The Study of Organizational Knowledge Capabilities, Knowledge Sharing, and Organizational Effectiveness:

A Socio-technical Perspective

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Abstract

Recent concerns about the issue of knowledge management (KM) for an intra-organization have accentuated the need for more efficient and effective knowledge sharing. Most scholars explore this issue from the economic and social capital perspectives, yet few research studies focus on organizational knowledge capabilities, specifically, the holistic perspective combined social with technological factors. Organizational knowledge capabilities are developed to perform knowledge processes more efficiency so as to achieve organizational success. Drawing from the theories of resource-based view (RBV), knowledge-based view (KBV), organizational capability, and KM, this study aims at investigating the relationship among organizational knowledge capability (OKC), knowledge sharing (KS), and organizational effectiveness.

Using structural equation modeling (SEM) with data from questionnaires collected in different industries, this study considers the knowledge managers and workers of knowledge-based organizations located in the north of Taiwan as research respondents. This study concludes four primary results: (1) IT/IS support can enhance the development of technical OKC; (2) organizational knowledge capabilities have a positive association with knowledge sharing, specifically in social OKC; (3) The more knowledge workers participate in knowledge sharing, the more organizational effectiveness can achieve; (4) firms which implement KM will be better in social OKC and knowledge sharing than firms which do not.

Keywords: knowledge management; socio-technical perspective; knowledge sharing; organizational knowledge capability.

Content

List of Tables

-VI-

List of Figures

Chapter 1 Introduction

1.1 Research Background

To bring about an increasing emphasis on managing knowledge in the dynamic knowledge environment, organizations move towards constructing more effective knowledge context for improving the knowledge activities. In the era of knowledge economy, the organizations need to integrate their infrastructures, processes, and business activities in order to develop their knowledge assets more efficiently for organizational survival and advancement. Therefore, the ability to scan and recognize critical knowledge plays an important role in gaining competitive advantage and organizational growth.

Knowledge management (KM), an emerging perspective for managing knowledge effectively, has been broadly applied to many fields from information management technologies (e.g. data mining, information retrieval, and knowledge extraction) to organizational design efforts (e.g. learning organization, knowledge community, and social capital). The importance of KM has been confirmed by the survey of Almashari et al. (2002), where 77 companies in Kuwait are investigated. They found that the entire samples (both governments and private firms) consider KM as an important factor in the organizations. Specifically, knowledge is an essential intangible resource in impacting the organizational performance. Most companies claim that KM is a part of corporate culture and can enable an organization to improve business process for achieving firm goals (Heisig and Vorbeck, 2001).

Many firms do efforts to improve organizational contexts for becoming knowledge oriented enterprises. The Most Admired Knowledge Enterprises (MAKE), a measure which presents organizational ability to convert tacit and explicit knowledge into new capital and shareholder value, founded in 1998 and aimed at identifying the leading KM organizations (see The KNOW Network website). The MAKE suggests eight knowledge performance criteria, such as a corporate knowledge-driven culture, knowledge workers, knowledge-based products and solutions, enterprise intellectual capital, collaborative knowledge sharing, a learning organization, value-based customer knowledge, and enterprise knowledge convert into shareholder value, to assess an effective knowledge organization. Some leading and famous KM enterprises, including Accenture, BMW, Buckman Laboratories, Dell, Nokia, Sony, and 3M, are best practices when the firms intent to implement KM activities. According to the recent industry survey of the German Top 1000 and European Top 200 companies (Heisig and Vorbeck, 2001), 55.4% of 146 companies have been conducted KM activities more than 3

years, and one fifths of the companies are in the planning stage. Therefore, the issue of KM is an emerging solution to manage knowledge effectively in practitioners.

On the other hand, the growing interest in KM research has been documented by a number of articles over the past decade (Serenko and Bontis, 2004). Figure 1.1 indicates the number of with the title of articles including "knowledge management" published in a variety of expert journals from 1980 to 2005. By surveying three databases, INSPEC, ABI/INFO, and SDOS, the results are all toward the similar tendency. Many research papers had presented since 1995, and the interests are still sustained. Therefore, the issues of KM in academicians are also a hot research topic.

	1980-1985	1986-1990	1991-1995	1996-2000	2001-2005
INSPEC	6	52	54	503	1174
ABI/INFO	1	8	8	699	1421
SDOS	0	0	10	107	217
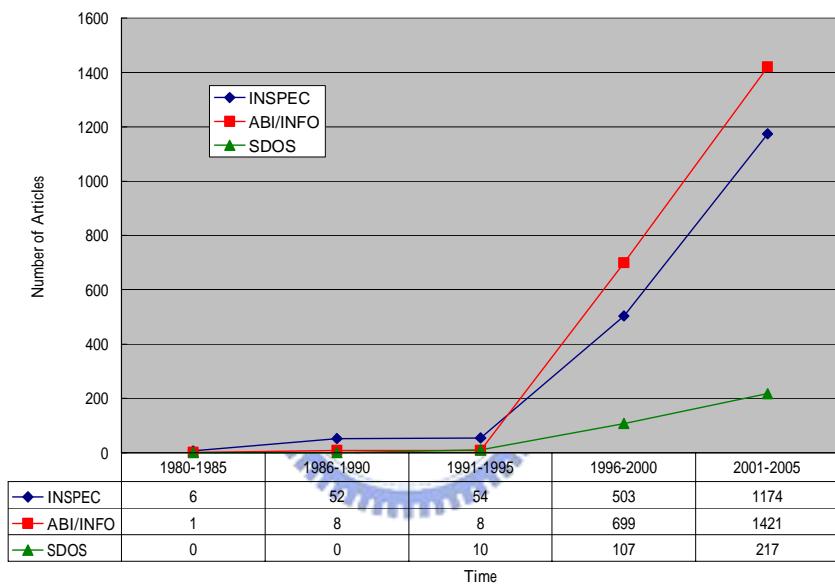
Figure 1.1 Published KM articles from 1980 to 2005 *(TI=knowledge management)*

Mouritsen and Larsen (2005) divided KM into two generations: individual and networked. The first wave focuses on people who are regarded as the source of firm's knowledge, and the most challenging is to distribute individual knowledge to others. For the second wave, KM centres a number of networked knowledge resources, which exist in the organizational context to create firm's value. In this stage, KM concentrates on the organizational competencies drew from the concept of core competencies (Pralahad and Hamel, 1990). In other words, how the organization is able to integrate knowledge resources, including technologies, skills, processes, and relations, is a worthily exploratory theme.

KM is a strategic activity that contributes to organizational profitability and advantage (Debowski, 2006); therefore, it is often connected to the issues of strategic management in an

organization. The objective of strategic management is to explore the formulation of superior performance in an organization. The theory of the resource-based view (RBV), developed to achieve a firm's competitive advantage and performance, has been well received in this field during the last decade (Barney, 1991; Grant, 1991). Past literature of the RBV has in fact concentrated on the development of existing specific resources - that is, tangible assets. In recent studies, scholars put more attention to the knowledge-based view (KBV) of the firm, including organizational learning, core competences, and knowledge management (Grant, 1997; Wiig, 1994). According to this perspective, organizational knowledge is considered as the most valuable resource, and the capability of how to manage it is the most significant driver of competitive advantage (Perez and Pablos, 2003). The theoretical insight provides a solid fundamental for the importance of organizational capability in managing knowledge resources.

Concerning the literature of knowledge management (KM) for an intra-organization, most researchers acknowledge that knowledge sharing plays an important role in the development of KM (Hendriks, 1999; King et al., 2002; Shin, 2004) and business success (O'Dell et al., 1999; Widen-Wulff and Ginman, 2004), but it is also the most difficult work (Almashari et al., 2002; Davenport and Prusak, 1998; Scholl et al., 2004). Davenport and Prusak (1998) revealed that KM projects aim at developing a knowledge intensive culture through encouraging knowledge sharing behavior. In general, organizations attempt to implement KM activities for multiple purposes, such as concentrating customer's focused knowledge, managing intellectual assets, or encouraging knowledge creation and innovation. However; more enterprises (e.g. Chevron, Dow Chemical, and Price Waterhouse) aim at retaining and transferring best practices when they conduct KM related actions (O'Dell et al., 1999).

Alinda and Hasliza (2004) revealed that organizational issue is the most dominant perspective adopted by KM researchers. Within the firm, the most important KM article is organizational capability, which manages knowledge as an essential resource for competitive advantage and firm growth. A number of theoretical themes exist about the organizational capabilities that yield a competitive advantage (Barney, 1991; Grant, 1991); however, comparatively few research studies have been conducted on the holistic view of knowledge resources and the capabilities for connecting the relationship with knowledge sharing and organizational performance.

1.2 Research Motivation

Depending on shared knowledge, collaboration, and trust, KM is a value-driven process

(Debowski, 2006). Following the perspective of KM process, many scholars provide a variety of knowledge processes. The processes include identifying, acquiring, organizing, storing, disseminating, applying, and creating knowledge. In general, knowledge is firstly acquired from the internal or external sources, and then they are organized and stored into the knowledge base through the effort of individual or MIS department. Next, transferring, sharing and disseminating knowledge to others are the critical activities within an organization. Lastly, knowledge is applied to create new knowledge within organizations, or it is sold to external customer or market. Indeed, knowledge sharing, transfer, or dissemination is the core procedure in the knowledge activities (Figure 1.2).
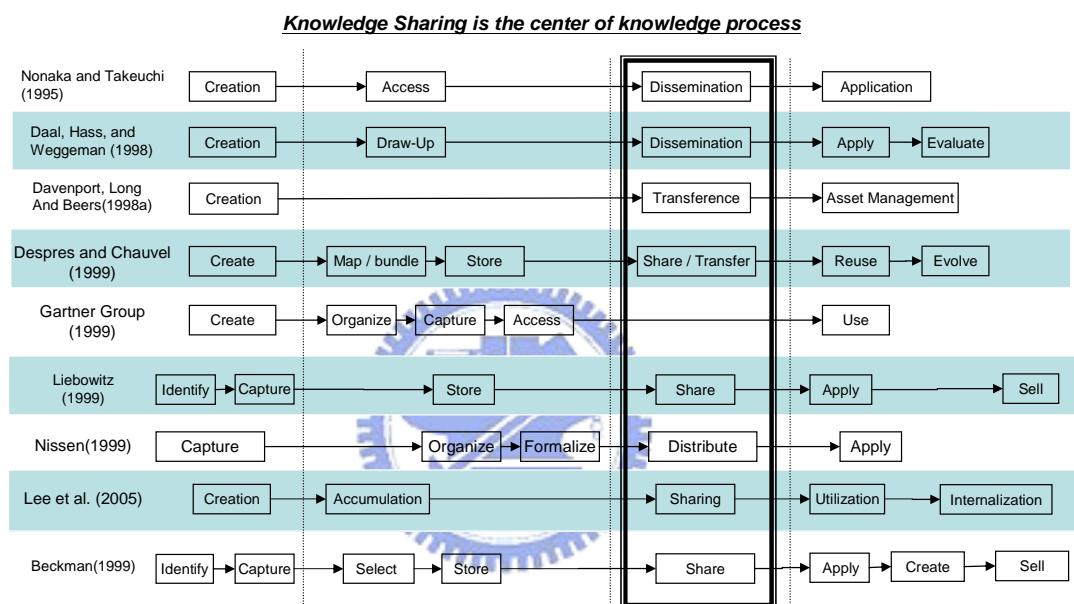
Figure 1.2 Knowledge sharing is the core of knowledge process
(Bechman, 1999; Lee et al., 2005; Nissen and Espino, 2000; Shin et al., 2001)

Scholl et al. (2004) assessed the future of KM by experts who had published on the subject of KM or participated in practical KM activities in an organization. The results of the survey reported that knowledge sharing is the most pressing and challenging theoretical research issue and practical problem for the advancement of KM, for example, how to identify the knowledge owners within an organization and how to motivate people to share their knowledge. Riege (2005) revealed that the practices and initiatives of knowledge sharing are a key component of KM. That is why we concern the issue of knowledge sharing behavior in this study.

Multi-faceted factors have been proposed to drive the behavior of knowledge sharing, such as a participant's motivation, social relationship, and organizational culture (Davenport and Prusak, 1998; Szulanski, 1996; Wasko and Faraj, 2005). Based on a variety of aspects, the

growing interest in knowledge sharing has been developed by a number of researchers. Shin (2004) constructed an integrated knowledge sharing framework to identify the important variables and relationships from economic perspectives. Cummings and Teng (2003) empirically tested the key factors of affecting R&D knowledge sharing through a context viewpoint. Alavi and Leidner (2001) proposed some research suggestions for effective knowledge sharing from the organizational perspective, including the social, cultural, and technical attributes. Some scholars attempted to explain knowledge sharing through intention-behavior perspective (Bock et al., 2005; Ryu et al., 2003). However, few research studies focus on the area of capability.

Organizational knowledge capabilities are recognized as an interesting theme in knowledge management studies (Kalling, 2003), and are developed to perform knowledge processes more effectively (Dawson, 2000). Following capability perspective, knowledge is regarded as the potential to impact organizational action (Alavi and Leidner, 2001). Over the past decade, many firms have given critical efforts to manage knowledge resources so as to enhance organizational capabilities. Alavi and Leidner (2001) believed that KM aims at building organizational competencies, understanding strategic know-how, and creating intellectual capital when knowledge is considered as a capability view. Mouritsen and Larsen (2005) argued that the 2nd wave of KM concerns the viewpoint of knowledge resources and organizational competencies. Hence, the competency of knowledge management and the utilization of knowledge resources for providing strategic advantage are new and crucial issues in the development of KM field (Kalling, 2003; King et al., 2002).

Buckman Laboratories, a chemical company established in 1945, made an essential commitment that knowledge should be considered as the organizational foundation in a competitive environment (Pan and Scarbrough, 1998). Buckman Laboratories adopted a holistic view, which consists of social and technical factors, to implement its knowledge management works. From a socio-technical perspective, Pan and Scarbrough (1998) depicted the case, the knowledge sharing behavior of Buckman Laboratories through a knowledge network system - K'Netix®. However, no systematic frameworks and validated measurements have been reported.

