees' commitment, capability, and confidence rather than try to control employees. Leadership involves envisioning the future, coordinating the development of a coherent mission for the organization, overseeing the development, controlling the processes, and providing a motivation toward organizational culture and climate (Wilsey, 1995; Javidan, 1991).

Pickering and Matson (1992) suggested that a new paradigm makes managers believe that employees want to be a part of something important; can be trusted to do a good job; and are capable, creative, and innovative. They believe that the new leadership style must include more vision and less micro-management, more supporting and less directing, more teaching and less controlling, more team development with a win-win focus and less win-lose focus, and a team responsibility rather than individual activity. Shetty (1992), especially,

focused on learning and communication to help define a clear vision, objectives, roles, and responsibilities of top management leadership and commitment.

Greengard (1998) insisted that one of the most important factors for successful KM is to ascertain that senior management recognizes its importance and buttresses the development of programs and policies to make it real.

Dess and Picken (2000) argued that in shifting from management of tangible resources to the management of a firm's intangible assets (knowledge and human resources), managers need to recognize five leadership roles that will allow an organization to work without rigidity and without losing control. They are (1) use of strategic vision; (2) empowering employees at all levels; (3) accumulating and sharing internal knowledge; (4) gathering and integrating external information; and (5) challenging the status quo.

According to Davenport et al. (1998), top-management leadership and commitment were the most critical factors for the successful KM project. By the same token, Van Buren (1998) identified senior management support as one of the most important critical factors for successful knowledge-creating and sharing culture. In addition, Goh (1998) pointed out that effective knowledge creation is not possible unless leaders empower employees and show a strong commitment to the organization. That is, top management must be willing to communicate with employees to make knowledge realistic and coordinate KM implementation process.

In sum, top management plays a key role not only in implementing KM but

also during the whole project. To exert their leadership and commitment in implementing a KM process: (1) they must have sufficient knowledge; (2) they must have realistic expectation of KM results; (3) they must communicate with employees; and (4) they must have the ability to coordinate the different interests of functional units involved in the KM implementation process. The following hypothesis is based on these findings:

H5: Strong top-management leadership and commitment is positively associated with the success of KM.

3.6.6 Organizational Constraints

Successful implementation of KM may not be achievable if organizations cannot shift from systems that hold accountable for processes to systems that hold people accountable for results. That is, one of the most important jobs for KM success depends on elimination of organizational constraints. Organizational constraints can affect negatively the perception and/or attitudes toward KM success.

Organizational constraints lead to inefficiency, ineffectiveness, and powerlessness. They tend to create hierarchical bureaucracy with few incentives to innovate. Hierarchical bureaucracy means that every task is broken into simple parts, each has the responsibility of a different level of employees, and each defined by specific rules and regulations (West, 1992). Organizational constraints

result in only a rigid preoccupation with standard operating procedure, vertical chains of command, and slow response.

Bonaventura (1997) claimed that rigid regulations, lack of incentives to be creative, and lack of commitment in budgeting and funding would be problems for the KM implementation. Demarest (1997) also argued that organizations should get rid of constraints involving hidden consequence performance appraisal, top-down management systems, and inadequate annual budgeting systems in order to successfully implement KM. The following hypothesis is presented based on the above findings:

H6: Efforts to minimize organizational constraints are positively associated with the success of KM.

3.6.7 Information Systems Infrastructure

Effective and efficient KM is unthinkable without information systems. Managers need information systems that will help them in tracking and building the organization's collective knowledge. Information systems also can help the organization manage and leverage knowledge systematically and actively. For example, Xerox was able to develop and transfer knowledge after a group of information systems infrastructure managers created a way to work together. The effort, called the Transition Alliance, is made up of 50 IT professionals who were responsible for managing 70,000 desktop workstations, almost 1,200 servers,

and networking hardware on five continents (Storck and Hill, 2000). A recent survey conducted by "InformationWeek" revealed that respondents consider KM strategic to their business. And the popular information technology tools for managing knowledge are relational databases, text and document search engines, groupware, data warehouses, and data mining tools (Davis and Riggs, 1999).

Savary (1999) insisted that an effective information systems infrastructure is necessary for the organization to implement the KM process. It includes a good infrastructure, such as databases, computer networks, and software. However, the information systems infrastructure involves more than a good relational database or sophisticated e-mail system. As a matter of fact, Davenport et al. (1998) pointed out two of the most critical factors for the successful KM project. One is the establishment of a broad information systems infrastructure based on desktop computing and communications. The other is utilization of the network technology infrastructure such as the Internet, Lotus Notes, and global communications systems for effective transfer of knowledge.

Ghilardi (1997) also argued that the two crucial components in a successful KM system are process and information systems. Information resource-center staff should play a critical role in both these areas. Databases encouraging employees not only to capture knowledge but also use it, in ways not possible with electronic mail.

King (1996) claimed that the pursuit of effectiveness and efficiency requires information systems managers to provide the appropriate information systems for an organization. Moreover, Bourdreau and Couillard (1999) noted that information systems provide KM capabilities that were not possible before. They further insisted that there is little in the literature that focused on information systems and its effect on KM. The reality is that many organizations are capitalizing on innovative and complex applications of information technology to gain an important knowledge advantage.

King (1999) said, however, successful development of KM requires an organization to think in terms of applications and how people use applications, not systems and software. In addition, Boisot and Griffith (1999) insisted that the information technology paradoxically favors at less abstract levels instead of higher levels of codification.

Robert H. Buckman (1998), CEO of the specialty chemicals maker Buckman Laboratories, claimed that the KM system in his company is user-friendly to non-techies because the 80% of his employees are not computer literate. In addition, the system is more responsive time to the customer, to the promotion on inside talent, and reducing the layers of hierarchy. Based on this literature, we advance the following hypothesis:

H7: A higher degree of reliable and flexible information systems infrastructure is positively associated with the success of KM.

3.6.8 Performance Measurement

One of the most traditional performance measures has been based on financial performance data such as return on investment (ROI). However, financial performance measurement alone can be inaccurate in terms of usability in that it tends to measure only financial terms. Since the value of an organization in the knowledge-economy has to be based on intellectual capital, traditional financial measures (e.g., price/earnings ratios, revenues, and market share) cannot measure intellectual capital adequately (Barsky, 2000).

Bavon (1995) defined performance measurement as "the collection of information about effectiveness and productivity of individuals, groups, and larger organizational units. It must improve or sustain organizational performance and accountability." Performance measurement can also identify shortfalls or stagnation.

According to recent research by Bassi and Van Buren (1999), there is a causal relationship between investments in intellectual assets and organizational measures of performance. A firm's intellectual assets includes not only employees' know-how but also business processes and customer knowledge as well.

Pearson (1999) insisted that effective knowledge delivery can be achieved by finding the right system of measurements, as well as better ways of building and delivering the right information to the right people at the right time. Martinez (1998) claimed that not only is the utilization of employees' intellectual capital

important. but that businesses should try to develop system that can measure the return on investment in intellectual capital. According to his study, employees who know they are valuable to their employees because of their expertise and their ability to communicate knowledge show their value when management helps them share the knowledge they have captured organized.

The recent development of intellectual capital measurement model by the "American Society for Training & Development Working Group" reveals two perspectives. One is a core set of measures to enumerate the intellectual capital stocks that are common to most organizations. The second is a set of key measures of financial performance to evaluate effectiveness (Van Buren, 1999).

According to Bukowitz and Petrash (1997), the Dow Chemical Co., Skandia, and Buckman Laboratories International are developing ways to measure how KM affects customers, which ultimately affects a company stock value. This means these firms can react to changes in organizational intangibles in sufficient time to adopt those changes. To measure intellectual assets, choose a few measures that focus on needs of employees and their intellectual contributions, and use those measures to redirect organization's actions. These findings lead to the following hypothesis:

H8: A higher level of performance measurement is positively associated with the success of KM.

3.6.9 Egalitarian Culture

An essential element of success in KM is creating an organizational culture that can motivate, support, and encourage capture, create, share, codify, and reuse of knowledge on individual, group, and organizational levels. An organization's culture provides order and structure for KM activities.

The culture is a set of beliefs, which provides an identity for the organization, which in turn defines how the organization runs day to day. The set of beliefs includes organizational purpose, criteria of performance, the location of authority, legitimate base of power, decision-making orientation, leadership style, compliance, evaluation, and motivation (Schermerhorn et al., 1991).

Numerous studies have pointed out the importance of culture in KM. Larson (1999) insisted that it is important to first consider the company's cultural environment before implementing KM. Companies that wish capture the knowledge of their employees must cultivate a culture that encourage teamwork and knowledge sharing. Galagan (1997) also argued that KM is a transformation of their employees' knowledge into a manageable asset, which includes reshaping the organizational structure and culture. The culture affects the organization's ability to adapt to change. Moreover, companies with an old culture, where beliefs and values are thoroughly embedded, will find change difficult.

Boisot (1998) claimed that the freedom associated with a knowledge asset, the more cultural preferences will shape its evolution and application. Thus, an

understanding of management practices, organizational values, and the communication process must be undertaken so that a culture, which supports the change, is created (Bruss and Ross, 1993).

Greengard (1998) defined three major cultural barriers to KM initiatives: (1) reluctance to share the best knowledge; (2) reluctance to use a peer's ideas; and (3) a low degree of collaboration with others. Those problems occur because employees fear sharing their best ideas and borrowing those of others. To create a knowledge friendly culture, first is to transmit the power of KM. Collaborative culture provides less opportunity for employees who do not operate as a member of the team. Secondly, employees using KM will need to be rewarded and reengineered. Finally, it is important to use employee evaluations to encourage participation.

Wah (1999) pointed out that knowledge sharing initiatives could only succeed if there is a corporate wide culture that encourages knowledge sharing. Since objectives are established, interactive learning should be the focus, and although lively interchanges are important, full participation is more important.

Melissie C. Rumizen, Buckman Laboratories assistant to the chair emphasized that "Although the importance of culture has long been acknowledged, I see a growing emphasis on measuring cultural values and developing and using methodologies to systematically change culture" (Abernathy, 1999).

In sum, KM seems fundamentally a cultural phenomenon. The

cooperation, coordination, and empowered teamwork of employees should be supported as the standard attitudes in the KM environment. Egalitarian culture, a basic component of a world-class organization, supports such attitudes. The major components of an egalitarian culture include (1) shared vision/information, (2) open communication, (3) leadership style, and (4) employee participation in decision-making (Lee, 1994). To investigate the relationship between egalitarian culture and successful KM implementation, the following hypothesis was constructed:

H9: A higher level of egalitarian climate is positively associated with the success of KM.

3.6.10 Benchmarking

Benchmarking is a very well-known management tool. It can be defined as the process of the developing and realizing improvement objectives and measuring of organizational performance against that of a leading organization. Benchmarking determines how the leading organization achieves those performance levels and uses the information as a basis for the organization's targets, strategies, and implementations (Karlof and Ostblom, 1993).