To summarize, by integrating the theories of RBV, KBV, socio-technical perspective, organizational capability, and KM, this study suggests a holistic research view to examine the knowledge sharing behavior. Moreover, IT/IS support, which is regarded as an important resource to enable the technical knowledge capability, is also examined in this study.

1.3 Research Questions

The purpose of this study is to examine the effects of how the different organizational knowledge capabilities on improving the organizational resources for effective knowledge sharing. The relationships among IT/IS support, organizational knowledge capabilities (OKC), knowledge sharing, and organizational effectiveness are developed and analyzed herein. Therefore, the purpose of this study is to: (1) explore the dimensions of organizational knowledge capability from a socio-technical perspective within a corporation; (2) investigate the leverage and impact between organizational knowledge capability and knowledge sharing; (3) examine the relationship between IT/IS resources and technical knowledge capability; (4) examine the significance about the effects of the knowledge sharing on organizational effectiveness; (5) explore the effects of KM program on organizational knowledge capability and knowledge sharing.

The dissertation is organized as follows. In chapter 2 we discuss some primary concepts – for example, organizational knowledge capability and knowledge sharing based on the theories of RBV, KBV, and socio-technical view. In chapter 3, this study proposes a research model and explains the relationship among different constructs. Then in chapter 4 and 5, we introduce the research methodology and analyze the results. Finally, we discuss the implications and conclusions in this study.

Chapter 2 Literature Review

2.1 Knowledge Management (KM)

The chronology of the important KM studies

*1:The purpose of knowledge management is to facilitate organizational knowledge process;
     furthermore, achieving firm's performance.
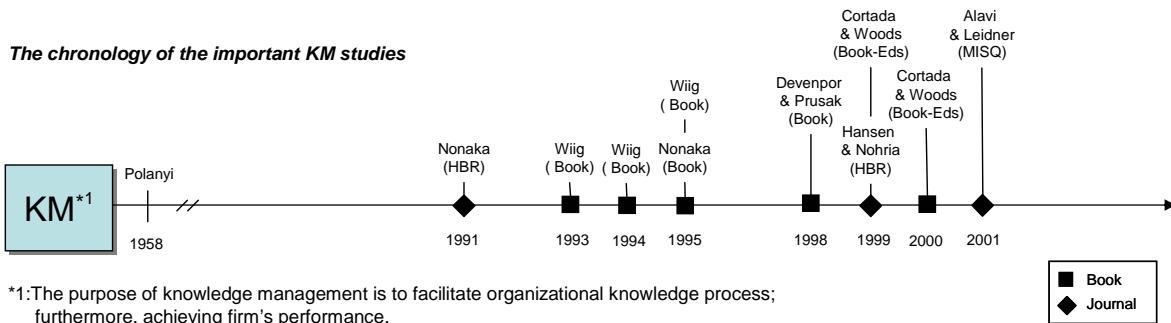
2.1.1 The evolution of KM

With the advent of knowledge economy, enterprises emphasize the importance of product innovation, process improvement, and value creation through knowledge accumulation and application. Thus, KM has recently been recognized as a significant means to manage organizational assets and capital. Several scholars have characterized the evolution or the related activities of KM through a few descriptions which exactly elaborate the development of historical events from different views. For example, Tiwana (2002) explored the evolution of KM based on the relationship of important managerial tools (see Figure 2.1).
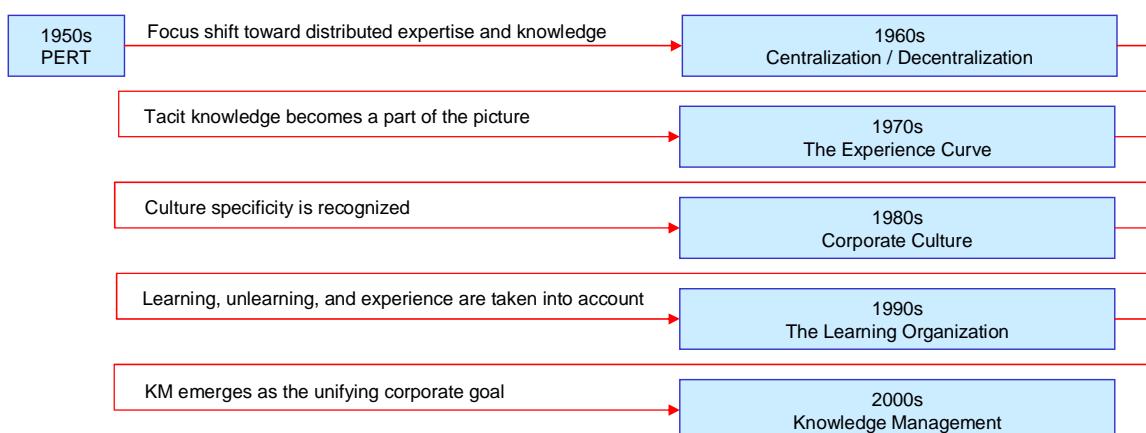
Figure 2.1 The evolution of knowledge management

(Source: Tiwana, 2002)

Knowledge management, drawing from the requirement of project management in the

1950s and drastically increasing since 1996, is a gradual evolution whose focuses shift from disseminating expert knowledge, perceiving tacit knowledge, recognizing corporate culture, conducting organizational learning, to integrating business goal. Notably, leveraging knowledge, experience, and intellectual assets is the key thread of the KM development.

Another example, Beckman (1999) recorded the KM related activities from 1980 to 1996. XCON, the first commercially expert system, was designed by Digital Equipment Corporation and Carnegie Mellon University as the origin of KM. The development of KM concept later spread broadly in multiple sources, including research scholar (Dr. Karl Wiig), journal publication (Harvard Business Review), academy conference (Knowledge Management Network), and enterprise involvement (Price Waterhouse). Besides, the consulting firms offer knowledge services to their customers in 1994. Like the tendency in the development of KM literature, the various firms and practitioners focus on KM investments and activities since 1996. The evolution of KM events is briefly shown in Table 2.1.

Table 2.1 Knowledge management activities

Year	Entity	Event
1980	Digital Equipment Corporation Carnegie Mellon University	One of the first commercially successful Expert Systems: XCON: Configures computer components
1986	Dr. Karl Wiig	Coined KM concept at keynote address for United Nation's International Labor Organization
1989	Large management consulting firms	Start internal efforts to formally manage knowledge
1989	Price Waterhouse	One of the first to integrate KM into its business strategy
1991	Harvard Business Review	One of the first journal articles on KM published
1993	Dr. Karl Wiig	One of the first books dedicated to KM published
1994	Knowledge management Network	First KM conference held
1994	Large consulting firms	First to offer KM services to clients
1996+	Various firms and practitioners	Explosion of interest and activities

Source Beckman(1999)

Moreover, Alinda and Hasliza (2004) revealed KM efforts through technology perspective (see Table 2.2). In the early stage (1960s), KM belongs to a data-centric activity which emphasizes the knowledge storage and capture with forms, reports, and database by information technology. Following the technical development, MIS-oriented information quires and DSS-oriented information analysis are important phases to identify knowledge application from the 1970s to the 1980s. In the 1990s, Web-based technology supports a wide variety of knowledge activities through capturing, organizing, disseminating, and using web portal. Furthermore, the computation techniques including searching, clustering, networking,

and mining are needed to convert a variety of information into effective knowledge since 2000. To summarize, an organization need more latent unknown knowledge in a firm. That is, the more implicit knowledge firms reap, the more productive activities firms perform.

Table 2.2 KM efforts influenced by technology revolution

Period	Orientation
1960s	Data-centric, IT orientation
	Knowledge captured in forms, reports and databases
1970s	Information-centric, MIS orientation
	Data converted to information via ad hoc database quires, graphics and presentations
1980s	Decision Support System orientation
	Knowledge encapsulated in models and simulations; more sophisticated statistical applications
1990s	Web-based knowledge support
	Capture, organization and dissemination of knowledge using web
2000s	Advanced Computation Techniques
	Convert information to knowledge using concept clustering, linking, searching, ontologisms, multimedia, AI and others

Source Alinda and Hasliza (2004)

Consequently, there exist various perspectives to interpret the signification of KM and the evolution of KM will still sustained through more broadly exploration.

2.1.2 The main contributors of KM

The development of KM can be traced from Polanyi's knowledge concept, including tacit knowledge and explicit knowledge. Tacit knowledge, rooted in individual action and ingrained in mental models, beliefs, and perspectives, is harder to articulate than explicit knowledge. Based on the knowledge level from individual to inter-organization, Nonaka and Takeuchi (1995) proposed the renowned knowledge conversion and spiral model to discriminate the interplay between the tacit and explicit knowledge. The model consists of socialization (from tacit to tacit), externalization (from tacit to explicit), combination (from explicit to explicit), and internalization (from explicit to tacit). Moreover, compared the characteristics of knowledge creation in Japanese companies with those in Western organization, The authors believed that Japanese (Eastern) organizations focus on group autonomy, tacit knowledge interaction (socialization and internalization), and experiential accumulation. In contrast, Western organizations emphasize on individual autonomy, explicit knowledge interaction (externalization and combination), and analysis capabilities. The book "The knowledge creating company" is written by Nonaka and Takeuchi in 1995, which has

been very influential (i.e. citation is number one) in the field of KM (Serenko and Bontis, 2004).

According to Beckman's (1999) survey, Dr. Karl Wiig is the originator of KM concept for United Nation's International Labor Organization in 1986. Dr. Karl Wiig, the main advocator in KM research, presented the term "knowledge management" formally in his book since 1993. KM is defined as the field of systematically analyzing, synthesizing, assessing, and implementing knowledge-related changes to achieve organizational objectives (Wiig, 1994). Wiig proposed multiple issues in his three volume books. For example, in Volume I, he considered the substance of knowledge and the activities of knowledge in an organization, a knowledge management program to become intelligent-acting organizations is prepared in Volume II, and Volume III explores the KM approaches including knowledge survey, knowledge map, and knowledge flow analysis.

Many businesses desire to understand what kind of the means and methods of KM can be implemented into an organization in terms of a strategic perspective. Hansen et al. (1999) proposed two significant strategies, codification and personalization, to manage organizational knowledge. Normally, firms focus on different KM styles based on their competitive strategies. Codification strategy, which connects people to document, provides high-quality, reliable and fast information systems by reusing codified knowledge. On the contrary, personalization strategy links people with people by knowledge channel or network to share tacit knowledge and experience. The differences of strategy aspects are shown in Table 2.3.

Serenko and Bontis (2004) revealed that "working knowledge" written by Davenport and Prusak (1998) is the second essential work to interpret how well the successful KM project in an organization. The authors survey many cases to explore a few critical questions when organizational managers intent to implement KM. These key questions include the role of knowledge in a firm, the identification of knowledge owners and searchers, the cultural, behavioral, and technological issues in KM, and the effectiveness of knowledge transfer in an organization. Moreover, four broad types of KM objectives and nine successful factors in KM project are proposed (see also Davenport et al., 1998). The objectives of KM are to create knowledge repositories, to improve knowledge access, to enhance knowledge environment, and to manage knowledge as an asset. The successful factors of KM consist of linking to economic performance or industry value, technical/organizational infrastructure, standard and flexible knowledge structure, knowledge-oriented culture, clear vision and language, motivational practices, multiple channels for knowledge transfer, and senior management

support. To summarize, organizational knowledge moved by a variety of forces is highly dynamic; therefore, human characteristics, such as experience, intuition, and values, are more critical challenges to manage and maximize knowledge assets than tangible capitals.

Table 2.3 Knowledge management strategy

Strategy Aspect	Codification	Personalization
Knowledge Management	• People-to-documents • Develop an electronic document archive to codify, disseminate, and reuse knowledge	• Person-to-person • Develop networks for linking people to share organizational and individual knowledge • Tacit knowledge can be acquired
Economic	• Reuse economics • Invest once in a knowledge asset; reuse it many times· • Use large teams with a high ratio of associates to partners • Focus on generating large overall revenues	• Expert economics • Charge high fees for highly customized solutions to unique problems· • Use small teams with a low ratio of associates to partners • Focus on maintaining high profit margins
Information Technology	• Invest heavily in IT; the goal is to connect people with reusable codified knowledge	• Invest moderately in IT; the goal is to facilitate conversations and the exchange of tacit knowledge
Human Resources	• Hire new college graduates who are well suited to the reuse of knowledge and the implementation of solutions • Train people in groups through computer-based distance learning	• Hire people with outstanding academic background who like problem solving and can tolerate ambiguity • Train people through one-on-one mentoring
Application	• Adopt when business dealing with similar and repetitive projects	• Adopt when primarily deal with unique and diverse problem-solving projects
The Incentives	• Reward people for using and contributing to document databases	• Reward people for directly sharing knowledge with others

Source: Hansen et al. (1999)

An important milestone about KM is reviewed by Alavi and Leidner (2001). The authors provide an interpretation of KM and knowledge management system (KMS) in different fields with IT perspective. Three issues are explored in this article. First, knowledge which increases organizational capability for effective action is regarded as a state of mind, an object, a process, an access condition, or a capability from different viewpoints. The perceptions of KM and KMS depend on alternative knowledge view. For example, if knowledge is viewed as an object, then KM is considered as management of knowledge stocks. If knowledge is regarded as a capability, then KM focuses on building core competencies. Second, a systematic framework of organizational KM processes, including creation/construction,

storage/retrieval, transfer, and application, is developed for analyzing the role of information technologies in these processes. For example, computer networks and electronic bulletin boards construct a community forum to support contact between knowledge seeker and knowledge owner. Third, research suggestions in KM process are proposed. For example, the research questions of knowledge transfer concern four issues: the application of IT to knowledge transfer, the effective strategies of KM in enabling knowledge transfer, the important attributes to motivate knowledge transfer, and the integration of external knowledge sources. Alavi and Leidner (2001) examined KM themes by combining the perspectives with strategic management, organizational theory, and information system, which provided an excellent reference to explain KM phenomenon.

Moreover, both KM yearbook 1999-2000 (Cortada and Woods, 1999) and KM yearbook 2000-2001 (Cortada and Woods, 2000) collected some important literatures to exhibit KM concepts from five dimensions, i.e., the nature of knowledge, knowledge-based strategies, KM and organizational learning, KM technologies and tools, and KM useful resources. Both are good references for researchers to study the field of KM.