"The purpose of benchmarking is to identify performance gaps and potential areas of improvement at the strategic or business process levels. Based on the significance of such gaps for competitive success, the management of a

company can initiate properly targeted efforts for improvements in performance indicators, (i.e., quality, cost, delivery time, or customer service and satisfaction) that impact its competitive advantage" (Kostas, 2000).

Drew (1997) has identified the following benefits and drawbacks of benchmarking: (1) benchmarking can be most effective when integrated with other systems such as strategic planning, budgeting, and human resource management; (2) an organization must not count on general impressions or anecdotes about competitors; (3) employees must also be educated in benchmarking best-practices; and (4) organizations that have thoroughly prepared and aligned their approach to strategic position, competencies, and market objectives accrue the greatest benefits from benchmarking.

Since managing knowledge work effectively is becoming a necessity for functional area heads and department managers, there are several methods can be utilized. Once an organization has benchmarked best practices, it is easier to apply the useful knowledge around the organization. (Davis, 1996).

Day and Wendler's (1998) study provides practical implications for a wider view of KM benchmarking. They insisted that it is necessary to develop knowledge strategy in order to capture, share, and manage organizational knowledge correctly, and one of the knowledge strategies would be benchmarking. They described McDonald's benchmarking development process as a knowledge strategy.

O'Dell and Grayson (1997) insisted that internal benchmarking can be an effective means to improvement. However, internal benchmarking must take into account ignorance, a culture that values team efforts less than personal expertise, and a lack of resources. The following hypothesis is presented based on the literature:

H10: A higher level of knowledge benchmarking is positively associated with the success of KM.

3.6.11 Knowledge Structure

Knowledge creation can be based on numerous sources. Knowledge can be created individually, in groups, and on an organization level. Specifically, useful knowledge can be captured and created by sharing knowledge with other members of work groups, suppliers, and customers. Thus, the establishment of a well-defined knowledge structure would be another critical factor for successful KM implementation.

Greco (1999) claimed that one of the key elements of successful KM is education to help employees recognize what is knowledge is valuable, and therefore merits sharing. Ulrich (1998) also argued that companies should ensure the development and growth of intellectual capital to bring about employee commitment and competence. The tools for increasing commitment in the workplace would include hired consultants and partnerships with suppliers,

customers, and vendors for knowledge sharing. For example, Robert Buckman (1999), Chairman and CEO of Buckman Laboratory, believes that the sharing of tacit knowledge by users will result in the information to update the explicit knowledge of the firm. Buckman Laboratory has put into place a code of ethics, part of which is the Effective Engagement of the Front Line. This code is the basis for knowledge sharing in the laboratory, providing a foundation on which respect and trust can be built. Getting knowledge sharing to the ideal level is realized by showing trust.

According to Xerox's case study by Hickins (1999), "success of the Xerox's KM initiatives lies in the company's decision to tailor the initiatives to their workers and not to emphasize the technology aspect of knowledge sharing." Knowledge sharing would involve capturing and documenting the tacit knowledge of workers. For example, most solutions to repair problems reside in the heads of Xerox's repair technicians. This is why the Xerox developed an intranet to allow the technicians to share tips.

Tynan (1999) insisted that leaders today need to develop new skills like risk taking and knowledge sharing in order to manage intangible assets and leverage employee knowledge effectively. There are three very powerful tools that assist managers in developing the new skills in an organization: (1) Modeling and encouraging the new behaviors; (2) Making a loud, undeniable statement; and (3) Identifying and rewarding those who show the new skills or behaviors.

Wenger (2000) claimed that aa a complement to the practice of knowledge sharing, a new organizational form, called community of practice, has emerged. This community of practice is a team whose members share expertise, and they share knowledge freely and creatively to find selections to problems.

Davenport and Klahr (1998) argued that the management of customer support knowledge is becoming increasingly important to organizations because of rapid product changes and the growing need for service-based orientation. Helping frontline staff serve customers involved the use of KM to deal with customer service problems. Thus, the following hypothesis is presented:

H11: An effective knowledge structure is positively associated with the success of KM.

Table 3-1

Summary of Research Hypotheses

H1: A higher level of employee training is positively associated with the success of KM.
H2: A high degree of employee involvement is positively associated with the success of KM.
H3: A higher level of teamwork is positively associated with the success of KM.
H4: A higher degree of employee empowerment is positively associated with the success of KM.
H5: Strong top-management leadership and commitment is positively associated with the success of KM.
H6: Efforts to minimize organizational constraints are positively associated with the success of KM.
H7: A higher degree of reliable and flexible information systems infrastructure is positively associated with the success of KM.
H8: A higher level of performance measurement is positively associated with the success of KM.
H9: A higher level of egalitarian climate is positively associated with the success of KM.
H10: A higher level of knowledge benchmarking is positively associated with the success of KM.
H11: An effective knowledge structure is positively associated with the success of KM.

CHAPTER 4

ANALYSIS AND RESULTS

This chapter provides statistical analysis and findings. The findings are presented in the following order: demographic characteristics, attitudes toward KM, perception of the degree of importance and the degree of implementation of KM, the difference between the importance and the implementation, factor analysis of the importance and the implementation, the multiple regression analysis, and the multivariate analysis of variance (MANOVA).

4.1 Demographic Characteristics of Respondents

This section provides the descriptive characteristics of the respondents and their organizations. Summaries of relevant characteristics are shown in Tables 4-1 through 4-8.

Table 4-1 provides information regarding the organization type for which respondents work. As the table indicates, the most frequently reported type of organization was non-profit organization (25.9%) followed by sales/marketing/retail (15.7%), manufacturing (13.4%), and hospitality (9.3%).

Table 4-2 shows the total revenue of the responding organizations. For approximately a quarter of the organizations, annual revenue was less than $10 million, while over $1 billion of annual revenue was reported by 20% of respondents. The number of employees indicates the size of each organization

(Table 4-3). Less than half of the organizations had 100 or fewer employees (40%). Approximately 40% of organizations had between 101 and 1000.

Table 4-1

Respondents' Organization Type

Type of Organization	Frequency[a]	Percent (%)
Non-Profit Organization	56	25.9
Sales/Marketing/Retail	34	15.7
Manufacturing	30	13.4
Hospitality	20	9.3
Publishing/Broadcasting	17	7.9
Technology/Research	15	6.9
Financial Services	14	6.5
Construction	11	5.1
Consultant/Law	6	2.8
Public Utility	6	2.8
Health Care/Hospital	5	2.3
Others	3	1.4

[a] N = 217

Table 4-2

Total Annual Revenue of the Responding Organizations

Range	Frequency	Percent (%)
$10 million or less	26	24.3
$10,000,001 - $100,000,000	12	11.2
$100,000,001 - $1,000,000,000	20	18.7
$1,000,000,001 – $10,000,000,000	13	12.2
More than $10 billion	7	6.5
Unknown	29	27.1

[a] N = 217

Table 4-3

Number of Employees of the Responding Organizations

Number of Employees	Frequency[a]	Percent (%)
100 or fewer	82	40.0
101 – 500	56	27.3
501 – 1,000	30	14.7
1,001 – 10,000	31	15.1
More than 10,000	5	2.4

[a] N = 217

Table 4-4 shows the time of a significant investment in KM. Approximately 40% of respondents indicated that their organizations plan to make a significant investment in KM within the next 2 years. A third of the organizations (29.8%) have already invested significantly in KM while 13 organizations (6.6%) have no plan to invest in KM. This means that most of these organizations (93.4%) are interested in committing organizational resources for KM.

Table 4-4

KM Investment Time

Investment Time	Frequency[a]	Percent (%)
Have already	59	29.8
Within the next 2 years	82	41.4
More than 2 years from now	44	22.2
Never	13	6.6

[a] N = 217

Table 4-5 shows the stage of KM development in organizations that have invested already or have plans to invest in KM in the near future. Out of all the organizations, 93.4% (from Table 4-4) were involved in KM planning and implementation. Of this 93.4%, 35.7% and 26.4% indicated that they are currently evaluating the importance of KM or planning for KM projects/applications, respectively.

Table 4-5

KM Development Progress

Stage of Development	Frequency[a]	Percent (%)
Currently evaluating the importance of KM	65	35.7
Planning for KM projects or applications	48	26.4
Have implemented one or more pilots	44	24.2
Other stage of development	25	13.7

[a] N = 217

Table 4-6 shows departments in these organizations in which KM is being implemented. The most common areas for implementing KM were information technology (32.3%) and customer service (26.3%). A fifth of respondents answered that KM was being implemented across the organization. It was surprising to find that least frequent areas for implementing KM were manufacturing (4.6%), engineering (10.1%), and product development (12.9%).

Table 4-6

Implemented Areas of KM

Area that KM being implemented	Frequency[a]	Percent (%)[b]
Information technology	70	32.3
Customer service	57	26.3
Across the organization	42	19.4
Marketing	41	18.9
Human resources	37	17.1
Research & Development	38	17.5
Finance	34	15.7
Product development	28	12.9
Engineering	22	10.1
Manufacturing	10	4.6

[a] N = 217
[b] It did not make up 100% because multiple answers were allowed.

Table 4-7 illustrates technologies that contribute to KM application. The information technology that contributed most to KM applications were the Internet access (59.0%), document management (41.5%), and web site content management (35%). Intranet was information technology that contributed least to KM applications (8.3%).

Table 4-7

KM Technology

Technologies That Contribute to KM Application	Frequency[a]	Percent (%)[b]
Internet access	128	59.0
Document management	90	41.5
Web site content management	76	35.0
Data warehouse	70	32.3
Decision support tools	66	30.4
Directories of resident experts	52	24.0
Groupware	39	18.0
Intranet	18	8.3
Others	15	6.9

[a] N = 217
[b] multiple answers contribute to a total of more than 100%.

Table 4-8 summarizes the demographic characteristics of respondents. The majority of respondents were male (67.4%) and more than 37 years of age (80%). Approximately one half of the respondents (45.7%) indicated their roles in the organization were in executive management. Line manager and project manager either accounted for 19.2% and 11.5%, respectively.

Table 4-8

Profiles of Respondents

Characteristics	Frequency[a]	Percent (%)
Gender		
Male	145	67.4
Female	70	32.6
Age		
< 36	43	20.0
37 – 48	91	42.3
> 49	81	37.7
Role in the organization		
Executive management	95	45.7
Line management	40	19.2
Project manager	24	11.5
Human resources	9	4.3
Consultant	5	2.4
IT management	3	1.4
Others	32	14.7

[a] N = 217

4.2 Overall Attitude Toward KM

The respondents were asked to rate the degree of their agreement with 6 attitude statements about KM on a five-point Likert scale (5 = Strongly Agree, 1 = Strongly Disagree). Reliability for 6 attitude statements was 0.391. Attitude ratings held by respondents for all statements about KM ranged from 1.22 to 4.36.