2.1.3 The research frameworks of KM

The studies of organizational theory and design have been developed for a long time. KM is regarded as a part of organizational activities; therefore, organizational performance or industrial value has to be considered. Handzic (2004) developed an integrated KM framework to connect the KM drivers and outcomes with organizational knowledge components (stocks, processes, and measures) and organizational environment (internal and external). As shown in Figure 2.2, most KM studies focus on exploring the relationships among three subsystems (influence factors, systems or processes, and organizational objectives).
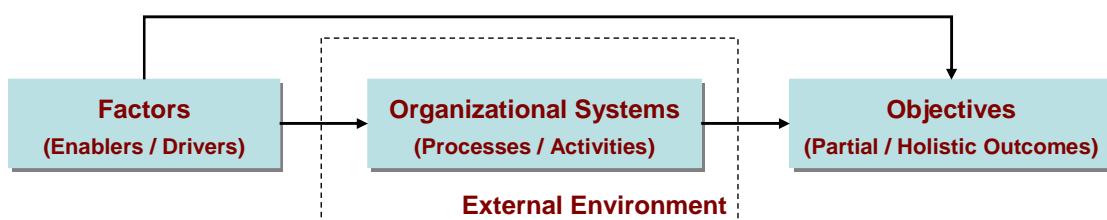
Figure 2.2 The relationship of organizational constructs

Nemati (2002) provided a global KM framework for studying the organizational or industrial factors which influence KM processes, and in turn affect successful KM

effectiveness. Given the interdisciplinary nature of the KM and the complexity of the research variables involved, more studies in global knowledge initiatives are needed to explore related questions. For example, the author believed that the research hypothesis "cultural impediments to knowledge transfer can lead to poorly constructed knowledge repositories" can be developed to examine the knowledge flow of global organization. The similar architecture of exploratory KM research is briefly depicted in Appendix A.

2.2 RBV and KBV

The chronology of the theory of resource based view

*2: Examining the effects of resources & capabilities on competitive advantage and organizational growth within the field of strategic management.
*3: Knowledge is the most important intangible resource; Exploring the importance of knowledge for firm's growth.
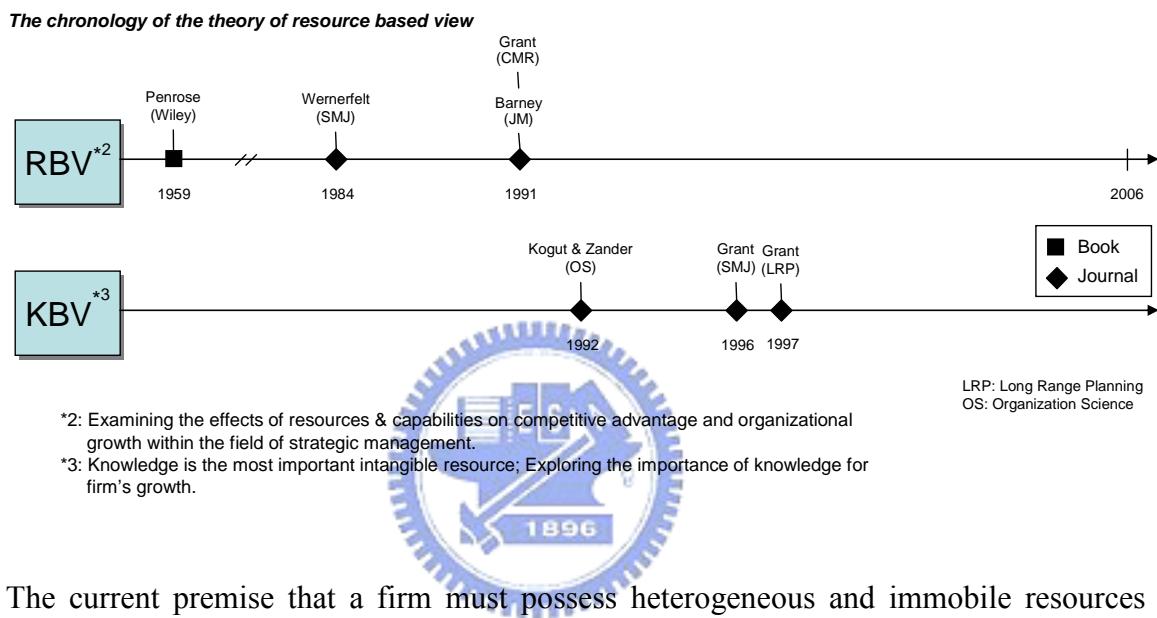
The current premise that a firm must possess heterogeneous and immobile resources to achieve sustained competitive advantage forms the basis of the resource based theory of the firm. The theory of resource based view (RBV) was derived from the Penrose's book "The theory of the growth of the firm" in 1959 and later expanded by others (Barney, 1991; Wernerfelt, 1984). The RBV indicated that firms are essentially profit-orientated entities endowed with a variety of resources; therefore, it is an important task that firms have to manage and use resources effectively. Organizational resources are defined as a collection of tangible and intangible assets, which are administrated and controlled by the organization in order to perform effective and efficient strategies (Barney, 1991). Particularly, valuable resources are rare, heterogeneous, immobile, and non-substitutable. The resource constructs are conceptualized as assets (what the firm has?) and skills (what the firm does?). The skills belong to intangible capabilities that enable firm to develop successful strategies. Tangible assets consist of financial and physical assets and intangible assets are composed of intellectual property, organizational assets, and reputation assets (Galbreath, 2005). Resource portfolio shown in Figure 2.3 explains the relationship among resource constructs.

The Resource Portfolio

Resources that are Assets		Resources that are Skills
Factors that have a tangible embodiment	Factors that have an intangible embodiment	
What the Firm Has (an "asset")		What the Firm Does (a "skill")
Tangible	**Intangible**	**Intangible**
Factors that can be observed, are financial in nature, have physical properties and can be recorded on the firm's balance sheet.	Non-physical factors that are used to produce goods or provide services, or are otherwise expected to generate future economic benefits for the firm.	Factors that enable firms to choose, develop, implement and realize value-creating market strategies.

Figure 2.3 Resource portfolio (Source: Galbreath, 2005)

A RBV of the firm elaborated that different performance is explained by the characteristics of assets and capabilities of the firm (Wernerfelt, 1984; Barney, 1991). Wernerfelt (1984) concerned this theme under the circumstances where a resource leads to high profits over a long period of time. Barney (1991) proposed a resource based model to emphasize the intra-organizational analysis of strength and weakness when compared to other rivals in competitive environment. Grant (1991) claimed that organizational resources and capabilities as the foundation for strategic development are a critical business direction, which combines two concepts including resource as the basis for corporate profitability and capability as organizational routines. For attaining the profitable market, a firm depends on its ability to acquire and defend advantageous positions in underlying resources being important to production and distribution.

Based on the accumulation of resource and capability in the organization, scholars have proposed that sustainable competitive advantage is difficult to duplicate and imitate (Barney, 1991; Grant, 1991). Relevant research concluded that intra-organizational resources (e.g. production technology, employee training, and relations among firm members) are important for achieving organizational competitiveness.

The research of knowledge-based view (KBV) has originated from the theory of RBV. Scholars argue that firm exist because of unique and special knowledge resources of leading to firm advantage. In general, the RBV treats knowledge as a generic resource, not a special asset. The theory of RBV emphasizes that the intrinsic characteristics of resources and capabilities prevent imitation. However, most knowledge objects in a firm can be viewed as knowledge resources which will be able to create organizational value. With the coming of knowledge era, enterprise's focus is not in tangible assets (e.g. land, labours), but in intangible

skills (e.g. knowledge, patterns).

Foss (1996) named a term "knowledge-based approaches to the theory of the firm" as an emerging aspect of an economic organization, and argued that the core role about the firm is an entity with the ability to learn and grow through a repository of distinct productive knowledge. For KBV approach, the firm capabilities viewed as the practices of knowledge-based organization are assumed to be at the core of sustainable competitive advantage and firm performance. Kogut and Zander (1992) believed that knowledge is regarded as the critical competitive resource, and the combinative capability is an important ability to synthesize and apply the existing and acquired knowledge resources to generate new business value. Grant (1996) argued that a firm's role is to integrate the specialist knowledge resident in individuals into organizational goods and services; thus, knowledge coordination in intra-organization is necessary. The kernel of knowledge in firms is reflected in the emergence of the KBV being an essential theory in contemporary organizational research. More generally, the increasing emphasis on the importance of knowledge-based capabilities will be viewed as a characteristic to drive the development of knowledge organization.

Moreover, Grant (1997) indicated a set of characteristics to conceptualize the knowledge-based view of the firm: (1) knowledge is the most essential resource for generating organizational value; (2) knowledge comprises different types, explicit and tacit, varying in their transferability; (3) individuals are the actor of knowledge creation and the repositories of tacit knowledge; (4) knowledge is subject to economies of scale and scope, and explicit knowledge can be deployed at low marginal cost. Therefore, concerning KBV as a parallel stream of KM in practice, firms will form a knowledge-based organization by using knowledge capabilities to develop new products, provide new services, and create new customer relationship. KM is a recent development, and it extends the concept of resources and capabilities in the strategic management research. The theory of KBV regards knowledge as the most strategically significant resources of the firm because knowledge assets are so complex that they are difficult to imitate. Besides, a variety of knowledge resources and capabilities among firms are the primary determinants of sustained competitive advantage and superior corporate performance.

According to Haataja's (2005) summarization, the RBV which recognize professional know-how as a critical resource should be more dynamically developed, and the KBV emphasizes the importance of tacit knowledge which is the source of innovativeness. The comparison between RBV and KBV from five dimensions is shown in Table 2.4.

Table 2.4 The Comparison between RBV and KBV

	The resource-based view	The knowledge-based view
How to achieve competitive advantage	Critical resource bundles combined to a right strategy	Knowledge sharing and knowledge creation
The service process	Different service strategies	Development of service innovations
Knowledge	Internal aspect - static	Cyclical - dynamic
Benefits of the model	Development of internal resources of the organization	Intellectual capital, creativity
Central development objects from the perspective of KIS	Understand dynamic nature of resources, interaction of interface area, resource accumulation	Bounded rationality, recognize intellectual capital, measurement challenges, knowledge protection, innovations

Source: Haataja (2005)

Consequently, an organization can establish and sustain its competitive advantage depended on a wide spread of knowledge innovation within the firm. Knowledge is seemed to be important assets and KM should be considered as a solution to support knowledge sharing, creation, and innovation through the aspect of the KBV.

2.3 Socio-technical Perspective

The chronology of the socio-technical system studies

*4 **Organizational system which emphasizes the interrelatedness of the functioning of the social and technical subsystems**
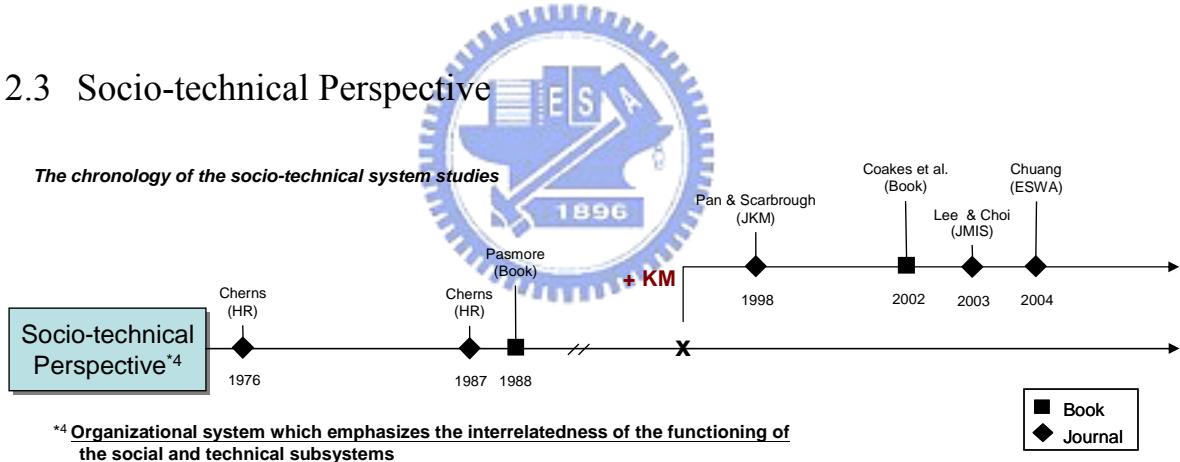
2.3.1 The development of socio-technical system

The theory of socio-technical systems (STS) was derived from the open systems theory. Pasmore (1988) proved that the socio-technical approach of organizational design is successful in organizations throughout the world in the 1950s; however, few organizations are designed by using STS principles and methods. The social system of an organization consists of many features about the organizational workers and their characteristics, such as individual attitudes and beliefs, relationship among company members, corporate culture, past experiences and values, and business policies. The technical system of an organization is composed of the tools, techniques, devices, configurations, and procedures used by employees to conduct business tasks. Following this perspective, the organizations began to make up of

people (the social system) by using tools, techniques and knowledge (the technical system) to produce goods or services for customers. Coakes et al. (2002) depicted a four-component socio-technical model. The model relates the technology to task, people and organizational structure. An organizational development is based on the interplay among these components. Consequently, the goal of STS is to design an organizational system which can improve the quality of working life, adapt the change of organizational environment, enhance the individual creativeness, and promote the job satisfaction of the employees.

Cherns (1976, 1987) provided nine key principles as a discipline of socio-technical design. For example, "compatibility" depicts that the design process must be compatible with system's objectives; "support congruence" means that systems should be established within a framework of social support for desired behavior; and "design and human values" denotes that the purpose of systems is to enhance the quality of working life. All principles are as broadly applicable in the case of a system design, which suggests the organization using socio-technical perspective to interpret the flexibility and effectiveness of system.

2.3.2 Socio-technical Perspective in the KM world

Two categorizations of KM strategies, codification and personalization, were proposed by Hansen et al. (1999). The knowledge strategy of codification concentrates on reusing codified knowledge by information systems and the knowledge strategy of personalization focuses on communicating individual tacit knowledge by organizational knowledge network. The knowledge codification strategy as system-centric view and the knowledge personalization strategy as human-centric view are consistent with the general KM approaches (Choi and Lee, 2002; 2003). According to Mason and Pauleen (2003), two board approaches (hard and soft) are considered when a firm implements KM. The hard aspects focus on the management of information objects through the development and the use of appropriate technology. The soft aspects focus on the capture and the transformation of knowledge into corporate assets through the management of people and processes.

In Ekbia and Hara's (2006) research, KM approaches are divided into three different views: techno-centric, human-centric, and socio-technical. The KM strategy of techno-centric view focuses on the knowledge capture, in which knowledge can be codified, organized, stored, and access by effective information and communication system. The human-centric view emphasizes knowledge which can be acquired and shared via the social process (e.g. experienced and skilled people, trust and reciprocal relationship among employees) of supporting the KM activities (Choi and Lee, 2003). The socio-technical view, like a balanced

or dynamic knowledge strategy noted by Choi and Lee (2002), strikes a right equilibrium between system and human knowledge strategies. In general, the dynamic knowledge style has higher corporate performance than the system and human styles (Choi and Lee, 2003). As we see, it does not pay much attention to issues of KM either techno-centric view or human-centric view. Therefore, the mainstream about KM strategy is to integrate both to develop KM activities, that is, the socio-technical view. The socio-technical view is described as a method of organizational interrelatedness of the social and technological subsystems (Bhatt, 2001; Pan and Scarbrough, 1998). Normally, the technical dimension is based on IT infrastructure and the social dimension emphasizes the importance of culture, structure, people, task, and environment.

The concept of socio-technical systems is rapidly applied to organizational research and KM fields. To reap organizational benefit, a firm should adopt the socio-technical view combining with technological and organizational infrastructure, corporate culture, knowledge and people as the source of strategic assets when developing, implementing, and managing its knowledge management system (Meso and Smith, 2000). Bhatt (2001) indicated that IT is an effective infrastructure to transfer data into information and people can interpret the information into knowledge by interacting with others. In other words, organization obtains long-term benefits from KM by coordinating social relations and technologies. Pan and Scarbrough (1998) depicted a KM case in Buckman Laboratories, where an effective knowledge network system, K'Netix®, is established to share knowledge and experience. This case, resulting from a socio-technical perspective, builds a KM environment for supporting the communication of firm's employees. Microsoft has also developed a successful KM system using the socio-technical approach to keep Microsoft's competitiveness (Meso and Smith, 2000). The technological infrastructure facilitates a rich knowledge sharing to support Microsoft's researchers in conducting R&D of future software products. On the other hand, knowledge friendly culture is a strategic asset which indicates a positive relationship to knowledge activities when employees participate in knowledge exchange. For archiving a knowledge centric organization, Coakes et al. (2002, p.87) integrated three interactive elements, including structure, technical infrastructure, and culture, to enable and manage organizational knowledge. Handzic (2004) explored the perceptions of knowledge workers for organizational KM system which considers technical and social aspects in an academic context. Lee and Choi (2003) examined the relationship between knowledge creation and socio-technical enablers in organizations. Chuang (2004) adopted the similar concept to examine how the impacts of the social and technical KM capabilities on

competitive advantage. Besides, Scholl et al. (2004) found that many organizations conduct some necessary KM activities to match social and technical aspects, which is recently the important theoretical advancement in KM research.

Consequently, in the designs of the socio-technical perspective, organizations can use social and technical resources effectively and manage knowledge process efficiently. Since the technologies can increase the efficiency of information flow using by organizational members and the social factors can improve the comprehension of knowledge, corporate needs to create an optimal balance between technical and social systems (Bhatt, 2001).

2.4 Organizational capabilities

The chronology of the organizational capability & competency

*5 **Corporate ability to deploy resources effectively for generating values and achieving organizational objectives**
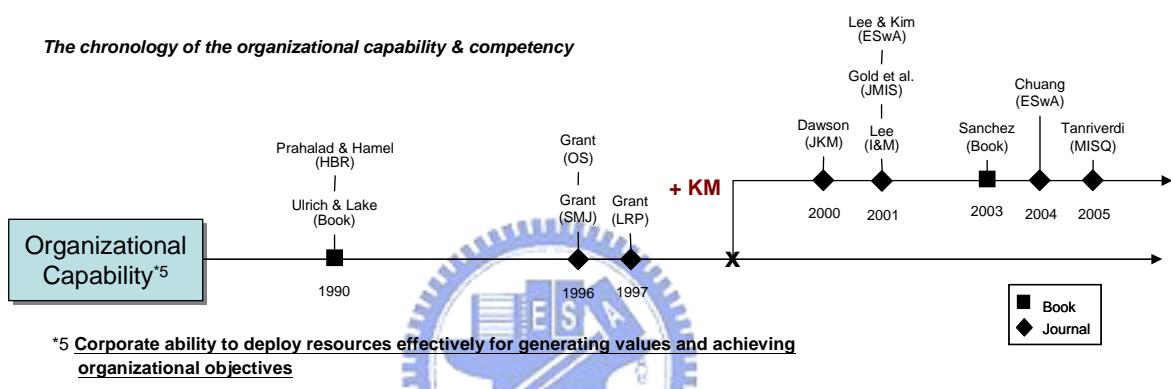
2.4.1 The development of organizational capabilities

Organizational capability, which integrates economic/financial, strategic/marketing, and technical capability as a key source of competitive advantage, is defined as "a business's ability to establish internal structures and processes that influence its members to create organization-specific competencies and thus enable the business to adapt to changing customer and strategic needs" (Ulrich and Lake, 1990, p.40). Abell (2000) indicated that corporate capability is created by multiple sources, for example, skills and expertise of staff, culture and values that encourage knowledge building and sharing, and technological infrastructure. The concepts are integrated with KBV into organizational design which emphasizes the ability to deploy peculiar resources to improve firm knowledge flow and enhance business profitability.

The roots of competitiveness are originated from the core competence of corporate which means the collective knowledge about how to coordinate a variety of product skills and integrate multiple streams of technologies (Prahalad and Hamel, 1990). Therefore, the core competencies, a critical advantage to create unique and integrated capability, are an organizational focus which attempts to achieve the competitive advantage (e.g. invent new

markets, delight customers with new products).

The issues of organizational capabilities have been recently explored as the outcome of knowledge integration (e.g. efficiency, scope, and flexibility) from the theories of resource-based view and knowledge-based view (Grant, 1996; Gold et al., 2001) – that is, knowledge can be found in individuals and capabilities should be developed to integrate such knowledge in an organization. Frans et al. (1999) revealed that the firms are likely to develop new organization forms and adequate combinative capabilities (system, coordination, and socialization) to increase their efficiency, scope, flexibility, and impact on knowledge absorption.

2.4.2 Organizational capabilities in the KM world

Without capabilities and resources, the implementation of knowledge activities will fail (Wiig, 1994). What is the organizational capability for using knowledge resources? Capabilities refer to how a firm deploys resources to generate values and achieve organizational objectives (Dutta et al., 2005). Lee and Kim (2001) suggested that organizational capability in KM can be formed by accumulating, managing, and utilizing firm's knowledge. For example, knowledge link capability refers as to learn or acquire firm's necessary knowledge from other organizations.

To enable a successful KM, the importance of organizational resources is emphasized. In general, organizational resources are composed of human practice and policy, organizational structure, culture, and technology (Donoghue et al., 1999). Drawing from the concept of competence-based view, Kalling (2003) depicted that the key feature in KM is the transformation of knowledge into competency. Dawson (2000) regarded knowledge capability as the focus of strategic assets. These resources are developed and utilized more effectively as organizational capabilities in order to achieve strategic advantages and benefits in a competitive environment.

Three distinct dimensions for defining important aspects of organizational capabilities can be elaborated from knowledge management perspective: process KM capability (Gold et al., 2001; Liu et al., 2004), infrastructure KM capability (Chuang, 2004; Gold et al., 2001), and cross-unit KM capability (Tanriverdi, 2005).

KM process capabilities emphasize the capabilities to operate and integrate the organizational knowledge flow. Gold et al. (2001) used knowledge acquisition, conversion, application, and protection as the KM process capabilities. Liu et al. (2004) indicated that knowledge obtaining, refining, storing, and sharing are the requisite capabilities in the product

manufacturing process. Bose (2002) presented several KM capabilities through the perspective of currently available technologies, including knowledge creation and capture, knowledge organization and storage, knowledge retrieval, collaboration and workflow, distribution, assimilation, and transformation.

The KM infrastructure capabilities are the fundamental capabilities for social capital maximization. To ensure the right knowledge brought to the right people, Donoghue et al. (1999) stated that successful KM has to connect many organizational components, including technology, human resources practices, organizational structure, and culture. Galbreath (2005) emphasized the important components for developing and utilizing organizational assets, such as culture, human policies, and organizational structure. Gold et al. (2001) indicated that infrastructure capabilities combine three components: technical, structural, and cultural capabilities. Khalifa (2003) adopted three factors, leadership, culture, and strategy, as KM infrastructure capability. Specifically, KM resource-based capabilities consist of technical resources, structural resources, cultural resources, and human resources (Chuang, 2004).

Tanriverdi (2005) proposed the cross-unit KM capabilities, the firm's ability to create, transfer, integrate, and leverage related knowledge across its business units, which includes three sub-dimensions: product, customer, and managerial capability. The cross-unit KM capability which creates and exploits the synergies from related knowledge resources can lead to superior firm performance. Besides, KM capabilities are interdependent and complementary, and they are needed to be managed as an integrated and interplayed system.

The infrastructure KM capability, combining explicit and tacit knowledge to create new knowledge through sharing and exchange mechanisms (Gold et al., 2001), is more dominant than the process KM capabilities for the knowledge management success (Khalifa, 2003). Therefore, this study adopts the infrastructure KM capabilities as the research variables.

2.4.3 Organizational knowledge capabilities (OKC)

Organizational knowledge capabilities are developed to perform knowledge processes (generating, capturing, sharing, and applying) more effectively so as to achieve organizational success (Dawson, 2000). Knowledge management capability (KMC) presents the ability to mobilize and deploy knowledge resources in combination with other resources and capabilities for enabling KM activities, and it has a positive effect on competitive advantage (Chuang, 2004) and organizational effectiveness (Gold et al., 2001). Summarily, both OKC and KMC have similar meanings and contexts. We will treat the two terms as the same concept and use OKC as the research variable in this study.

In general, organizational capability is regarded as the actable assets which are expressed to be shared among business members and is developed to be towards a view of socio-technical balance (Coakes et al., 2002). To develop OKC successfully, Dawson (2000) proposed two primary means: technology, and skills and behaviors, which are consistent with the socio-technical perspective proposed by Pan and Scarbrough (1998). Moreover, drawing upon the works of Gold et al. (2001) and Chuang (2004), four organizational knowledge capabilities are proposed to depict the phenomenon about how an organization operates knowledge resources and capabilities to improve knowledge processes for attaining the firm's performance - that is, technical, structural, cultural, and human knowledge capabilities.

Organizational knowledge capabilities are characterized as a research variable to depict the fundamental capabilities for the social capital maximization in an organization. The following discussion of each social OKC (structure, culture, and human) and technical OKC provides more details.

2.4.3.1 Social organizational knowledge capabilities

Structural knowledge capability (SKC)

Structural factors are normally presented in an incentive system (e.g. reward, career advancement, and learning opportunities) (Hall, 2001), work environment (e.g. task flow and "ba") (Nonaka and Konno, 1998), and political directives (e.g. norm and principle) (Syed-Ikhsan and Rowland, 2004), which are often explicit means for implementing new activities or establishing an unused system in a firm. Structural knowledge capability, assessing the extent to which an organization integrates structural resources (such as incentive, context, and policy), aims at creating new knowledge through external encouragement and punishment for organizational creativity and innovation. Thus, SKC is an important component in leveraging the social OKC framework.

Cultural knowledge capability (CKC)

Organizational culture, the collective perceptions, beliefs, norms, and values of employees in the workplace (Debowski, 2006), is the most usually-cited factor for supporting knowledge management activities. Multi-faceted cultural concepts are adapted to explore organizational knowledge actions, including sharing culture (Davenport et al., 1998), learning culture (Cummings and Teng, 2003), cooperative and collaborative culture (Goh, 2002), and knowledge-centered culture (Janz and Prasarnphanich, 2003). In general, the alignment of core values within organization, including collaboration, communication, interaction, will contribute to establish a positive and effective knowledge culture (Debowski, 2006). Cultural

knowledge capability, the supportive capability for valuing organizational knowledge and building up an interactive, collaborative atmosphere among organizational members, assesses the extent of knowledge-related activities in an organization. Thus, the effectiveness of CKC is critical to influence a social OKC construction.

Human knowledge capability (HKC)

Shared understanding, meaning working closely with others and having a familiarity among organizational members, is an important antecedent of knowledge activities (Ko et al., 2005). O'Dell et al. (1999) noted that teams, relationships, and networks are significant elements to transfer knowledge and best practices more effectively. Human knowledge capability is conceptualized herein as the relationship of interpersonal understanding and the extent of interaction among a firm's members for creating valuable knowledge network in an organization. Thus, the HKC is attributed to the framework of social OKC.

2.4.3.2 Technical organizational knowledge capabilities

Bharadwaj (2000) revealed three dimensions of IT based resources: the tangible resource (e.g. physical infrastructure), the human IT resources (e.g. IT skills), and the intangible IT-enabled resources (e.g. knowledge assets). The author adopted the theory of RBV to define a firm's IT capability as a firm which combines with its other resources and capabilities to deploy IT based resources effectively for organizational competitiveness. Based on different knowledge types, Bassellier et al. (2001) divided IT competence into two categories: (1) explicit IT knowledge emphasizes the understanding about the knowledge of technology, information system, and IT management etc.; (2) tacit IT knowledge focuses on the experience about the personal use of IT.

Tippins and Sohi (2003) conceptualized IT competency as the extent to which a firm is knowledgeable about the utilization of IT effectively to manage information within the firm. The authors divided IT competency into three dimensions: IT knowledge (e.g. technical knowledge about computer based systems), IT operations (e.g. utilizes IT to manage market and customer information), and IT objects (e.g. computer-based hardware and software). Information technologies, being used to synthesize, enhance, and expedite organizational KM, may regularly play a critical role in the perspective of KBV (Alavi and Leidner, 2001).