Attitude statements about KM and means are shown in Table 4-9. Managers indicated the strongest degree of agreement to the statement "It would be possible, through more effective management, to leverage the knowledge existing in my organization," with a mean rating of 4.36. Other statements that received positive agreement from managers included "Since organizational knowledge assets have become more important, we will see greater emphasis on KM in the future," with a mean rating of 4.22 and "Our organization is considered to be in the knowledge intensive business," with a mean rating of 4.14. In addition, most managers did not agree to the statement "Knowledge management has a negative impact on job security of employees," with a mean rating of 1.22.

The attitude statement with the least agreement from managers about KM was "A KM specialist, such as Chief Knowledge Officer (CKO) or an external consultant, is needed for effective management of knowledge," with a mean rating of 2.79.

Table 4-9

Attitudes Toward KM

Attitudes Statement	Mean [a]
It would be possible, through more effective management, to leverage the knowledge existing in my organization.	4.36 ± 0.55
Since organizational knowledge assets become more important, we will see greater emphasis of knowledge management in the future.	4.22 ± 0.66
Our organization is considered to be in the "knowledge-intensive" business.	4.14 ± 0.90
Knowledge management has a negative impact on job security of employees.	1.22 ± 0.84
Knowledge management will emerge primarily through pre-built applications for specific business processes and problem areas.	3.00 ± 0.84
A knowledge management specialist, such as Chief Knowledge Officer (CKO) or an external consultant, is needed for effective management of knowledge.	2.79 ± 1.02

[a] 5 = Strongly Agree, 3 = Undecided, 1 = Strongly Disagree

4.3 Perception of the Degree of Importance and Implementation

4.3.1 The Degree of Importance

Table 4-10a illustrates the mean scores of the degree of importance of 39 attributes concerning KM. The degree of importance held by respondents for all attributes of KM ranged from 2.26 to 5.00 with a group mean rating of 4.20 ± 0.50 (5 = very important, 3 = moderately important, 1 = not important). The highest rated attribute of KM was "A spirit of cooperation and teamwork," with a mean rating of 4.71. Other attributes that received higher perception of importance by managers included "Sharing knowledge with other members of a work group" and "Promote employee ownership and workmanship," with both mean ratings of 4.53.

The lowest rated attribute was "Sharing knowledge with suppliers," with a mean rating of 3.57; however, this still lies between moderately important and important. Other attributes receiving lower ratings were "Knowledge management awareness training to non-supervisory employees (M = 3.72)," "Supporting utilization of a knowledge-related measurement mechanism (M = 3.77)," and "Encouraging knowledge creating teams such as knowledge task force, the future group, or learning group (M = 3.78)." All 39 attributes scored higher than 3.50 out of a five-point Likert-type scale; that is, all attributes were perceived as important or very important for KM.

Table 4-10a

Mean Scores of Degree of Importance

Attributes	Importance Mean[a] ± SD
A spirit of cooperation and teamwork	4.71 ± 0.54
Sharing knowledge with other members of a work group	4.53 ± 0.65
Promote employee ownership and workmanship	4.53 ± 0.72
Top management encouragement toward formal/informal communication	4.49± 0.66
Reward and recognition for actual performance improvement	4.47 ± 0.75
Effectiveness of information systems	4.47 ± 0.68
Efficiency of information systems	4.47 ± 0.69
Usability and understandability of output	4.47 ± 0.68
User friendliness of information systems	4.46 ± 0.69
Organizational commitment to empower people	4.46 ± 0.73
Actively encourage employee involvement in decision processes	4.41 ± 0.73
Supporting team-based approaches to problem solving	4.41 ± 0.70
Policies to improve the quality of work life	4.36± 0.77
Top management leadership and commitment toward knowledge management	4.36± 0.80
Sharing knowledge with members of other work groups within my organization	4.36 ± 0.71
Gaining knowledge about customers, own competencies and capabilities	4.34 ± 0.80
Access to the majority of knowledge within my organization	4.30 ± 0.74

[a] 5 = Very Important, 3 = Moderately Important, 1 = Not Important

Table 4-10a (Cont.)

Mean Scores of Degree of Importance

Attributes	Importance Mean[a] ± SD
Promote ongoing employee contributions	4.30 ± 0.71
Fairness of individual or team-based performance measurement	4.29 ± 0.84
Effectiveness of performance measurement	4.26 ± 0.77
Encouraging employees to participate in internal and external new learning opportunities such as conferences, training seminar, university courses, etc.	4.26 ± 0.77
A formal system that allows for contribution of every employee's opinions or suggestions	4.24± 0.83
Data sharing among different applications	4.20 ± 0.79
Current corporate hardware and operating systems rules and standards to support future computer platform compatibility	4.20 ± 0.72
Organizational support to seek human values of employees	4.17± 0.85
Top management encouragement toward utilization of the knowledge management system	4.12± 0.84
Analysis of job performance data and information	4.08 ± 0.84
Minimization of hierarchical and bureaucratic procedures for effective knowledge management	4.02 ± 0.93
Encouraging employees to benchmark other organizations' best practices	3.98 ± 0.93
Adequate budgeting or funding to support knowledge management projects	3.95 ± 0.92
The complexity and limitation of current applications software to develop interactive knowledge management applications	3.86 ± 0.88
Providing guidelines to operate a benchmarking	3.85 ± 0.90

[a] 5 = Very Important, 3 = Moderately Important, 1 = Not Important

Table 4-10a (Cont.)

Mean Scores of Degree of Importance

Attributes	Importance Mean[a] ± SD
Providing the employees with adequate information of knowledge management related principles through training	3.85 ± 0.94
Reformulation of any rules (i.e., personnel policies) that obstruct the implementation of knowledge management	3.79 ± 0.95
Documentation of the most operating rules, policies, and procedures for knowledge management implementation processes	3.79 ± 0.92
Encouraging knowledge creating teams such as knowledge task force, the future group, or learning group	3.78 ± 0.99
Supporting utilization of a knowledge-related measurement mechanism	3.77 ± 0.95
Knowledge management awareness training to non-supervisory employees	3.72 ± 0.93
Sharing knowledge with suppliers	3.57 ± 1.05

[a] 5 = Very Important, 3 = Moderately Important, 1 = Not Important

4.3.2 The Degree of Implementation

Table 4-10b shows the mean scores of the degree of implementation of 39 attributes concerning KM. The degree of implementation of KM for 39 attributes ranged from 1.28 to 4.95 with a group mean rating of 2.78 ± 0.68 (5 = extensively implemented, 3 = moderately implemented, 1 = not implemented). The attribute that was mostly implemented was "Top management encouragement toward utilization of the knowledge management system," a mean rating of 3.40. "Encouraging employees to participate in internal and external new learning opportunities (M = 3.34)" and "A spirit of cooperation and teamwork (M = 3.33)" followed. The attribute "A sprit of cooperation and teamwork" received higher perception scores in both importance and implementation.

The least implemented attribute was "Supporting utilization of a knowledge-related measurement mechanism," with a mean rating of 2.15. Other attributes that were less implemented were "Providing guidelines to operate a benchmarking" and "Encouraging knowledge creating teams," both with mean ratings of 2.30. The attribute "Supporting utilization of a knowledge-related measurement mechanism" not only received lower perception toward the degree of importance but was also implemented the least frequently. Thirty attributes out of 39 ranged between 2.51 and 3.50; this means that attributes were implemented moderately while the rest were little implemented.

Table 4-10b

Mean Scores of Degree of Implementation

Attributes	Implementation Mean[b] ± SD
Top management encouragement toward formal/informal communication	3.40 ± 0.97
Encouraging employees to participate in internal and external new learning opportunities such as conferences, training seminar, university courses, etc.	3.34 ± 1.01
A spirit of cooperation and teamwork	3.33 ± 1.03
Supporting team-based approaches to problem solving	3.20 ± 1.03
Sharing knowledge with other members of a work group	3.17 ± 0.96
Reward and recognition for actual performance improvement	3.11 ± 1.17
Promote employee ownership and workmanship	3.08 ± 1.13
Analysis of job performance data and information	3.07 ± 1.08
Organizational commitment to empower people	3.03 ± 1.16
A formal system that allows for contribution of every employee's opinions or suggestions	3.00 ± 1.07
Policies to improve the quality of work life	2.99 ± 1.09
Effectiveness of performance measurement	2.98 ± 1.09
Actively encourage employee involvement in decision processes	2.93 ± 1.03
Sharing knowledge with members of other work groups within my organization	2.92 ± 0.98
Effectiveness of information systems	2.91 ± 0.91
Organizational support to seek human values of employees	2.88 ± 1.05

[b] 5 = Extensively Implemented, 3 = Moderately Implemented, 1 = Not Implemented

Table 4-10b (Cont.)

Mean Scores of Degree of Implementation

Attributes	Implementation Mean[b] ± SD
Gaining knowledge about customers, own competencies and capabilities	2.88 ± 0.99
Fairness of individual or team-based performance measurement	2.87 ± 1.15
Promote ongoing employee contributions	2.84 ± 1.04
Top management leadership and commitment toward knowledge management	2.82 ± 1.03
Usability and understandability of output	2.81 ± 0.92
Current corporate hardware and operating systems rules and standards to support future computer platform compatibility	2.79 ± 1.04
Access to the majority of knowledge within my organization	2.77 ± 0.99
Efficiency of information systems	2.77 ± 0.93
User friendliness of information systems	2.74 ± 0.95
Top management encouragement toward utilization of the knowledge management system	2.59 ± 1.08
Data sharing among different applications	2.56 ± 0.92
Adequate budgeting or funding to support knowledge management projects	2.54 ± 0.97
Documentation of the most operating rules, policies, and procedures for knowledge management implementation processes	2.54 ± 1.04
Minimization of hierarchical and bureaucratic procedures for effective knowledge management	2.51 ± 1.18
The complexity and limitation of current applications software to develop interactive knowledge management applications	2.41 ± 0.90

[b] 5 = Extensively Implemented, 3 = Moderately Implemented, 1 = Not Implemented

Table 4-10b (Cont.)

Mean Scores of Degree of Implementation

Attributes	Implementation Mean[b] ± SD
Sharing knowledge with suppliers	2.38 ± 0.97
Encouraging employees to benchmark other organizations' best practices	2.38 ± 1.06
Reformulation of any rules (i.e., personnel policies) that obstruct the implementation of knowledge management	2.37 ± 1.01
Knowledge management awareness training to non-supervisory employees	2.35 ± 1.09
Providing the employees with adequate information of knowledge management related principles through training	2.35 ± 1.02
Providing guidelines to operate a benchmarking	2.30 ± 0.98
Encouraging knowledge creating teams such as knowledge task force, the future group, or learning group	2.30 ± 1.12
Supporting utilization of a knowledge-related measurement mechanism	2.15 ± 0.98

[b] 5 = Extensively Implemented, 3 = Moderately Implemented, 1 = Not Implemented

4.4 Comparison of the Degree of Importance and Implementation

Paired t-test was used to compare the degree of importance with the degree of implementation. Results of paired t-test in differences are shown in Table 4-11. The most differences in means between the degree of importance and the degree of actual implementation were shown in attributes related to information systems: "User friendliness of information systems (M_d[a] = 1.87)," "Efficiency of information systems (M_d = 1.84)," and "Usability and understandability of output (M_d = 1.81)." These attributes were not implemented to the extent of that they were perceived as important.

The attribute that showed the least difference between the degree of importance and the degree of implementation was "Analysis of job performance data and information (M_d = 1.01)." This attribute was implemented as much as it was perceived as the degree of importance, even significantly different at p = 0.001.

As Table 4-11 shows, there were significant differences between the degree of importance and the degree of implementation for all attributes ($p < 0.001$). The perceived degree of importance was much higher than the degree of implementation indicating the extent to which KM has actually been implemented in respondents' organizations. This relationship is illustrated as a scatter graph in Figure 4-1.

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[a] Md = Mean difference

Table 4-11

Comparison of the Degree of Importance and Implementation

Attributes	Difference Mean	t-value
User friendliness of information systems	1.87	22.289*
Efficiency of information systems	1.84	22.194*
Usability and understandability of output	1.81	22.459*
Data sharing among different applications	1.79	21.111*
Supporting utilization of a knowledge-related measurement mechanism	1.78	20.342*
Encouraging employees to benchmark other organizations' best practices	1.76	19.897*
Effectiveness of information systems	1.71	21.163*
Providing guidelines to operate a benchmarking	1.71	18.973*
Access to the majority of knowledge within my organization	1.68	20.193*
Providing the employees with adequate information of knowledge management related principles through training	1.66	18.727*
Encouraging knowledge creating teams such as knowledge task force, the future group, or learning group	1.64	17.427*
Actively encourage employee involvement in decision processes	1.63	19.178*
The complexity and limitation of current applications software to develop interactive knowledge management applications	1.61	18.586*
Promote ongoing employee contributions	1.61	19.063*

* $p < 0.001$

Table 4-11 (Cont.)

Comparison of the Degree of Importance and Implementation

Attributes	Difference Mean	t-value
Promote employee ownership and workmanship	1.61	18.107*
Gaining knowledge about customers, own competencies and capabilities	1.60	19.661*
Organizational commitment to empower people	1.60	17.375*
Sharing knowledge with members of other work groups within my organization	1.58	18.924*
Current corporate hardware and operating systems rules and standards to support future computer platform compatibility	1.57	18.110*
Top management leadership and commitment toward knowledge management	1.54	20.052*
Top management encouragement toward utilization of the knowledge management system	1.53	18.573*
A spirit of cooperation and teamwork	1.52	19.043*
Reward and recognition for actual performance improvement	1.52	16.100*
Knowledge management awareness training to non-supervisory employees	1.51	17.944*
Minimization of hierarchical and bureaucratic procedures for effective knowledge management	1.51	17.285*
Sharing knowledge with other members of a work group	1.49	19.819*
Reformulation of any rules (i.e., personnel policies) that obstruct the implementation of knowledge management	1.42	17.867*

* $p < 0.001$

Table 4-11 (Cont.)

Comparison of the Degree of Importance and Implementation

Attributes	Difference Mean	t-value
Fairness of individual or team-based performance measurement	1.42	17.434*
Adequate budgeting or funding to support knowledge management projects	1.41	17.920*
Policies to improve the quality of worklife	1.37	17.960*
Supporting team-based approaches to problem solving	1.36	15.842*
Sharing knowledge with suppliers	1.34	15.683*
Organizational support to seek human values of employees	1.29	16.858*
Effectiveness of performance measurement	1.28	16.244*
Documentation of the most operating rules, policies, and procedures for knowledge management implementation processes	1.26	16.071*
A formal system that allows for contribution of every employee's opinions or suggestions	1.24	16.242*
Top management encouragement toward formal/informal communication	1.09	17.351*
Encouraging employees to participate in internal and external new learning opportunities such as conferences, training seminar, university courses, etc.	1.05	13.229*
Analysis of job performance data and information	1.01	12.713*

* $p < 0.001$

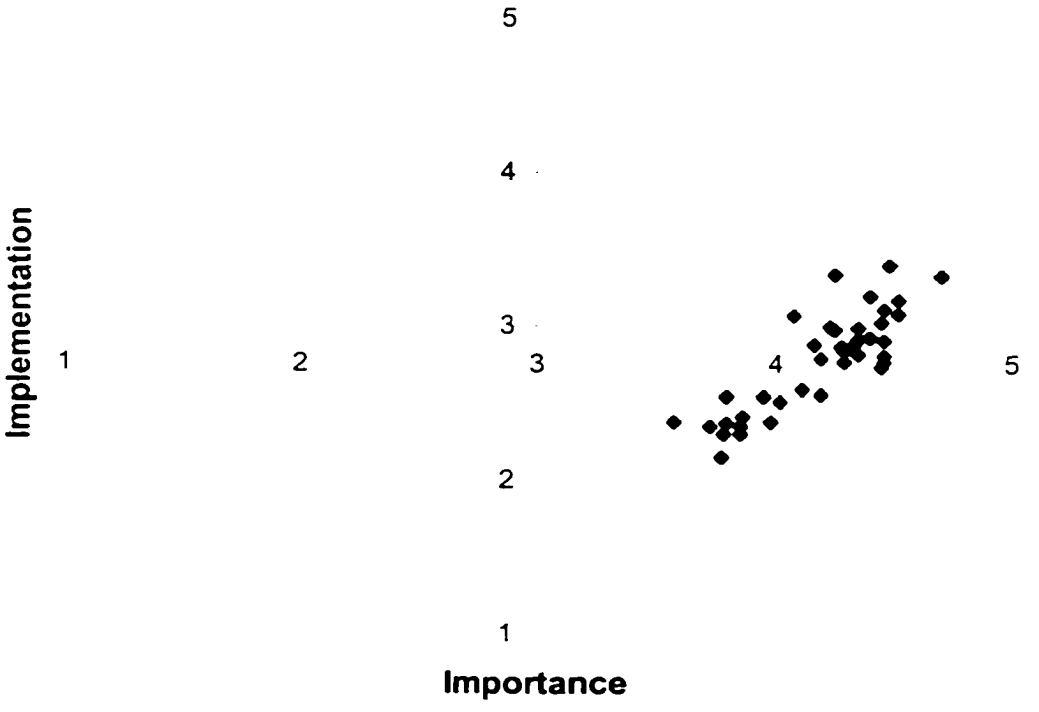

Figure 4-1

Scatter Graph for the Degree of Importance and Implementation

4.5 KM Factors

Extraction of principal factors with varimax rotation was performed on 39 attributes measuring the degree of importance and implementation for the sample of 217 organizations. Principal components extraction was used prior to principal factors extraction to estimate the number of factors, presence of outliers, absence of multicolinearity, and factorability of the correlation matrices. With an $\alpha = .001$ cutoff level, no respondents produced scores that identified them as outliers.

Factors and loading for importance and implementation are shown in Table 4-12 and 4-14, respectively. Attributes are ordered and grouped by size of loading to facilitate interpretation. Nunnally (1978) states that an item with low-item-total correlation indicates that the item is not drawn from the same domain and should be deleted to reduce error and unreliability. Therefore, supplementary tables including eigenvalues, variance explained (%), and coefficient α follow (Table 4-13 and 4-15). Attributes with similar loading on two factors and attributes with loading less than .40 were removed.

4.5.1 Importance Factors of KM

The results of factor analysis for importance are shown in Table 4-13. The six factors with eigenvalues of 1.00 or greater, with 63.9% of the variance explained, included 35 attributes for importance. Four attributes with similar loadings on two factors were removed. The six factors were labeled as knowledge supportive human resource, leadership and policy, information

systems, performance measurement, knowledge friendly environment, and knowledge sharing. Eight attributes were categorized as a knowledge supportive human resource factor; it included employee training, employee involvement, teamwork, and employee empowerment. The leadership and policy factor explained top-management leadership and commitment and organizational constraints. The factor of knowledge friendly environment consisted of egalitarian climate and knowledge benchmarking.

Table 4-12

Factor Analysis of Degree of Importance

Factors	Factor Loading
Factor 1: Knowledge Supportive Human Resource	
Actively encourage employee involvement in decision processes	.741
Organizational commitment to empower people	.731
A spirit of cooperation and teamwork	.704
Promote employee ownership and workmanship	.684
Supporting team-based approaches to problem solving	.681
Promote ongoing employee contributions	.646
Encouraging employees to participate in internal and external new learning opportunities such as conferences, training seminar, university courses, etc.	.504
Organizational support to seek human values of employees	.445
Factor 2: Leadership and Policy	
Top management leadership and commitment toward knowledge management	.738
Top management encouragement toward utilization of the knowledge management system	.733
Adequate budgeting or funding to support knowledge management projects	.690
Reformulation of any rules (i.e., personnel policies) that obstruct the implementation of knowledge management	.637
Documentation of the most operating rules, policies, and procedures for knowledge management implementation processes	.595
Minimization of hierarchical and bureaucratic procedures for effective knowledge management	.471
Policies to improve the quality of worklife	.438
Factor 3: Information Systems	
Effectiveness of information systems	.814
Usability and understandability of output	.768
User friendliness of information systems	.749
Efficiency of information systems	.733

Table 4-12 (Cont.)

Factor Analysis of Degree of Importance

Factors	Factor Loading
Factor 3 (cont.): Information Systems	
Current corporate hardware and operating systems rules and standards to support future computer platform compatibility	.612
Data sharing among different applications	.607
Factor 4: Performance Measurement	
Effectiveness of performance measurement	.726
Analysis of job performance data and information	.662
Fairness of individual or team-based performance measurement	.607
A formal system that allows for contribution of every employee's opinions or suggestions	.565
Reward and recognition for actual performance improvement	.554
Top management encouragement toward formal/informal communication	.423
Factor 5: Knowledge Structure	
The complexity and limitation of current applications software to develop interactive knowledge management applications	.655
Providing guidelines to operate a benchmarking	.644
Supporting utilization of a knowledge-related measurement mechanism	.635
Encouraging knowledge creating teams such as knowledge task force, the future group, or learning group	.589
Encouraging employees to benchmark other organizations' best practices	.415
Factor 6: Knowledge Sharing	
Sharing knowledge with members of other work groups within my organization	.765
Sharing knowledge with other members of a work group	.684
Access to the majority of knowledge within my organization	.536
Gaining knowledge about customers, own competencies and capabilities	. 464

Table 4-13

Factor Analysis Supplement of Degree of Importance

Factors	Eigen-values	Variance Explained (%)	Coefficient α
Factor 1: Knowledge Supportive Human Resources	15.801	40.5	.879
Factor 2: Leadership and Policy	2.426	6.2	.871
Factor 3: Information Systems	2.074	5.3	.895
Factor 4: Performance Measurement	1.903	4.9	.858
Factor 5: Knowledge Friendly Environment	1.439	3.7	.833
Factor 6: Knowledge Sharing	1.2661	3.2	.808

4.5.2 Implementation Factors for KM

The six factors with eigenvalues of 1.00 or greater included 33 attributes for implementation. However, due to the low coefficient alpha and lack of relationship, the sixth factor was removed (Eigenvalue = 1.104, Coefficient α = .609). The results including the five factors with 31 attributes are shown in Table 4-14, with 63.0% of the variance explained. The five factors were labeled as knowledge supportive human resource, leadership and policy, information systems, performance measurement, and employee education. In the factor analysis of implementation, the employee education factor was separated from the knowledge supportive human resource. This meant that the employee education is one of the critical factors for achieving a successful implementation of KM.