From the KM perspective, the technical knowledge management capability can assist firms in enabling rapid acquisition, storage, and exchange of knowledge, mapping internal or external knowledge sources, integrating organizational knowledge flows, and applying existing knowledge to create new knowledge (Chuang, 2004; Gold et al., 2001). Therefore,

the technical knowledge capability, the ability to integrate and deploy knowledge by using information communication technology (ICT) effectively, is an essential attribute in a knowledge organization.

2.5 Knowledge sharing (KS)

To successfully reap the effectiveness of KM, knowledge sharing should be the most important consideration (King et al., 2002; Shin, 2004). Many organizations already acquire such potential benefits through knowledge sharing activities, e.g. Toyota (Dyer and Nobeoka, 2000), Texas Instruments (TI), Dow Chemical (O'Dell et al., 1999; Shin, 2004), and Ford (McDermott and O'Dell, 2001).

Knowledge sharing is depicted as a set of behaviors about knowledge exchange which involve the actors, knowledge content, organizational context, appropriate media, and societal environment (Lee and Suliman, 2002; Shin, 2004). Hendriks (1999) suggested a conceptualized model which consists of two main activities for effective knowledge sharing - namely, transmission and absorption (Davenport and Prusak, 1998). The knowledge owner externalizes his knowledge through the skills of codification, elaboration, and presentation. Knowledge is subsequently transmitted to the recipient (reconstructor) by the appropriate media or channels, and then the reconstructor internalizes this knowledge through the capabilities of reading, learning, interpreting, and absorbing. Therefore, knowledge sharing involves many complicated and various factors and it is worthy of further research in identifying what factors help foster knowledge sharing.

Lee (2001) proposed two types of knowledge sharing: the explicit knowledge which can be clearly articulated in written documents (e.g. business reports) and the implicit knowledge which is embedded into an individual's experience (e.g. know-how). In order to demonstrate why knowledge workers participate in knowledge sharing behavior, Bock et al. (2005) integrated the organizational climate construct and TRA (theory of reasoned action) model, which consists of the attitude of knowledge sharing and subjective norm. Ryu et al. (2003) measured the knowledge sharing behavior by combining the aspects of TRA and TPB (theory of planned behavior).

Shin (2004) exhibited a knowledge sharing process that was identified by three integrated perspectives – that is, economic view, agent based, and RBV. For effective knowledge sharing from the organizational perspective, Alavi and Leidner (2001) proposed some research suggestions, including the social, cultural, and technical attributes. The

organizational culture is the most essential issue for an effective knowledge sharing (McDemott and O'Dell, 2001). Knowledge contextual domain, including source/recipient, activities, and relation, is a special viewpoint to explain the important factors in successful knowledge transfer (Cummings and Teng, 2003). Hendriks (1999) depicted the relationship between information technology and knowledge sharing that exist both direct and indirect effects. Wasko and Faraj (2005) and Widen-Wulff and Giman (2004) explained the phenomenon of knowledge sharing through social capital perspective. Combining with the factors of social and technical, Pan and Scarbrough (1998) explored the knowledge sharing system on Buckman Laboratories. Lee (2001) claimed that organizational capability is a research variable to mediate the relationship between outsourcing and knowledge sharing. With the view of capability-based, Yang and Chen (in press) investigated the knowledge sharing behavior to examine the importance of knowledge capabilities. Different perspectives to explore knowledge sharing are shown in Figure 2.4.
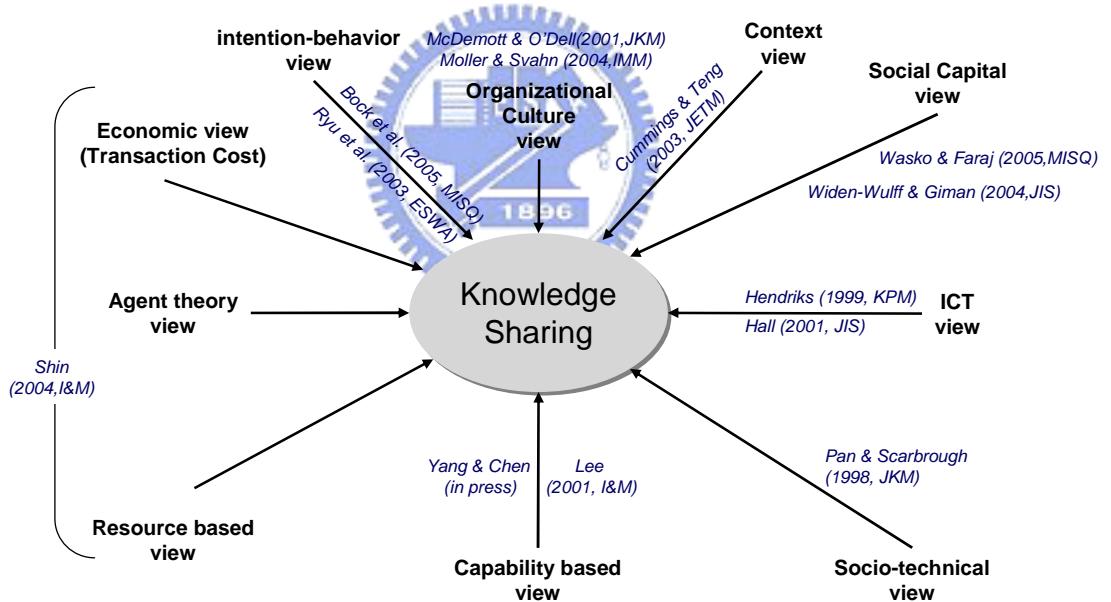
Figure 2.4 The multifaceted perspectives on knowledge sharing

Three subjects have to be incorporated with the development of knowledge sharing (Yang and Wan, 2004). First, social interactions and organizational networks can accelerate the activities of knowledge sharing. Second, technologies can facilitate the communication of knowledge sharing. Third, top managers must provide a sharing context and establish knowledge culture. All of these themes are the composition of knowledge focused strategies. Lee and Suliman (2002) proposed a knowledge sharing framework which is affected by five

factors – that is, the actors who participate in the activity, the characteristics of shared knowledge, the organizational concerns, the channel which is communicated with others, and the environmental climate. Riege (2005) revealed three dozen barriers for knowledge sharing categorized by individual, organization, and technology view. By investigating 431 U.S. and European organizations, Ruggles (1998) found some important impediments for knowledge sharing: culture (54%), organizational structure (28%), information communication technology (22%), incentive system (19%), and staff turnover (8%).

To explore the multiple factors impacting knowledge sharing from a literature review, we categorize these factors into three dimensions based on Lee and Suliman (2002) and four sub-dimensions at the organizational level based on the socio-technical view (Lee and Choi, 2003; Pan and Scarbrough, 1998) (see Table 2.5).

Table 2.5 Summary on knowledge sharing factors

Dimension	Sub-dimension	Factors	References
Organizational Level	Culture	Sharing culture / Cooperation & collaboration culture / Knowledge-centered culture / Learning culture	Cummings & Teng (2003); Goh (2002); Janz & Prasarnphanich (2003); Lee & Suliman (2002); Syed-Ikhsan & Rowland (2004)
	Structure	Incentive and reward / Work design / Management support / Norm / Political directives	Bock et al. (2005); Hall (2001); Lee & Suliman (2002); Syed-Ikhsan & Rowland (2004)
	People	Arduous relationship / Shared understanding / Similar knowledge frame / Social interaction	Cummings & Teng (2003); Goh (2002); Ko et al. (2005); Szulanski (1996); Tsai (2002)
	Technology	IT infrastructure / IT system / IT know-how / IT support	Bolisani & Scarso (1999); Hendriks (1999); Lee & Suliman (2002); Riege (2005); Syed-Ikhsan & Rowland (2004);
Individual Level		Motivation / Prior experience / Absorptive capacity / Education levels / Source credibility	Lee & Suliman (2002); Ko et al. (2005); Riege (2005); Szulanski (1996);
Knowledge Level		Explicit & tacit knowledge / Causal ambiguity / Knowledge articulability / Knowledge embeddedness	Cummings & Teng (2003); Goh (2002); Lee & Suliman (2002); Szulanski (1996)

However, this study examines the capability from the perspective of organizational knowledge, which has to foster the creation, acquirement, integration, and dissimilation of organizational knowledge, not from individuals' viewpoint. For example, prior experience embedded on an individual is hard to be created by an organization. On the other hand, the

characteristics of knowledge level involve the original knowledge presentation and meanings, but they are not the purpose of this study. For example, the causal ambiguity of knowledge cannot be exhibited more clearly by organizational dissimilation. Therefore, we adopt the first dimension which is composed of culture, structure, people, and technology as the important factors in organizational knowledge sharing. The remaining two dimensions, individual and knowledge level, are ignored herein.

2.6 Organizational Effectiveness

The main goal of business development is to obtain a superior competitive advantage and organizational performance for a firm's sustainable growth. Prahalad and Hamel (1990) emphasized the organizational competitiveness that comes from the core competence in the enterprise.

Concerning a firm's growth, the achievement of organizational performance is the most significant objective. The measurement of organizational performance, usually as a dependent variable in many research studies, is widely recognized from multi-faceted perspectives including financial performance, business performance (e.g. operational domain), and organizational effectiveness (Venkatraman and Ramanujam, 1986). Generally, the effects of knowledge activities on performance are shown in a wide range of domain; therefore, the term 'organizational effectiveness', the broadest concept to reflect performance in the research of strategic management and organization theory, is adopted in this study. Organizational effectiveness, including multiple criteria or predictors – for example, profitability (Tippins and Sohi, 2003), operational efficacy, and market share (Choi and Lee, 2002), is ordinarily referred to how well a firm achieves its strategic goals.

Moreover, the operationalizations of effectiveness variables are generally classified into two types. First, the objective information includes financial indices such as ROI, ROA, and ROS (Calantone et al., 2002). For example, Vandenberg et al. (1999) believed that a truly effective organization can be observed by two valid measures: financial performance (ROE) and overall employee turnover rate. Second, the perceptual measurement which is compared to competitors by self-assessment is an indirect approach to acquire the sensitive information (Choi and Lee, 2002). For example, Tippins and Sohi (2003) asked the respondents to report how well their firm performed in profitability, customer retention, and sales growth relative to all other rivals. Both the types are usually shown in a variety of management literature.

Chapter 3　Research Design

The development of research theme is a creative process through theoretic exploration, literature analysis, and practical cognition that enterprises need. The relationship between knowledge management and organizational performance is a hot issue that many firms desire to recognize. However, KM is a wide variety of processes involving knowledge identification, retrieval, storage, sharing, transfer, creation, and application. Of all the related KM activities, knowledge sharing is the most interesting topic that firms concern about. Thus knowledge sharing behavior is assumed to explore in this study. KM strategy is regarded as the methodology when firms implement KM activities. Three knowledge strategies (techno-centric, human-centric, and socio-technical) are studied through a series of literature reviews. In this study we emphasize a holistic aspect covering social and technical dimensions to explain organizational knowledge strategy – that is, the socio-technical view is adopted to examine the constituent of knowledge resource and capability. Besides, the theory of capability based is also an important perspective to understand organizational core competencies for achieving competitive advantage. The infrastructural knowledge capabilities which are adopted in this study are considered as primary research variables including multifaceted factors such as technology, culture and structure to affect organizational development. To summarize, this study aims at constructing an integrated framework to explore the relationship among capabilities, knowledge sharing, and organizational effectiveness through socio-technical knowledge strategy, which is shown in Figure 3.1.
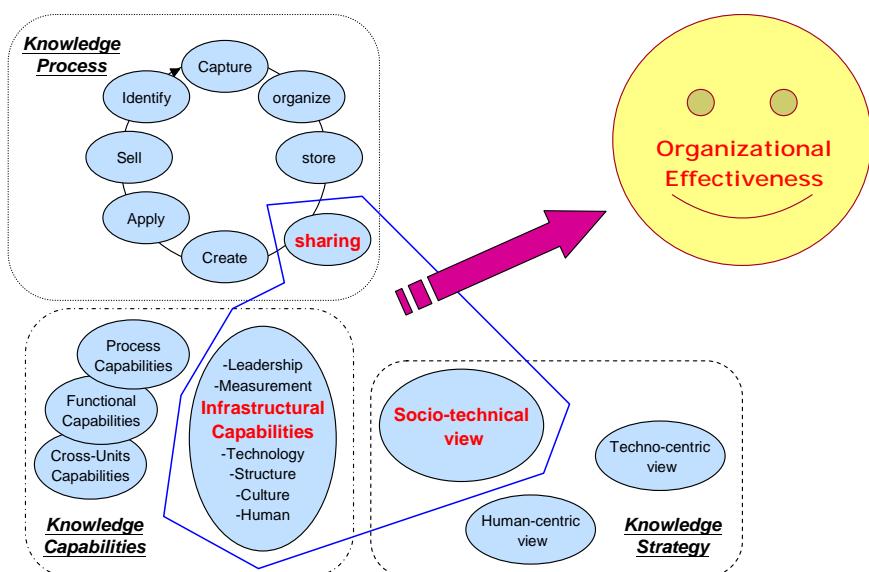

Figure 3.1 Research design

The integrated framework based on four theories or perspectives is proposed to explore the relationship among resources, capabilities, behavior, and effectiveness. First, the technologic resource is considered as an effective IT/IS support to promote technical capability based on resource-based view (RBV). The theory of RBV stressed that firms are essentially profit-orientated entities endowed with a variety of tangible resources to manage, control, and use them effectively through the improvement of capabilities. Next, knowledge is regarded as a specific intangible resource and capabilities are clearly noted as "intermediate transformation ability" between resources and objectives (Dutta et al., 2005). Therefore, this study adopts the viewpoint of knowledge capabilities for operating organizational resources to drive knowledge activities more effectively, which draws from the theories of KBV and organizational capability. Third, there are four types of organizational resources (culture, structure, people, and technology) and two categories of organizational knowledge capabilities (social OKC and technical OKC) that are identified by the knowledge strategy of socio-technical view. In this study, socio-technical view considers knowledge sharing as a harmonious process that needs to be promoted by both top-down managerial intervention and bottom-up employee involvement (Ekbia and Hara, 2006). Lastly, firms implement knowledge activities that aim at attaining organizational profitability and growth, which is the primary purpose of knowledge management.