Factor analysis showed that there were differences between factors perceived as important and factors actually implemented. Factors that were considered as important to the successful implementation of KM and were actually implemented in the organization were knowledge supportive human resource, leadership and policy, information systems, and performance measurement. The knowledge friendly environment and knowledge sharing were perceived as important, but not actually implemented. When KM was implemented in an organization, the employee education on KM is a factor considered, rather than knowledge structure and knowledge sharing.

Table 4-14

Factor Analysis of Degree of Implementation

Factors	Factor Loading
Factor 1: Knowledge Supportive Human Resource	
Supporting team-based approaches to problem solving	.766
Promote employee ownership and workmanship	.730
Actively encourage employee involvement in decision processes	.723
Sharing knowledge with other members of a work group	.722
A spirit of cooperation and teamwork	.703
Organizational commitment to empower people	.660
Sharing knowledge with members of other work groups within my organization	.630
A formal system that allows for contribution of every employee's opinions or suggestions	.479
Factor 2: Leadership and Policy	
Top management encouragement toward utilization of the knowledge management system	.781
Top management leadership and commitment toward knowledge management	.746
Adequate budgeting or funding to support knowledge management projects	.709
Reformulation of any rules (i.e., personnel policies) that obstruct the implementation of knowledge management	.675
Minimization of hierarchical and bureaucratic procedures for effective knowledge management	.605
Organizational support to seek human values of employees	.572
Access to the majority of knowledge within my organization	.543
Documentation of the most operating rules, policies, and procedures for knowledge management implementation processes	.511
Policies to improve the quality of worklife	.422
Factor 3: Information Systems	
Efficiency of information systems	.804
User friendliness of information systems	.779

Table 4-14 (Cont.)

Factor Analysis of Degree of Implementation

Factors	Factor Loading
Factor 3 (Cont.): Information Systems	
Effectiveness of information systems	.776
Usability and understandability of output	.756
Current corporate hardware and operating systems rules and standards to support future computer platform compatibility	.642
Data sharing among different applications	.630
Factor 4: Performance Measurement	
Effectiveness of performance measurement	.766
Analysis of job performance data and information	.762
Fairness of individual or team-based performance measurement	.684
Reward and recognition for actual performance improvement	.627
Factor 5: Employee Education	
Providing the employees with adequate information of knowledge management related principles through training	.713
Knowledge management awareness training to on-supervisory employees	.660
Encouraging employees to participate in internal and external new learning opportunities such as conferences, training seminar, university courses, etc.	.554
Encouraging knowledge creating teams such as knowledge task force, the future group, or learning group	.461

Table 4-15

Factor Analysis Supplement of Degree of Implementation

Factors	Eigen-values	Variance Explained (%)	Coefficient α
Factor 1: Knowledge Supportive Human Resources	17.109	43.9	.912
Factor 2: Leadership and Policy	2.723	7.0	.911
Factor 3: Information Systems	.1.911	4.9	.906
Factor 4: Performance Measurement	1.564	4.0	.887
Factor 5: Employee Education	1.276	3.3	.807

4.6 Reliability Test

The reliability of a measure refers to its stability over a variety of conditions (Nunnally and Bernstein, 1994). It concerns the dependability, consistency, accuracy, predictability, and stability of a measuring instrument (Kerlinger, 1986). Poor reliability can be a result from various sources such as, contestable instrument items, researcher bias, respondent bias, and unreliable subjects. The Cronbach alpha coefficient is widely used for estimating the internal consistency and reliability of a measure. Typically, alpha can range from 0 to 1. Although there is no definite value for evaluating the reliability of a measure, the rule of thumb is that an alpha coefficient above 0.7 signifies high reliability (Nunnally and Bernstein, 1994; Pedhazur and Pedhazur Schmelkin, 1991).

The size of this coefficient depends on the average correlation among items and the number of items. If the value is low, dropping items that do not contribute significantly to the average correlation can increase the value of alpha and, in essence, the reliability of the measure (Carmines and Zellers, 1997). Tables 4-13 and 4-15 represent the results of reliability testing. The alpha coefficient for this study ranged from a low of 0.808 (knowledge sharing) to a high of 0.895 (information systems) in terms of the degree of importance and a low of 0.807 (employee education) to a high of 0.912 for knowledge supportive human resources for the degree of implementation.

4.7 Construct Validity Test

The purpose of construct validity is to assess the quality of correspondence between a theoretically based construct and its operational measures (Babbie, 1995). One of the most powerful methods to test construct validity is factor analysis (Kerlinger, 1986). If all items in the variables are factor analyzed and loaded in accordance with a priori theoretical expectations, then significant aspects of construct validity have been assessed (Nunnally and Bernstein, 1994). Table 4-12 and 4-14 show the results of principal factor analysis by using a varimax rotation on items used to measure the study variables. All the constructs were loaded onto single factors in accordance with a priori expectations. Although there is no generally accepted standard on significance of factor loadings, the 0.3 criterion suggested by Nunnally and Bernstein (1994) was chosen. As shown in tables 4-12 and 4-14, all the items had factor loadings higher than 0.3.

4.8 Multiple Regression Analysis

Multiple regression analysis was conducted to examine the relationships of the six independent variables from the importance scales (knowledge supportive human resources, leadership and policy, information systems, performance measurement, knowledge friendly environment, knowledge sharing) and the five independent variables from the implementation scales (knowledge supportive

human resources, leadership and policy, information systems, performance measurement, employee education) with perceived success of KM.

Multiple regression analysis is a powerful and versatile method applicable to situations in which the research goal is to explain or predict a single variable on the basis of multiple independent variables (Pedhazur, 1982). As Hair et al. (1987) pointed out, the stepwise multiple regression analysis is especially appropriate when there is a relatively large number of independent variable for inclusion in the function. By sequentially determining the next best discriminating variable at each step, variables that are not useful are eliminated. The reduced set typically is almost as good as, and sometimes better than, the complete set of variables (Stevens, 1991).

Because individual attributes were scaled successfully, with high coefficient alphas of all six factors for importance (Table 4-13) and five factors for implementation (Table 4-15), item mean averages were used as factor means while conducting the multiple regression analysis. For the dependent variable indicating perceived success of KM, three statements in section IV of the questionnaire were used; the mean was 4.14 out of 5 point scale.

4.8.1 Hypothesis Test of Importance Factors

The multiple regression results of the relationships between the six factors for importance and the success of KM are presented in Table 4-16. The table shows the standardized coefficient (β), significance level, and adjusted squared

multiple correlation coefficient (adjusted R^2). The data show that the independent variable as a whole explained 7.0% of the variance in the success of KM, significant at the 0.05 level. As shown in Table 4-16, "Leadership and Policy" was positively associated with the success of KM ($p < 0.001$). However, other factors were not found to be positively associated with the success of KM.

The "Knowledge Supportive Human Resource" factor was not positively associated with the dependent variable (Table 4-16). This does not support Hypotheses H1 to H4, including employee training, employee involvement, teamwork, and employee empowerment factors. Thus, H1, H2, H3, and H4 were rejected. The "Leadership and Policy" factor was positively associated with the success of KM, with a probability of 0.000. Top-management leadership and commitment and fewer organizational constraints were found to be related to the success of KM, providing support for H5 and H6. The factors of "Information Systems, Performance Measurement, Knowledge Friendly Environment, and Knowledge Sharing" failed to support hypotheses H7, H8, H9 and H10, and H11, respectively. These four factors were not positively associated with the success of KM.

4.8.2 Hypothesis Test of Implementation Factors

The multiple regression results of the relationship between the five factors for implementation and the success of KM are shown in

Table 4-17. The five implementation factors explained 4.2% of the variance in the dependent variable, which is statistically significant at the 0.05 level. The "Information Systems" factor was positively associated with the success of KM ($p < 0.01$), while the other factors including Knowledge Supportive Human Resource, Leadership and Policy, Performance Measurement, and Employee Education were not positively associated with the successful KM implementation.

The factors "Knowledge Supportive Human Resources" and "Employee Education" were used to determine hypothesis H1 through H4. The results of regression analysis for these two factors did not support hypothesis H1, H2, H3, and H4 including employee training, employee involvement, teamwork, and employee empowerment. "Leadership and Policy" was not positively associated with the success of KM when KM was actually implemented in organizations. "Information Systems" was considered to be positively associated with the time of implementation. Thus, H5 and H6 were rejected and H7 was accepted. "Performance Measurement" was found not to be positively associated with the dependent variable: H8 was not supported. H9, H10, and H11 were not able to be tested when considering implementation factors, because items related to egalitarian climate (H9), benchmarking (H10), and knowledge structure (H11) were not loaded and so deleted in factor analysis (See Table 4-14).

Table 4-16

Effect of Six Factors of Importance on the Success of KM

Factors	Standardized Coefficient (β)	Significance Level of Slope	Adjusted R^2
Knowledge Supportive Human Resource	.076	.359	.070
Leadership and Policy	.272	.000	
Information Systems	.114	.128	
Performance Measurement	.090	.327	
Knowledge Friendly Environment	.091	.304	
Knowledge Sharing	-.012	.883	

Table 4-17

Effect of Five Factors of Implementation on the Success of KM

Factors	Standardized Coefficient (β)	Significance Level of Slope	Adjusted R^2
Knowledge Supportive Human Resource	-.036	.594	.042
Leadership and Policy	.018	.791	
Information Systems	.216	.001	
Performance Measurement	-.036	.595	
Employee Education	.037	.588	

4.9 Multivariate Analysis of Variance

A multivariate analysis of variance (MANOVA) was performed to identify interrelationship between KM factors and organizational characteristics. According to the extensive literature review, there are no reports that KM factors can be influenced by organization type, annual revenue, number of employees, and time of investment on KM. Since this study investigated a various type and size of organizations, it would be logical to identify the degree of influence of organizational characteristics on KM factors as a researchers interest. Multivariate analysis of variance (MANOVA) tests whether mean differences among groups on a combination of dependent variables are likely to have occurred by chance (Tabachnick and Fidell, 1996).

Overall factor means for both importance and implementation scales were separately examined by the type of organization, annual revenue, number of employees, and time of investment in KM. Because of the many different types of organization (from Table 4-1), the three most common types of organization were used for MANOVA: non-profit organization, sales/marketing/retail, and manufacturing. For statistical purposes, each independent variable was regrouped to have a similar number of respondents for each group.

The independent variables were the organization type, annual revenue, number of employees, and time of investment on KM. The six dependent variables were selected from the importance scales (knowledge supportive human resources, leadership and policy, information systems, performance

measurement, knowledge friendly environment, and knowledge sharing). The five dependent variables were also selected from the implementation scales (knowledge supportive human resources, leadership and policy, information systems, performance measurement, and employee education.

4.9.1 Importance Scale

MANOVA results of the differences in the importance scale are presented in Tables 4-18, 4-19, 4-20, and 4-21. The data showed no significant differences of mean scores by type of organization, annual revenue, number of employees, and investment time in KM pertaining to the six critical factors for importance. In Table 4-18, the mean scores of non-profit organizations for "Performance Measurement" factor was lower than that for sales/marketing/retail and manufacturing organizations; however, it was not significant at α level of 0.05.

Mean ratings of factors perceived as important to successful implementation of KM were not affected by organizations' type, size, and the status of KM implementation.

Table 4-18

Perceived Importance of KM Factors among Different Types of Organizations

	Type of Organization[a,b]					
Factor	1	2	3	*F*	*df*	*p*
Knowledge Supportive Human Resource	4.42	4.48	4.34	.565	2	.570
Leadership and policy	4.14	4.20	3.98	1.29	2	.280
Information Systems	4.35	4.41	4.37	.22	2	.801
Performance Measurement	4.19	4.47	4.41	3.04	2	.052
Knowledge Friendly Environment	3.85	3.89	3.69	.73	2	.484
Knowledge Sharing	4.39	4.40	4.46	.13	2	.875

Wilks's lambda = .828, F = .1.835, p = .044

[a] For type of organization, 1 = non-profit organization, 2 = Sales/Marketing/Retail, 3 = manufacturing

[b] For ratings within the table, 5 = very important, 4 = important, 3 = moderately important, 2 = minor important, 1 = not important. The mean of a factor was the average of item means in that factor.

Table 4-19

Perceived Importance of KM Factors among Organizations with Different Annual Revenues

Factor	Annual Revenue[a,b] 1	2	3	4	*F*	*df*	*p*
Knowledge Supportive Human Resource	4.47	4.42	4.41	4.33	.248	3	.863
Leadership and policy	4.18	4.27	4.18	4.05	.304	3	.822
Information Systems	4.37	4.33	4.55	4.40	.533	3	.661
Performance Measurement	4.44	4.35	4.48	4.38	.206	3	.892
Knowledge Friendly Environment	3.85	3.97	3.98	3.84	.206	3	.892
Knowledge Sharing	4.43	4.35	4.51	4.30	.580	3	.630

Wilks's lambda = .878, F = .513, p = .950

[a] For annual turnover, 1 = $10 million or less, 2 = $10,000,001 - $100,000,000, 3 = $100,000,001 - $1,000,000,000, 4 = $ 1 billion or more.

[b] For ratings within the table, 5 = very important, 4 = important, 3 = moderately important, 2 = minor important, 1 = not important. The mean of a factor was the average of item means in that factor.

Table 4-20

Perceived Importance of KM Factors among Organizations with Varying Numbers of Employees

Factor	Number of Employees[a,b]			*F*	*df*	*p*
	1	2	3			
Knowledge Supportive Human Resource	4.42	4.40	4.32	.433	2	.649
Leadership and policy	4.11	4.00	4.00	.617	2	.541
Information Systems	4.33	4.43	4.38	.664	2	.516
Performance Measurement	4.31	4.29	4.27	.037	2	.963
Knowledge Friendly Environment	3.84	3.83	3.79	.066	2	.936
Knowledge Sharing	4.39	4.37	4.34	.075	2	.927
Wilks's lambda = .969, F = .515, p = .905						

[a] For number of employees, 1 = 100 or less, 2 = 101 – 1,000, 3 = more than 1,000

[b] For ratings within the table, 5 = very important, 4 = important, 3 = moderately important, 2 = minor important, 1 = not important. The mean of a factor was the average of item means in that factor.

Table 4-21

Perceived Importance of KM Factors among Organizations with a Different Amount of Time Investment for KM

Factor	Time of Investment[a,b]				*F*	*df*	*p*
	1	2	3	4			
Knowledge Supportive Human Resource	4.36	4.47	4.44	4.27	.860	3	.463
Leadership and policy	4.12	4.10	4.04	3.84	.793	3	.499
Information Systems	4.34	4.44	4.44	4.10	1.59	3	.193
Performance Measurement	4.30	4.41	4.24	4.05	1.76	3	.157
Knowledge Friendly Environment	3.81	3.92	3.86	3.55	1.04	3	.374
Knowledge Sharing	4.34	4.44	4.41	4.24	.74	3	.529

Wilks's lambda = .930, F = .773, p = .733

[a] For time of investment, 1 = have already, 2 = within 2 years from now, 3 = more than 2 years from now, 4 = never

[b] For ratings within the table, 5 = very important, 4 = important, 3 = moderately important, 2 = minor important, 1 = not important. The mean of a factor was the average of item means in that factor.

4.9.2 Implementation Scale

MANOVA results of the difference of implementation scale are presented in Tables 4-22, 4-23, 4-24, and 4-25. The post hoc analysis (Tukey method) was conducted to examine where significant differences existed. When the MANOVA generated an F statistic that was significant, a follow-up technique is necessary to isolate which population means are different (and which are alike). The objective of the post hoc comparison is to better understand why the MANOVA yielded a significant F. A post hoc investigation helps the researcher understand why the MANOVA H_o was rejected. Because there were significant F results in this study, post hoc comparison using the Tukey's test was conducted to isolate which population means are different.

The degree of implementation in different type of organizations was significantly different on knowledge supportive human resource (p = .012), leadership and policy (p = .006), and performance measurement (p = .000) (Table 4-22). The degree of implementation for these three factors in Non-profit organizations was significantly different from those in manufacturing. Annual turnover and number of employees did not show any difference of mean scores on six dependent variables (Table 4-23 and 4-24). However, time of investment affected the degree of implementation for knowledge supportive human resource, leadership and policy, information systems, performance measurement, and employee education (p = .000). Post-hoc analysis was conducted to discover where the difference occurred. Organizations which have already invested and

plan to invest within 2 years showed significantly different implementation status on "knowledge supportive human resource" and "leadership and policy" from those that plan to invest more than 2 years from now or never plan to invest in KM ($p < .05$).

There was no significant difference in the degree of implementation by factors among organizations with different annual turnover and number of employees at α level of 0.05. However, there were significant differences in the degree of implementation by factors among different types of organizations and different time of investment.

The degree of importance examined by importance factors on KM did not appear to be affected by the characteristics of diverse organizations. However, organizations that had different characteristics influenced the degree of implementation when examined by implementation factors.

Table 4-22

The Degree of Implementation affected by KM Factors among Different Types of Organizations

Factor	Type of Organization[a,b] 1	2	3	*F*	*df*	*p*
Knowledge Supportive Human Resource	2.84_c	$3.12_{c,d}$	3.38_d	4.63	2	.012
Leadership and policy	2.44_c	2.95_d	$2.60_{c,d}$	5.30	2	.006
Information Systems	4.35	4.41	4.44	.22	2	.801
Performance Measurement	2.48_c	3.27_d	3.20_d	11.06	2	.000
Employee Education	2.39	2.70	2.45	1.79	2	.172

Wilks's lambda = .702, $F = 4.327$, $p = .000$

[a] For type of organization, 1 = non-profit organization, 2 = Sales/Marketing/Retail, 3 = manufacturing

[b] For ratings within the table, 5 = extensively implemented, 4 = implemented, 3 = moderately implemented, 2 = little implemented, 1 = not implemented. The mean of a factor was the average of item means in that factor.

[c, d] No difference between same characters within each factor

Table 4-23

The Degree of Implementation affected by KM Factors among Organizations with Different Annual Revenues

	Annual Revenue[a,b]						
Factor	**1**	**2**	**3**	**4**	***F***	***df***	***p***
Knowledge Supportive Human Resource	3.34	2.95	2.95	3.11	1.16	3	.326
Leadership and policy	2.82	2.50	2.46	2.82	1.39	3	.250
Information Systems	4.38	4.33	4.55	4.46	.65	3	.586
Performance Measurement	3.19	2.88	3.04	3.07	.31	3	.816
Employee Education	2.80	2.42	2.39	2.63	1.09	3	.358

Wilks's lambda = .892, F = .760, p = .721

[a] For annual turnover, 1 = $10 million or less, 2 = $10,000,001 - $100,000,000, 3 = $100,000,001 - $1,000,000,000, 4 = $ 1 billion or more.

[b] For ratings within the table, 5 = extensively implemented, 4 = implemented, 3 = moderately implemented, 2 = little implemented, 1 = not implemented. The mean of a factor was the average of item means in that factor.

Table 4-24

The Degree of Implementation affected by KM Factors among Organizations with Varying Numbers of Employees

Factor	Number of Employees[a,b]			*F*	*df*	*p*
	1	2	3			
Knowledge Supportive Human Resource	3.09	3.12	2.99	.31	2	.734
Leadership and policy	2.72	2.67	2.47	1.29	2	.276
Information Systems	4.33	4.43	4.39	.61	2	.544
Performance Measurement	2.94	3.06	2.89	.51	2	.599
Employee Education	2.71	2.53	2.41	1.86	2	.159
Wilks's lambda = .948, F = 1.06, p = .393						

[a] For number of employees, 1 = 100 or less, 2 = 101 – 1,000, 3 = more than 1,000

[b] For ratings within the table, 5 = extensively implemented, 4 = implemented, 3 = moderately implemented, 2 = little implemented, 1 = not implemented. The mean of a factor was the average of item means in that factor.

Table 4-25

The Degree of Implementation affected by KM Factors among Organizations with a Different Amount of Time Investment for KM

Factor	Time of Investment[a,b] 1	2	3	4	*F*	*df*	*p*
Knowledge Supportive Human Resource	3.39_c	3.18_c	2.62_d	2.48_d	11.59	3	.000
Leadership and policy	3.16_c	2.69_c	2.12_d	2.03_d	22.82	3	.000
Information Systems	4.34	4.45	4.44	4.10	1.64	3	.182
Performance Measurement	3.32_c	$3.07_{c,d}$	$2.58_{d,e}$	2.46_e	7.16	3	.000
Employee Education	2.96_c	$2.67_{c,d}$	2.07_e	$2.19_{d,e}$	12.23	3	.000

Wilks's lambda = .696, $F = 4.889$, $p = .000$

[a] For time of investment, 1 = have already, 2 = within 2 years from now, 3 = more than 2 years from now, 4 = never

[b] For ratings within the table, 5 = extensively implemented, 4 = implemented, 3 = moderately implemented, 2 = little implemented, 1 = not implemented. The mean of a factor was the average of item means in that factor.