Therefore, this study provides four assumptions: (1) IT/IS support is regarded as an technological resource to enable the refinement of technical knowledge capability; (2) organizational knowledge capabilities can affect knowledge sharing behavior through an effective deployment of knowledge resources (Yang and Chen, in press); (3) knowledge sharing is contributive to product innovation and process improvement based on successful cases (e.g. Ford and Toyota) and literature supports (Moller and Svahn, 2004; Nelson and Cooprider, 1996; Yang et al., 2002); (4) there exist better capabilities and behaviors when firms have implemented KM programs. We thus propose a holistic framework to link these relationships which are shown in Figure 3.2.

Consequently, an integrated framework based on the theories of RBV, KBV, and organizational capability in a socio-technical perspective is proposed to test the relationship among IT/IS support, organizational knowledge capabilities, knowledge sharing behavior, and organizational effectiveness. Moreover, the implementation of KM as a comparative condition to test the effects on research variables is also examined. Accordingly, this study sets forth nine hypotheses and assesses them empirically.
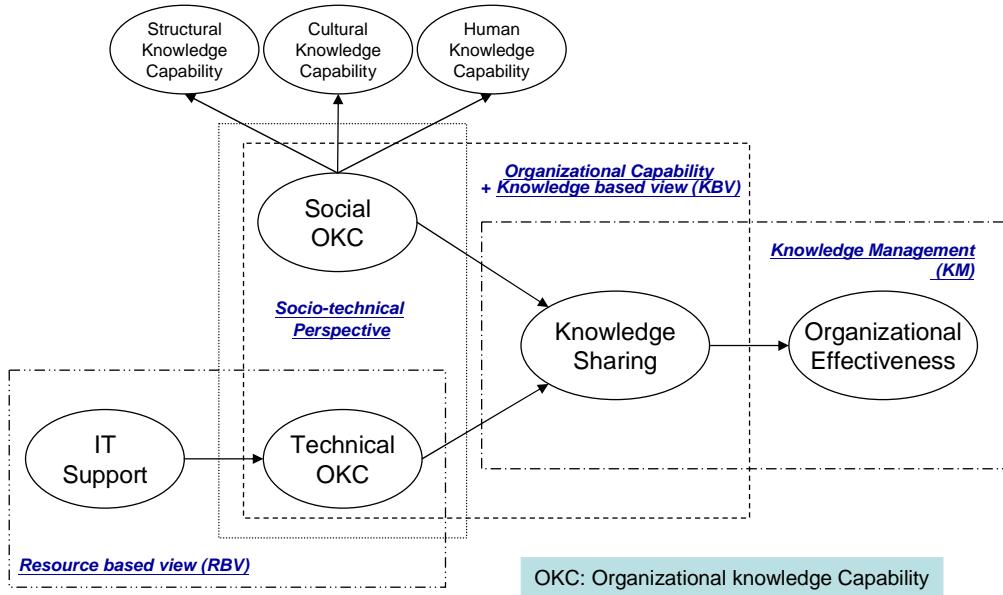
Figure 3.2 Research framework

3.1 Organizational knowledge capability and knowledge sharing

The core capabilities of knowledge organization are important in providing information and knowledge-based services. Wiig (1994) claimed that KM initiatives will fail if the investments of organizational resources and capabilities are inappropriate. In other words, an effective KM should contribute to organizational performance through the development of organizational knowledge capability (Gold et al., 2001). Lee's (2001) empirical research revealed that an organizational capability to learn or acquire the needed knowledge from other organizations is a key mediator for successful knowledge sharing. Thus, the enhancement of knowledge capabilities as the foundation of organizational development is beneficial for organizational effectiveness. Normally, knowledge sharing which are encouraged in knowledge intensive organization is regarded as a core knowledge process (Debowski, 2006) and organizational capabilities invest on process improvement, work effectiveness, learning, and supporting technology that facilitate knowledge transfer and sharing. Hence, these are needed if a firm strengthens organizational knowledge capability to reap the effectiveness and efficiency of knowledge sharing. Based on the socio-technical research in KM, this study intends to explore the effects of organizational knowledge capabilities (social OKC and technical OKC) on the behavior of knowledge sharing.

3.1.1 Social OKC and knowledge sharing

Organizational activities are usually composed of many different social constructs,

including culture, structure, people, (Chaung, 2004; Gold et al., 2001; Lee and Choi, 2003) and their interrelation. Many studies put attentions on the sharing of knowledge resources, emphasizing the importance of organizational culture, collaborative relationship, shared motivation of knowledge workers, mutual trust, and social interaction (Lee and Kim, 2001; Tsai, 2002; Yang and Wan, 2004). Widen-Wulff and Ginman (2004) concluded that social capital which contributes to the mechanism of knowledge sharing can provide an effective framework to explain how group resources are available in individual setting. Lee and Kim (2001) believed that a reward system and corporate culture both are effective means to change people's attitudes and behaviors more sustained in different organizational stages. Thus, we assume that social resources can be deployed effectively by organizational capability, which is positively on knowledge sharing. As Coakes et al. (2002) indicated that knowledge sharing is regarded as the process of social construction, which involves social collaboration among different business functions. Therefore, the following hypothesis can be drawn:

Hypothesis 1: Social OKC have a positive effect on the knowledge sharing behavior in an organization.

Structural knowledge capability

Organizational structure is frequently mentioned as the solution to encourage people to share and apply knowledge within organization (Janz and Prasrnphanich, 2003). Normally, two structural factors are presented in organizational activities. First, an appropriate incentive and reward mechanism enhances the motivation to share knowledge (Davenport and Prusak, 1998; Hall, 2001). For example, Hall (2001) exhibited the categories of reward for knowledge sharing – namely, hard and soft rewards. The former consists of economic pay, learning opportunities, and career advancement, and the latter includes enhanced reputation and personal satisfaction. Second, political directives are effective forces for inspiring employees' motivation to share knowledge (Syed-Ikhsan and Rowland, 2004). Moreover, King et al. (2002) reported that organization needs to motivate individuals to contribute their knowledge into a KM system, which is an important theme for organization to retain intellect capital. Therefore, we propose:

Hypothesis 1a: Structural knowledge capability has a positive effect on the behavior of knowledge sharing in an organization.

Cultural knowledge capability

Organizational culture, the core beliefs, values, and social norms of the collective members in an organization, is a frequently-cited factor for successful knowledge activities (Davenport et al., 1998; Debowski, 2006). Specifically, the cultural factor is imperative to encourage and support knowledge creation, sharing, and application (McDermott and O'Dell, 2001; Goh, 2002). De Long and Fahey (2000) identified that culture influences the behaviors central to KM activities (creation, sharing, and use) in four different ways. Cummings and Teng (2003) stressed that learning culture affects knowledge sharing, which focuses on the recipient context. Goh (2002) proposed that cooperative and collaborative culture is an important prerequisite to drive the propensity for high knowledge sharing. Janz and Prasarnphanich (2003) revealed that knowledge-centered culture is an effective factor for cooperative learning. Thus, the effectiveness of organizational culture is one of the critical capabilities influencing a firm's survival and success (Yang and Wan, 2004). Therefore, we propose:

Hypothesis 1b: Cultural knowledge capability has a positive effect on the behavior of knowledge sharing in an organization.

Human knowledge capability
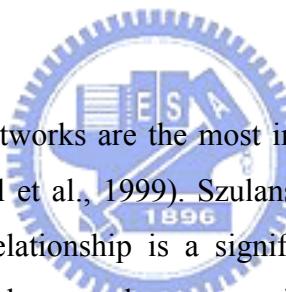
Teams, relationships, and networks are the most important elements to transfer and share knowledge effectively (O' Dell et al., 1999). Szulanski (1996) and Ko et al. (2005) proved empirically that an arduous relationship is a significant barrier when knowledge sharing occurs. Social interaction, employees who communicate frequently with each other, has a positive correlation on organizational knowledge sharing that was supported (Connelly and Kelloway, 2003; Tsai, 2002). As noted by Yang and Wan (2004), social interactions can be efficaciously used for transferring tacit knowledge. Thus, working closely with others and having a familiarity between the source and recipient in an organization are important antecedents of knowledge sharing - namely, shared understanding (Ko et al., 2005). Human knowledge capability is conceptualized herein under two important aspects. First, the relationship between the knowledge owner and recipient is appropriately constructed. Second, the degree of acquaintance and understanding among a firm's members is measured. As McDermott and O'Dell (2001) stressed that human networks are one of the key facilitators for sharing knowledge. Therefore, we propose:

Hypothesis 1c: Human knowledge capability has a positive effect on the behavior of knowledge sharing in an organization.

3.1.2 Technical OKC and knowledge sharing

Information technology (IT) is a critical enabler when a business implements a KM program, as it has direct and indirect influences on knowledge sharing (Hendriks, 1999; Lee and Suliman, 2002) by increasing the speed of sharing and by decreasing costs due to time and distance (Albino et al., 2004). Bolisani and Scarso (1999) studied different cases and found various information communication technologies (ICT) which are effective tools for knowledge sharing activities in an organization. Malhotra and Majchrzak (2004) stated that IT can overcome the barriers of knowledge sharing and generate new knowledge effectively. ICT infrastructure and ICT know-how also have a significant effect on knowledge sharing performance (Syed-Ikhsan and Rowland, 2004).

ICT is an infrastructure which supports the information platform for accessing and distributing knowledge. However, without capabilities for using ICT, the platform is worthless. To support knowledge activities, IT may be appropriately viewed as an organizational capability (Bharadwaj, 2000) and the capabilities for holding, deploying, and accessing knowledge are required at different stages of the KM initiatives (Wiig, 1994). Ritter and Gemunden (2004) claimed that technological competence is positively correlated with the degree of innovation success and further enables a firm to become a market leader through new development of product and process. Therefore, the following hypothesis can be drawn:

Hypothesis 2: Technical OKC have a positive effect on the knowledge sharing behavior in an organization.

3.2 Knowledge sharing and Organizational effectiveness

In the recent years, many studies have focused on the issue of how KM contributes to improve organizational performance and create business value. As most company administrators eager to recognize the crucial theme in the development of KM: how to use knowledge activities to provide strategic advantage for firm growth? These concerns have been concentrated on different notions which connect KM with organizational effectiveness.

According the survey of King et al. (2002), 43% of 126 managers at executive level believed that KM programs have positively direct or indirect effects on organizational performance. Lee et al. (2005) proposed a knowledge management performance index (KMPI) to measure an effective knowledge management. The authors claimed that if knowledge circulating process (KCP), including knowledge creation, accumulation, sharing, utilization, and internalization, is efficient and effective, then it will contribute to performance.

Knowledge sharing has been identified as a primary focus for the development of KM.

Most researchers acknowledged that knowledge sharing was an essential factor for achieving organizational competitiveness (Moller and Svahn, 2004) and business success (Widen-Wulff and Ginman, 2004). Nelson and Cooprider (1996) examined empirically that the mutual trust and influence between IS group members and line customers to share their knowledge will lead to IS success. Yang et al. (2002) found the positive relationship between the effectiveness of knowledge sharing and NPD performance. Riege (2005) indicated that the primary equation of knowledge sharing is "better and purposeful sharing of useful knowledge translates into accelerated individual and organizational learning and innovation through the development of better products that are brought faster to target market, thus enhancing market performance." We thus believe that knowledge sharing can promote organizational success; therefore, we propose:

Hypothesis 3: Knowledge sharing has a positive effect on the organizational effectiveness.

3.3 IT/IS support and Technical OKC

Although the relationship between resource and capability has been elaborated in the development of RBV theory, little literature is provided by a perspective of information technology. Daugherty et al. (2005) revealed that resource commitments to information technology will have a positive impact on IT capabilities. As many literature noted that ICT (Information communication technology) and IS (Information system) are important infrastructures for supporting knowledge flows (i.e. knowledge sharing) throughout the intra-organization or inter-organization (Hendriks, 1999; Hall, 2001). IT/IS support depicts that companies provide IT resources to enact employees for searching and accessing task-related information, storing work knowledge systematically into IT/IS platform, and coordinating collaborative works by effective communication (Lee and Choi, 2003). Based on the assumption of RBV, resources can be employed effectively by organizational capabilities; especially, high levels of IT support and technology capability are important because of the nature of organizational operations. That is, the more IT/IS resources firms provide, the more technical capabilities organizational members possess. Therefore, we propose:

Hypothesis 4: IT/IS support has a positive effect on the technical OKC in an organization.

3.4 KM, OKC, and KS

In KM studies the perspectives of the KBV and organizational capabilities are primary themes (Kalling, 2003). KBV emphasizes the importance of organizational knowledge which

leads to organizational advantage and business success, while organizational capability focuses on deploying resources effectively to improve the business process. Since organizational knowledge capabilities directly impact a successful KM, the positive relationship could be confirmed (Gold et al., 2001). In other words, knowledge management plays an important supporting role by proving a coordinating mechanism to enhance the conversion of resources into capabilities. Moreover, knowledge sharing is the most significant objective for effective KM (Hendriks, 1999; King et al., 2002; Shin, 2004). Thus, when examining whether the activities of KM are successful, the involvement of knowledge sharing provides some appropriate evidence to answer this problem.

This study concerns the explanatory power for testing this question: does the implementation of KM contribute to organizational knowledge capabilities and knowledge sharing activities? Following this problem, we adopt this term herein, implementing/not-implementing KM, as two comparative groups to test the effects on organizational knowledge capabilities and knowledge sharing. Therefore, we propose:

Hypothesis 5a: Firms which implement KM will be more participative in knowledge sharing activities than firms which do not.

Hypothesis 5b: Firms which implement KM will be better in social OKC (cultural, structural, and human) and technical OKC than firms which do not.
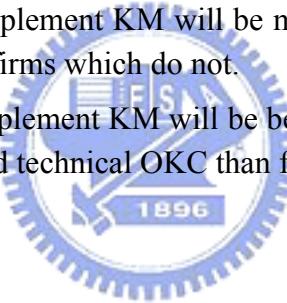
Chapter 4　Research Methodology

This chapter depicts details of this study to examine and validate the proposed model and hypotheses. First, the sources and operationalization of research constructs are introduced by synthesizing a variety of literature in order to form a survey questionnaire. Then the strategy about sampling selection and the survey procedure are portrayed by a series of investigations.