[c, c, e] No difference between same characters within each factor

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This chapter begins by presenting the managerial implications of the study results. The second section discusses the strengths and contributions of these results, while the third section addresses the inherent limitations in this study. Possible direction for future studies will conclude the discussion.

5.1 Managerial Implications of the Study Results

The knowledge-based economy in the intelligence age is moving forward at a very rapid pace. It became a business phenomenon for the KM paradigm to play a vital role in an organization's success in the global market. Over and above participation in the knowledge-based economy, KM will help shape an organization's technological and organizational innovations for a more effective operation.

Throughout this study, a number of managerial concepts and ideas have been explained, tested, and analyzed. Many academicians and practitioners have suggested numerous managerial practices and ideas for successful KM. Management should not follow fashion or a stream of superficial activities. It should focus on innovations and organization-wide improvements, regardless of organizational characteristics or type (Lee, 1994). From this focal point, an organization can achieve or even exceed its expectations and goals. Thus, this

study developed an instrument to empirically investigate the critical factors for successful implementation of KM by utilizing a survey questionnaire.

5.1.1 Respondents' Perceptions of KM

The overall respondents' attitudes toward KM were examined. The results indicate that the respondents seemed aware of the importance of KM in terms of their organization's current and future performance. Most respondents view their organization's business as knowledge intensive, which is similar to the results of a recent joint survey by Business Intelligence and Ernst & Young Center for Business Innovation (Ruggles, 1998). Also, most respondents think of KM as a way to promote more effective management. However, the respondents do not believe strongly that a KM specialist such as a Chief Knowledge Officer (CKO) or an external consultant is needed for effective management of knowledge. Only a few leading organizations have CKOs or external KM consultants to promote effective KM, indicating that managers might not have an appropriate understanding of the exact role and impact of CKO or external KM consultant. Unlike Fortune 500 or leading KM companies, the organizations from the Gallup industry database utilized for this study are more likely generic organizations, meaning these organizations usually do not institute such innovative paradigms as KM.

According to a recent survey, top executives of both Canadian Financial Post 300 firms and US Fortune 500 firms view information technology as one of

the most critical factors for the success of KM (Covin et al., 1997). As the survey indicated, information technology was the most commonly implemented area of KM. This result confirms that, regardless of organization type and size, various industry executives consider information technology as the most important area for the success of KM even though academicians view the success of KM differently based on their professional background. This result also indicates that information technology's role in most organizations is inevitable, and many MIS empirical studies have confirmed this.

One conflicting result is that Intranet was the least used technology in KM application. This result is somewhat confusing. It is inevitable that the Internet is the best and most fundamental source for KM (Davenport 1996; Ruggles, 1998; Cisco and Strong, 1999; Hibbard, 1997; McCartney, 1998; Roberts, 2000). According to research reports, other than the Internet, the Intranet is the most important information technology for successful KM implementation within an organization in order to foster learning, sharing, and collaboration (Baladi, 1999; Cohen, 1998; Greenberg, 1998; Frappaolo and Capshaw, 1999). However, some respondents might not recognize what the Intranet can contribute to a KM program or how the Intranet can be utilized in order to establish a successful KM structure.

5.1.2 Comparison Between Importance and Implementation of KM Factors

The Paired t-test compared the degree of importance with the degree of implementation. The results indicate that more than half of the top 25% attributes' mean (based on Table 4-11) differences between the degree of importance and the degree of actual implementation were primarily in information systems infrastructure such as "user friendliness of information systems," "efficiency of information systems," "usability and understandability of output," "data sharing among different applications," and "effectiveness of information systems."

These attributes were not implemented to the degree that they were perceived as important. This implies two things. One is that it may be difficult to recognize the impact of information systems infrastructure on KM unless the respondent's job is related to information technology. The other is, according to Table 4-4, only a third of respondents' organizations (29.8%) are either starting to develop KM or beginning to implement KM. As Savary (1999) pointed out, information systems cannot play a vital role unless organizations are finally ready to implement KM. Since most of respondents' organizations have not started to establish or implement KM, the gap between perceived importance and actual implementation of KM is greater than the bottom 25% attributes' mean differences. After all, information technology favors the diffusion at lower levels of codification and abstraction (Boisot and Griffith, 1999).

The other top 25% attributes' mean differences between the degree of importance and the degree of actual implementation were mainly in

benchmarking such as, "encouraging employees to benchmark other organization's best practices," "providing guidelines to operate a benchmarking," and "supporting utilization of a knowledge-related measurement mechanism." This is also inevitable because, like information systems, benchmarking is not applicable unless an organization begins to establish a KM program. Likewise, the final top attribute, "access to the majority of knowledge within my organization," is possible only after the implementation of a KM program. Thus, it is logical to conclude most respondents did not seem to understand the gap between perceived importance and actual implementation of KM because most organizations have not yet started to establish or implement KM. In other words, only organizations that have initiated KM programs can understand importance of benchmarking and knowledge accessibility.

On the other hand, the bottom 25% attributes' mean differences between the degree of importance and the degree of actual implementation were somewhat fragmented and diversified. The bottom 25% attributes were implemented to the degree that they were perceived as important.

Five attributes (such as, "policies to improve worklife," "organizational support to seek human values of employees," "encouraging employees to participate in internal and external new learning opportunities," "supporting team-based approaches to problem solving," and "top management encouragement toward formal/informal communication") were related to KM friendly

organizational culture, human resource activity support, and top management commitment.

Many empirical studies about innovations like, BPR (Business Process Reengineering) and TQM (Total Quality Management) have confirmed that cultural and top management support with appropriate training and teamwork promotion are the most common formulas to succeed from the initiation to implementation. KM is another emerging innovation, and it shares very similar success factors with BPR and TQM in terms of the perspectives of cultural support, top management support, appropriate training, and teamwork promotion. It seems respondents' viewpoints are also consistent with the results of much other research, which, since most respondents are executives familiar with the research in their fields, is hardly surprising. In addition, these same executives are fully aware that a KM program needs fundamental organizational commitment like innovations such as BPR and TQM.

The other attributes were "analysis of job performance data and information," "effectiveness of performance measurement," "documentation of the most operating rules, policies, and procedures for KM implementation processes," and "sharing knowledge suppliers." The first two attributes are concerned with performance measurement. Pearson (1999) pointed out that delivery of KM to an organization can be started by establishing appropriate performance measurement systems. As Pearson insisted, respondents' organizations seem

well aware of the implications of performance measurement even though few respondents' organizations have started to establish or implement KM.

The other two attributes are related to organizational constraints and knowledge structure. Numerous academic and practical studies have confirmed that organizational constraints are the biggest barriers to innovation. In that sense, respondents must understand the importance of organizational constraints because this attribute has been a very popular issue in business world.

Knowledge creation can be based on numerous sources. Knowledge can be created individually, in groups, and on an organization level. However, the most useful knowledge can be captured and created by sharing knowledge with suppliers since today's dynamic environment requires continuous interaction with suppliers. Thus, the prominence of this attribute is not surprising at all.

In sum, the results of comparing importance and implementation are consistent with the results of KM research. As numerous studies indicate, creation of a knowledge friendly culture based on strong top management commitment and leadership and appropriate human resource support are the key ingredients for successful KM program implementation. It is especially interesting to observe that respondents are deeply aware of importance of knowledge sharing with supplier. This phenomenon implies that the spectrum of KM should not be limited to within an organization. On the other hand, information systems infrastructure can only play a key role after successful initiation of KM program. Also, other traditional issues such as benchmarking, performance measure, and

elimination of organizational constraints should be considered as fundamental driving forces for KM implementation.

5.1.3 The Effects of CSFs on KM Implementation

The relationship between the hypothesized variables and KM success was tested by employing multiple regression analysis. The findings of the regression indicate that top management leadership/commitment and fewer organizational constraints are critical to KM success in terms of the degree of importance. Regarding the degree of implementation, information systems infrastructure is considered as critical to KM success. These findings are consistent with previous and current KM research even though the organizational culture is the most critical factor for KM implementation according to numerous studies. Thus, this result confirms that most organizations consider top management leadership and information systems infrastructure as the most critical factors for the KM success.

5.1.4 The Effects of Organizational Characteristics on KM Factors

The findings of MANOVA indicate that six factors based on the degree of importance are not influenced significantly by the type of organization, annual revenue, number of employees, and investment time in KM. That is, the impact of each factor in the category on the successful implementation of KM was not affected by type of organization, annual revenue, number of employees, and investment time on KM. This result seems to make sense because it would be

difficult to measure the impact of these factors unless the respondent's organization had experience of KM implementation.

On the other hand, the degree of implementation was significantly different for knowledge supportive human resource, leadership and policy, and performance measurement in different types of organizations. Especially, the degree of implementation of these three factors in non-profit organization was better than those in manufacturing. This result is somewhat confusing because there is no research concerning the impact of KM on non-profit organizations.

Time of investment in KM does influence the degree of implementation of knowledge supportive human resource, leadership and policy, information systems, performance measurement, and employee education. However, annual revenue and number of employees do not affect the degree of implementation significantly. This result clearly shows that the effect of KM is visible only if organizations are in the process of KM implementation. That is why organizations that have already invested, or plan to invest within 2 years in KM, showed significantly different implementation status of "knowledge supportive human resource" and "leadership and policy" from those that plan to invest more than 2 years later or never plan to invest in KM.

5.2 Contributions of the Study

This study has implications for the body of knowledge of KM in general and for practitioners:

First, this study extends our knowledge of KM, especially concerning implementation issues. This study serves as a foundation for building a cumulative tradition of research on KM implementation. This study is probably among the first empirical works to specifically examine comprehensively the success factors that affect the implementation of KM. Although a few other studies have investigated success factors, their scope was limited, and the investigations were neither systematic or statistical investigated. Especially, Davenport et al. (1998) investigated only a small sample of organizations and did not include specific human resource related factors such as training, empowerment, and participation.

Second, this study attempted to identify critical success factors based on a structured questionnaire. This study may be the first study that developed and employed a structured questionnaire to investigate KM success factors based on various types of organizations. Few other studies have attempted to investigate the impact of KM, and these studies focused only on a limited number of organizations or a particular type of organization, such as consulting firms.

Finally, the most significant contribution of this study is that it provides a framework for the development of a measurement instrument for KM implementation. Only a few research reports have been published on the

development of survey measurement scales to evaluate KM factors. Moreover, this research has focused exclusively on the development of measurement scales. Thus, the measurement scales and questions utilized in this study can serve as the starting point for further refining the measurement instrument for future studies in KM.

5.3 Limitations of the Study

There are some major limitations to this study. The possibility of a biased perception of KM implementation should be considered. As a means of organizational performance improvement, KM has been publicized as a major tool or technique through the mass media as well as various academic writings, including reports by major consulting companies. As a result, KM has been viewed as a major tool for performance improvement without any assessment of the actual impact of its implementation. Consequently, this exaggeration of circumstances may affect managers' perception of KM principles and the actual usage of those principles.

Second, it is necessary for the researcher to make tradeoffs between explanatory power and the scope of research. Although this study attempted to reasonably infer a causal relationship between treatment and dependent variable, the ambiguity about the direction of a causal relationship may still be regarded as a potential threat to internal validity. External validity, which represents the ability to generalize a particular finding across different measures, settings, and

populations, is another limitation. Thus, although this study included multiple measurements to predict critical factors, the replication may be different.

Finally, this study is cross-sectional research. The assumption of causality relationships in the model is best tested with longitudinal design. Because a cross-sectional study addresses issues at only one point in time, it does not capture the complex interrelationships between variables that come into effect over time. A longitudinal study is more appropriate to capture such details.

5.4 Recommendations for Further Research

This study investigated the critical success factors affecting successful KM implementation and indicates several viable areas for future research. One of the most promising research topics would be the causal relationships among critical success factors to either KM success or one of the aspects of productivity.

Researchers, however, need to keep in mind a couple of important things to conduct this type of study. First, the number and characteristics of surrogate measures to predict a dependent variable should be clearly defined in advance. Second, researchers must carefully design the research to minimize problems with validity and reliability. This type of research needs to be powerful enough to demonstrate that a potential cause and effect could have covaried. In addition, all third variables, in terms of confounding variables, must be ruled out.

Another feasible research topic would be a cross-cultural comparative analysis of KM implementation among countries or cultural groups. As the

globalization and knowledge-based economy markets have accelerated, cross-cultural management is regarded as one of the most important issues in transnational corporations. For a cross-cultural comparative study, researchers should carefully select a sample country where KM principles are already in place. At a minimum, very similar principles of KM should be employed organization-wide. The promise of this type of study is that researchers can identify how cultural differences affect management philosophy.

Furthermore, the development of a measurement instrument for management principles or activities in the public sector is a possible topic. This study attempts to measure the critical factors of KM implementation in the private sector. Thus, a retest of the instrument with different industry groups and sample size may produce different results. One of the promises of KM is improvement of organizational performance without increasing the physical size of organization; implications for federal or state government or any other public sector organization, such as the military, could yield interesting results. In addition, there is a possibility of achieving quite different results based on geocentric and polycentric differences.

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Appendix

FACTORS AFFECTING KNOWLEDGE MANAGEMENT IMPLEMENTATION

Knowledge management is a formalized, integrated approach to identifying and managing an organization's knowledge assets. These knowledge assets may include knowledge bases, documents, policies, and procedures as well as unarticulated expertise and experience across the organization. Today, with the increasing globalization of business, explosion of information technology, erosion of corporate hierarchies, and dispersion of business activities, the issue of more efficient and effective utilization of organization's knowledge assets has become a currency in management circles.

SECTION I. **The following statements describe various issues of knowledge management. Please circle the degree of your agreement with each statement using the following scale.**

5 = Strongly Agree
4 = Agree
3 = Undecided
2 = Disagree
1 = Strongly Disagree

1.	Our organization is considered to be in the "knowledge-intensive" business.	1	2	3	4	5
2.	It would be possible, through more effective management, to leverage the knowledge existing in my organization.	1	2	3	4	5
3.	Since organizational knowledge assets have become more important, we will see greater emphasis on knowledge management in the future.	1	2	3	4	5
4.	Knowledge management has a negative impact on job security of employees.	1	2	3	4	5
5.	Knowledge management will emerge primarily through pre-built applications for specific business processes and problem areas.	1	2	3	4	5
6.	A knowledge management specialist, such as Chief Knowledge Officer (CKO) or an external consultant, is needed for effective management of knowledge.	1	2	3	4	5

SECTION II. **Please complete the two scales for the importance and the degree of implementation of the factors described below. Indicate your perception of the degree of importance for each statement to the successful implementation of knowledge management in your organization. Use the degree of implementation scale to indicate the extent that knowledge management has actually been implemented in your organization.**

5 = Very Important
4 = Important
3 = Moderately Important
2 = Minor Importance
1 = Not Important

5 = Extensively Implemented
4 = Implemented
3 = Moderately Implemented
2 = Little Implemented
1 = Not Implemented

IMPORTANCE	FACTOR	IMPLEMENTATION
1 2 3 4 5	Organizational support to seek human values of employees	1 2 3 4 5
1 2 3 4 5	A formal system that allows for contribution of every employee's opinions or suggestions	1 2 3 4 5
1 2 3 4 5	Policies to improve the quality of worklife	1 2 3 4 5
1 2 3 4 5	Top management leadership and commitment toward knowledge management	1 2 3 4 5
1 2 3 4 5	Top management encouragement toward utilization of the knowledge management system	1 2 3 4 5
1 2 3 4 5	Top management encouragement toward formal/informal communication	1 2 3 4 5
1 2 3 4 5	Adequate budgeting or funding to support knowledge management projects	1 2 3 4 5
1 2 3 4 5	Reformulation of any rules (i.e., personnel policies) that obstruct the implementation of knowledge management	1 2 3 4 5
1 2 3 4 5	Minimization of hierarchical and bureaucratic procedures for effective knowledge management	1 2 3 4 5
1 2 3 4 5	Documentation of the most operating rules, policies, and procedures for knowledge management implementation processes	1 2 3 4 5

IMPORTANCE	FACTOR	IMPLEMENTATION
1 2 3 4 5	Analysis of job performance data and information	1 2 3 4 5
1 2 3 4 5	Effectiveness of performance measurement	1 2 3 4 5
1 2 3 4 5	Fairness of individual or team-based performance measurement	1 2 3 4 5
1 2 3 4 5	Reward and recognition for actual performance improvement	1 2 3 4 5
1 2 3 4 5	Sharing knowledge with other members of a work group	1 2 3 4 5
1 2 3 4 5	Sharing knowledge with members of other work groups within my organization	1 2 3 4 5
1 2 3 4 5	Sharing knowledge with suppliers	1 2 3 4 5
1 2 3 4 5	Gaining knowledge about customers, own competencies and capabilities	1 2 3 4 5
1 2 3 4 5	Access to the majority of knowledge within my organization	1 2 3 4 5
1 2 3 4 5	Effectiveness of information systems	1 2 3 4 5
1 2 3 4 5	Efficiency of information systems	1 2 3 4 5
1 2 3 4 5	User friendliness of information systems	1 2 3 4 5
1 2 3 4 5	Usability and understandability of output	1 2 3 4 5
1 2 3 4 5	Data sharing among different applications	1 2 3 4 5
1 2 3 4 5	Current corporate hardware and operating systems rules and standards to support future computer platform compatibility	1 2 3 4 5
1 2 3 4 5	The complexity and limitation of current applications software to develop interactive knowledge management applications	1 2 3 4 5
1 2 3 4 5	Providing guidelines to operate a benchmarking system	1 2 3 4 5
1 2 3 4 5	Supporting utilization of a knowledge-related measurement mechanism	1 2 3 4 5

IMPORTANCE	FACTOR	IMPLEMENTATION
1 2 3 4 5	Encouraging employees to benchmark other organizations' best practices	1 2 3 4 5
1 2 3 4 5	Encouraging employees to participate in internal and external new learning opportunities such as conferences, training seminar, university courses, etc	1 2 3 4 5
1 2 3 4 5	Knowledge management awareness training to non-supervisory employees	1 2 3 4 5
1 2 3 4 5	Providing the employees with adequate information of knowledge management related principles through training	1 2 3 4 5
1 2 3 4 5	Promote ongoing employee contributions	1 2 3 4 5
1 2 3 4 5	Actively encourage employee participation in decision processes	1 2 3 4 5
1 2 3 4 5	A spirit of cooperation and teamwork	1 2 3 4 5
1 2 3 4 5	Supporting team-based approaches to problem solving	1 2 3 4 5
1 2 3 4 5	Encouraging knowledge creating teams such as knowledge task force, the future group, or learning group	1 2 3 4 5
1 2 3 4 5	Organizational commitment to empower people	1 2 3 4 5
1 2 3 4 5	Promote employee ownership and workmanship	1 2 3 4 5

SECTION III. The following statement describes overall perception about knowledge management. Please circle the degree of your agreement with each statement using the following scale.

1. I believe the knowledge management program fits our organization and the industry	1 2 3 4 5
2. The knowledge management program can contribute to our organization's product s or services competitiveness.	1 2 3 4 5
3. The knowledge management program can improve our organization's overall performance and sustainable competitiveness.	1 2 3 4 5

SECTION IV. The following questions are designed to obtain demographical information about you and your organization.

1. Please indicate the type of organization for which you are currently working:

_____	Public Utility	_____	Construction
_____	Manufacturing	_____	Financial Services
_____	Sales/Marketing/Retail	_____	Technology/Research
_____	Consultant/Law	_____	Transport/Distribution
_____	Health Care/Hospital	_____	Non-profit
_____	Others (please specify)	_____	

2. Please indicate the approximate annual turnover of your organization:

   $_____

3. Please indicate the number of employees at your location:

   _____

4. When is your company most likely to make a significant investment in knowledge management?

_____	Have already	_____	Within the next year
_____	1 to 2 years from now	_____	2 to 4 years from now
_____	More than 4 years from now	_____	Never

If you answered "Never" on Question #4, please go to Question #8.

5. In what stage of development is knowledge management in your organization?

_____ Currently evaluating the importance of knowledge management
_____ Planning for a knowledge management project
_____ Have one or more applications in the planning stage
_____ Have implemented one or more pilot applications
_____ Others (please specify) _____

6. In which functional area(s) of your organization is knowledge management being implemented today?

_____	Across all organization	_____	Customer service
_____	Finance	_____	Human resources
_____	Information technology	_____	Manufacturing
_____	Marketing	_____	Engineering
_____	Product development	_____	Research and development
_____	Others (please specify)	_____	

7. What component technologies are most significant in contributing to knowledge management applications? (Indicate all that apply.)

_____	Intranet	_____	Data warehouse
_____	Groupware	_____	Decision support tools
_____	Internet access	_____	Directories of resident experts
_____	Document management	_____	Web site content management
_____	Others (please specify)	_____	

8. Sex: _____ Male _____ Female

9. Age: _____

10. Please indicate your role in the organization.

_____	Executive management	_____	Project manager
_____	Chief knowledge officer	_____	IT management
_____	Line management	_____	Consultant
_____	Human resources		
_____	Others (please specify)	_____	

We appreciate your contribution to this study. If you would like have a copy of this research result, please include your business card in the return envelope or write down your address below.

Name: _____

Address: _____

_____

_____

E-mail: _____

Thank you for your participation!!

Please fold this questionnaire and mail in the return envelope.