4.1　Survey instrument

This study uses a survey questionnaire to test the hypotheses described in section 3. Most of the research variables in the proposed model are well-established constructs.

Organizational knowledge capability (OKC) is defined as the ability to mobilize and deploy knowledge resources in combination with other resources and capabilities for performing knowledge processes effectively. The proposed model measures OKC using fifteen items to describe the ability to deploy knowledge resources (Chuang, 2004; Dawson, 2000; Gold et al., 2001). They are divided into two subsystems by socio-technical perspective. Social OKC, including cultural knowledge capabilities (4 items), structural knowledge capabilities (4 items), and human knowledge capabilities (3 items), is the ability to link and leverage non-technical knowledge resources for achieving organizational objective. Technical OKC (4 items) is composed of the ability to deploy knowledge by using ICT effectively (Bharadwaj, 2000; Chuang, 2004; Gold et al., 2001).

IT/IS support is regarded as a concept of resource commitment that is measured by 5 items (Lee and Choi, 2003). Since technical infrastructure is an essential organizational support for firm employees to perform routine works, the degree of IT/IS support may view as a set of technical resources for organizational activities.

Knowledge sharing behavior is measured by seven items which focus on the activities of explicit and implicit knowledge sharing (Bock et al., 2005; Lee, 2001; Ryu et al., 2003). Because the effectiveness of knowledge sharing is difficult to measure (Riege, 2005), this study adopts the degree of participating knowledge sharing to which organizational members actually share knowledge with others as research construct.

Organizational effectiveness, firm's objective for achieving financial or market growth, is assessed by 7 items, including higher profits and better services (Choi and Lee, 2002; Tippins and Shoi, 2003). Because the contribution of KM activities to organizational performance is hard to be translated into tangible benefits, this study adopts a cognitive scale to measure

organizational effectiveness.

The definition of the variables and the related literature is shown in Table 4.1, and this validity of content and construct is assured by the literature.

Table 4.1 Research variables

Variables	Definition	Related literature
Social OKC	The ability to link and leverage non-technical knowledge resources for achieving organizational objective.	Chuang (2004); Gold et al. (2001)
Cultural knowledge capability	The supportive capability for valuing organizational knowledge and building up an interactive, collaborative atmosphere among organizational members.	Chuang (2004); Gold et al. (2001)
Structural knowledge capability	The integrative capability such as norm, policy, context, and an incentive system in an intra-organization aims at creating new knowledge.	Chuang (2004); Gold et al. (2001)
Human knowledge capability	The relationship and interpersonal understanding among organizational members.	Chuang (2004); Lee and Choi (2003)
Technical OKC	The ability to integrate and deploy knowledge by using ICT effectively.	Bharadwaj (2000); Chuang (2004); Gold et al. (2001)
IT/IS Support	Degree of IT/IS support for organizational activities	Lee and Choi (2003)
Knowledge sharing behavior	The degree to which organizational members actually share knowledge with others	Bock et al. (2005); Lee (2001); Ryu et al. (2003)
Organizational effectiveness	Firm's objectives for achieving financial or market growth, for example, higher profits and good services	Choi and Lee, 2002; Tippins and Shoi, 2003

*OKC: Organizational knowledge capability

4.2 Data collection and sample description

A pilot test was conducted before sending out the final questionnaire version. Two phases are elaborated for the pilot test in this study. Firstly, we invited ten doctoral students from three institutes in National Chiao Tung University (Taiwan) to examine the syntax of the questionnaires' items. Secondly, ten company employees were asked to check the semantic concept of the questionnaires. The questionnaires' data are collected by the various variables, whereby seven-point Likert scales are used. Respondents are asked to indicate the extent to which they disagree or agree with the given statement by selecting its perception in the appropriate question (where 1=strongly disagree and 7= strongly agree). All measure items

are shown in the Appendix B (Table B1 and B2) and the results are coded in SPSS for Windows.

This sample is administered from different positions, departments, and industries. The two main reasons for choosing these respondents are because they belong to knowledge-based organizations and experienced knowledge-workers. Most knowledge-based industries and organizations are located in the north of Taiwan (e.g. the high-tech industrial park in Hsinchu), and the experienced knowledge-workers are professional in understanding the organizational characteristics and business environment. In our survey the respondents who come from universities and colleges of northern Taiwan were screened by education and experience. Specifically, the respondents of EMBA (executive rank managers of various organizations, average age around 43) and MBA (middle level managers, average age around 33) are qualified.

The survey was conducted within a duration of two months. We received 278 questionnaires from 410 questionnaires sent. This accounts for a response rate of 67.8%. However, 22 returned responses were not usable, yielding 256 effective questionnaires and a usable response rate of 62.4%. Table 4.2 summarizes the respondents' characteristics according to industry type and demographics.
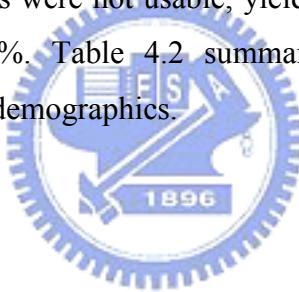
Table 4.2 The profile of respondents

Measure	Items	Freq.	Percent (%)	Cumulative (%)
(a) Industry Type				
Government		38	14.8	14.8
Finance/Insurance		13	5.1	19.9
Semiconductor/Opto-Electronics		46	18.0	37.9
Communication/Network		25	9.8	47.7
Computer		31	12.1	59.8
Service		50	19.5	79.3
Manufacturing		24	9.4	88.7
Others		29	11.3	100
(b) Demographic Information of Respondents				
Gender	Male	153	59.8	59.8
	Female	103	40.2	100
Age	≤30	91	35.5	35.5
	31-40	80	31.3	66.8
	>40	85	33.2	100
Firm size	≤1000	123	48.0	48.0
	>1000	133	52.0	100
Education	Graduate (above)	67	26.2	26.2
	Bachelor	182	71.1	97.3
	Others	7	2.7	100
Department	Headquarters	48	18.8	18.8
	Marketing	34	13.3	32.1
	Manufacturing	10	3.9	36.0
	R&D	43	16.8	52.8
	Accounting	30	11.7	64.5
	MIS	37	14.5	79.0
	Others	54	21.0	100
Position	Superintendent	51	19.9	19.9
	Department Manager	29	11.3	31.2
	Middle Level Manager	46	18.0	49.2
	Employees	126	49.2	98.4
	Others	4	1.6	100

Chapter 5   Research Analysis and Results

In this study all analyses involve the structural equations model (SEM) using the statistical software LISREL 8.54 and the T-test using SPSS 11.0 to examine the proposed hypotheses. SEM, widely used in the behavioral sciences, is a powerful statistical technique that can be viewed as a combination of factor analysis and path model. Related research variables are analyzed as follow. In the first part we observe the descriptive statistics and correlations of research variables. Next, a two-stage procedure (measurement model and structure model) to verify the fitness between data and model is recommended by Anderson and Gerbing (1988). The authors claimed that there are a number of comparative strengths to the model building and inference process. Two-stage approach allows all pattern coefficients to examine tests of the significance, any structural model to assess acceptable fit, and a particular framework to compare the substantive model of interest with alternative models. The purpose of the measurement model is to test reliability and validity for distinct constructs using confirmatory factor analysis (CFA). CFA is used the observed variables to measure the latent constructs and assess the observed values whether can represent what this survey really wants to measure or not. The structural model examines the model that fits the data and tests the causal relationships among the latent variables, which is similar to a path analysis. Finally, two groups (organization which implement and not-implement KM) are compared with various research variables.

5.1 Descriptive statistics and correlations

The descriptive statistics and correlation matrix of the key variables is shown in Table 5.1. The majority of correlations are statistically significant at $p < .01$. All of the measures are relatively distinct, with the highest correlation measured at .720 and the lowest at .266 among all positively significant coefficients; but the association between technical OKC and organizational effectiveness is not significant (.122).

The average score on technical OKC is superior to that of social OKC, which shows that most of the firms do a lot of efforts in the investment of technical resources and capabilities, not social. Cultural knowledge capability is greater than other social OKC that means the collaborative and sharing culture perceived by most firms.

Moreover, the assessment of the reliability for each scale is above the cut off value (0.7) and we find them to be acceptable.

Table 5.1 Descriptive statistics and correlation matrix of the key variable

Variables	Mean	S.D.	α	1	2	3	4	5	6	7
KS	5.2686	.8881	.9319	1.00						
CKC	5.2217	.9985	.8814	.583**	1.00					
SKC	4.6006	1.0737	.8215	.571**	.647**	1.00				
HKC	4.6159	1.0156	.8331	.566**	.656**	.620**	1.00			
Technical OKC	5.9580	.8257	.8514	.468**	.394**	.318**	.245**	1.00		
IT/IS Support	4.8401	1.1901	.9432	.517**	.560**	.720**	.521**	.266**	1.00	
Effectiveness	4.7271	1.0414	.9167	.388**	.553**	.627**	.514**	.122	.594**	1.00

** Correlation is significant at the 0.01 level.

5.2 The results of the measurement model

5.2.1 Confirmatory factor analysis

In order to test the factor structure more rigorously, the entire set of items are examined using confirmatory factor analysis (CFA). A confirmatory measurement denotes the relations of the observed variables to their posited underlying constructs that allow inter-correlating freely (Anderson and Gerbing, 1988). CFA provides an assessment of convergent and discriminant validity which aims at eliminating non-significant items (lower item-to-construct loadings). In the field of social sciences, the standardized factor loadings recommended minimum is usually 0.40 (Yli-Renko et al., 2001). A variety of CFA operations can be assessed by various literature; some concentrates on each of sole constructs (Daugherty et al., 2005; Ritter and Gemunden, 2004), another emphasize one exogenous (all-X model) and one endogenous (all-Y model) (Gold et al., 2001), and others highlight the holistic model (Calantone et al., 2002). In this study we adopt the method of isolated construct to estimate the factor loadings and fit indices of the measurement model.

Table 5.2 reveals the results of scale validation that factor loadings range from 0.63 to 0.95, and none of the indicators are non-significant ($p<.05$). As the significance of factor loadings indicates that the results of the measurement model performed very well; thus, the convergent validity is supported.

The measurement model is presented in an acceptable model fit and all of the fit-indices support the model which represents a reasonable fit to the data.

Table 5.2 Confirmatory factor analysis

Construct Dimension	Standardized Loading	GFI	NFI	NNFI	CFI
Social OKC					
Structural knowledge capability		0.95	0.94	0.83	0.94
SKC-1	0.80				
SKC-2	0.82(12.43)				
SKC-3	0.63(9.71)				
SKC-4	0.76(10.95)				
Cultural knowledge capability		0.99	0.99	0.99	1.00
CKC-1	0.72				
CKC-2	0.82(11.92)				
CKC-3	0.85(12.20)				
CKC-4	0.74(10.91)				
Human knowledge capability		1.00	1.00	1.00	1.00
HKC-1	0.72				
HKC-2	0.89(11.38)				
HKC-3	0.78(11.32)				
Technical OKC		0.98	0.98	0.95	0.98
TOKC-1	0.66				
TOKC-2	0.83(11.01)				
TOKC-3	0.87(11.23)				
TOKC-4	0.74(10.13)				
IT/IS support		0.90	0.96	0.92	0.96
IT/IS-1	0.94				
IT/IS-2	0.95(31.26)				
IT/IS-3	0.85(21.73)				
IT/IS-4	0.78(17.79)				
IT/IS-5	0.83(20.26)				
Knowledge sharing		0.86	0.95	0.93	0.95
KS-1	0.80				
KS-2	0.82(14.92)				
KS-3	0.86(16.11)				
KS-4	0.76(13.59)				
KS-5	0.86(15.99)				
KS-6	0.88(16.59)				
KS-7	0.84(15.46)				
Organizational effectiveness		0.91	0.96	0.95	0.96
OE-1	0.87				
OE-2	0.83(17.32)				
OE-3	0.84(17.62)				
OE-4	0.76(14.80)				
OE-5	0.81(16.59)				
OE-6	0.70(13.11)				
OE-7	0.65(11.75)				

t values are shown in parentheses.

Discriminant validity assesses a series of chi-square differences by comparing a model with the others, combining two explanatory constructs with the unconstrained model. We ensure that discriminant validity follows Calantone et al. (2002), for example, by combining human

knowledge capability and cultural knowledge capability into one construct which generates the result that the chi-square is 643.73 and degrees of freedom are 203. The chi-square difference with the original model is significant ($\Delta\chi^2$=109.94, df=4, p<0.1), which supports that these measures are distinct. This study examines each set of constructs in the measurement model and discriminant validity is supported in all test cases.

5.2.2 The measurement of second-order factor

In the framework a second-order factor measurement is developed. Social organizational knowledge capability is modelled as a second-order construct that is measured by the three first-order indicators including structural knowledge capability, cultural knowledge capability, and human knowledge capability. For validating the second-order model exists, five alternative models were examined in the confirmatory factor analysis (Xia and Lee, 2005) and the patterns are shown in Figure 5.1.

(a) Model 1: null **(b) Model 2: one first-order factor** **(c) Model 3: three uncorrelated first-order factors**

(d) Model 4: three correlated first-order factors **(e) Model 5: a second-order factors**
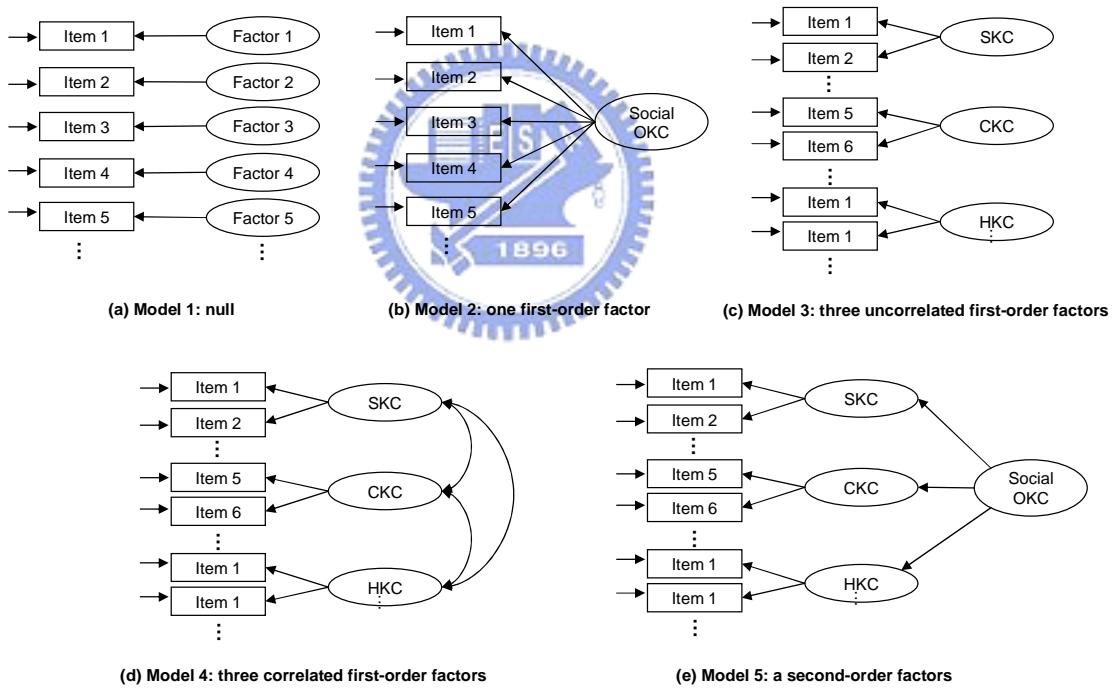
Figure 5.1 Alternative models tested in confirmatory analysis

Model 1 hypothesizes that each factor is measured by one item, which form eleven first-order factors to examine the model fitness. One first-order factor, a unidimensional construct, is a plausible model of underlying data structure which explains all the common variance among the 11 items assumed in Model 2. Model 3 supposes that 11 items form into three uncorrelated first-order factors that concerns reflect three dimensions: structural knowledge

capability, cultural knowledge capability, and human knowledge capability. Model 4 hypothesizes that three first-order factors account for the covariance among the 11 items and the correlations among these factors. Model 5 hypothesizes that the 11 items form into three first-order factors and that these three first-order factors are measured by a second-order factor, social OKC.

Testing with SEM software (LISREL), the results of alternative models are shown in Table 5.3. To assess the adequacy of the proposed model, a few fit indices can be observed through statistic analysis. For example, the ratio of chi-square (χ^2) over the degree of freedom (*df*), normed chi-square, is used to measure the fitness of research model. Normally, the smaller value normed chi-square, the better model fit. An acceptable value of normed chi-square ratio is lower than 3 (Ritter and Gemunden, 2004), even lower than 5 (Xia and Lee, 2005). The results show that Model 1, 2, and 3 were not reasonable because most of their fit indices did not reach to the threshold criteria. The results of both Models 4 (normed chi-square = 2.84, GFI = 0.92, NFI = 0.97, and CFI = 0.98) and Model 5 (normed chi-square = 2.84, GFI = 0.92, NFI = 0.97, and CFI = 0.98) were acceptable because all fit indices meet the criteria.

Table 5.3 Results of second-order model

Model No.	Construct Dimension	χ^2	d.f	χ^2/d.f (<5.0*)	GFI (>0.9)	NFI (>0.9)	NNFI (>0.9)	CFI (>0.9)
Model 1	Null	1588.12	44	36.10	0.82	0.92	0.91	0.82
Model 2	Social OKC (First order)	282.19	44	6.41	0.82	0.92	0.91	0.82
Model 3	Three uncorrelated first order	427.64	44	9.72	0.77	0.88	0.86	0.89
Model 4	Three correlated first order	116.32	41	2.84	0.92	0.97	0.97	0.98
Model 5	Social OKC (Second order)	116.32	41	2.84	0.92	0.97	0.97	0.98

The model is not adapted.
* The threshold criteria based on the survey of Xia and Lee (2005).

Therefore, both models, 4 and 5, are adopted to examine the relationship between social OKC and knowledge sharing. Figure 5.2 presents the values of the parameter estimations of Model 4 (three correlated first-order factors). The model exhibits the data quite well because the factor loadings range from 0.64 to 0.86 and the correlations of constructs range from 0.75 to 0.77.

Then, the result of second-order factor model is shown in Figure 5.3. The results confirm that a second-order factor of social organizational knowledge capability exists. All first-order factors loaded on the second-order factor range from 0.86 to 0.88 and are strongly significant at *p* <.01.
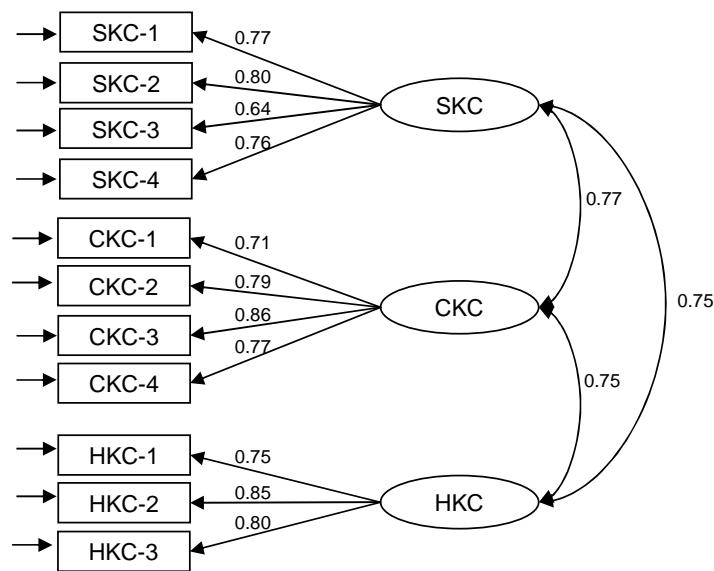
Figure 5.2 Parameter estimations of three correlated first-order model (Model 4)
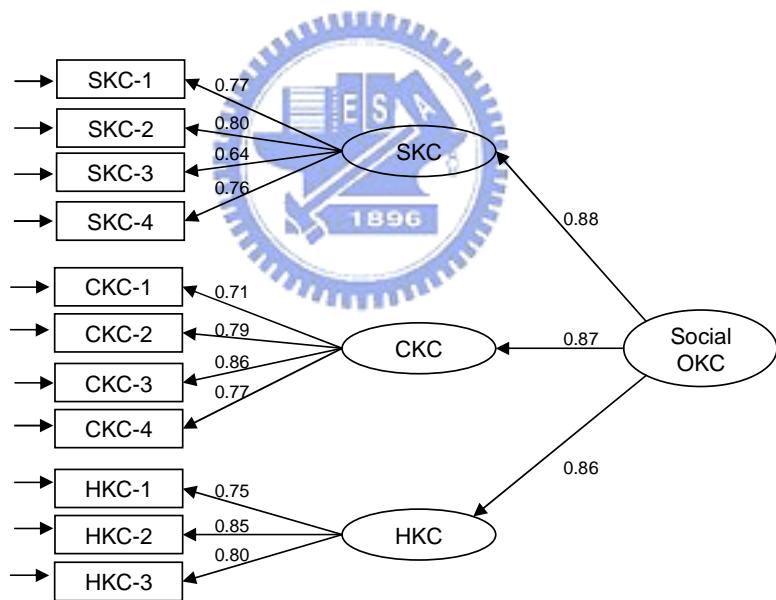
Figure 5.3 Parameter estimations of second-order model (Model 5)

5.3 **The analysis results of competing models**

A first order model analysis is used to examine the hypotheses and the relationship among structural knowledge capability, cultural knowledge capability, human knowledge capability, and knowledge sharing. This model whose fit indices (NFI = 0.94, NNFI = 0.95, and CFI =0.96) are reasonable and its normed chi-square is 3.02 appears to be acceptable. The results show that structural and human knowledge capabilities are more likely to drive the knowledge

sharing activities at a statistically significant level. Hypotheses 1a and 1c are therefore supported. However, there is no significant association, but it is closely noted, between cultural knowledge capabilities and knowledge sharing; therefore, Hypothesis 1b is not confirmed. The results are shown in Figure 5.4.
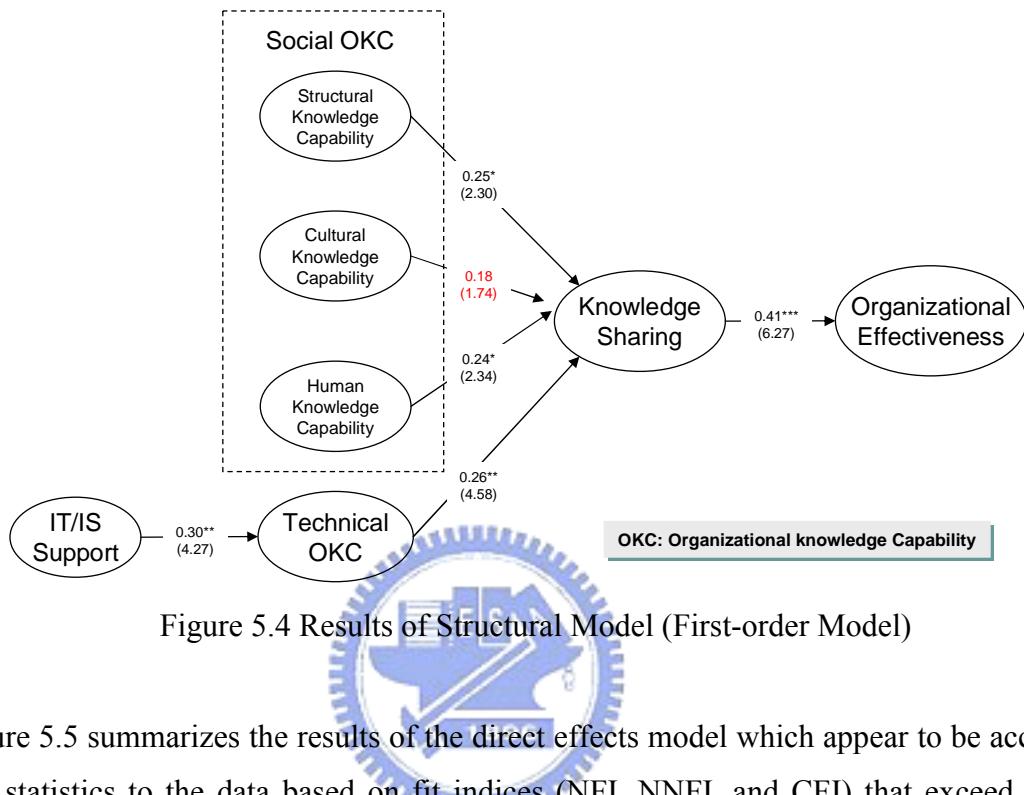
Figure 5.4 Results of Structural Model (First-order Model)

Figure 5.5 summarizes the results of the direct effects model which appear to be acceptable fitting statistics to the data based on fit indices (NFI, NNFI, and CFI) that exceed 0.9 and normed chi-square is 2.74, which is reasonable. Examining the significant effects, the variety of the path coefficient is observed. First, social OKC has a positive effect on knowledge sharing with a standardized path coefficient of .66 (Hypothesis 1 is supported, t=10.28, p<.01). Second, a significant, positive relationship exists between Technical OKC and knowledge sharing as the path coefficient is estimated at .25 (Hypothesis 2 is confirmed, t=4.47, p<.01). Third, knowledge sharing has a positive effect on organizational effectiveness with a standardized path coefficient of .43 (Hypothesis 3 is supported, t=6.57, p<.01). Fourth, the relationship between IT/IS support and technical OKC is significant at 0.30 (Hypothesis 4 is confirmed, t=4.27, p<.01) in the model.
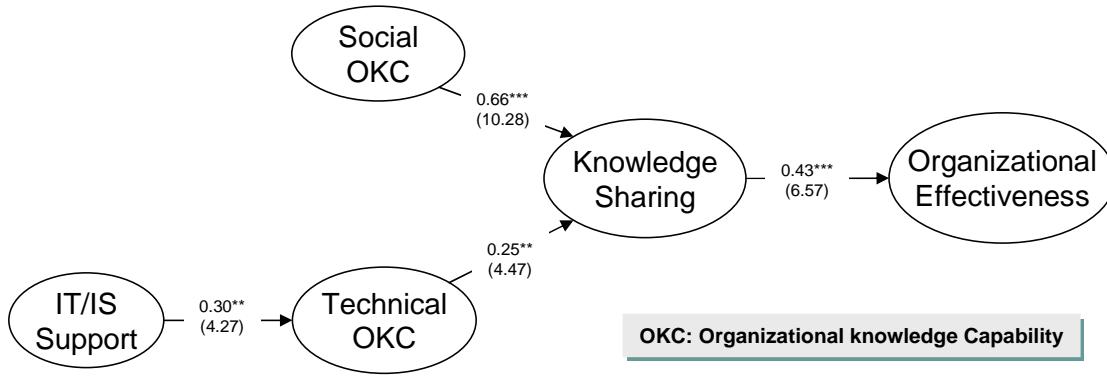
Figure 5.5 Results of Structural Model (Second-order Model)

5.4 Results of implementing & not-implementing KM organizations

To investigate the influence on Organizational knowledge capability and knowledge sharing when KM is implemented in the firm, this study adopts whether or not to implement KM as a comparative criterion to test the effects on OKC and KS. Accordingly, we split all of the samples into two groups: implementing KM or not. One group already embarks on the KM program in the firm - namely, implementing KM. Another group is called not-implementing KM, which does not yet promote KM in the firm. To validate this hypothesis, *t*-tests are used, and the results are shown in Table 5.4.
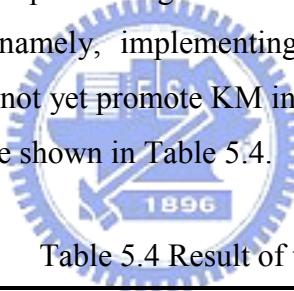
Table 5.4 Result of the *t*-test

Variables	Implementing KM (N=131)		Not implementing KM (N=125)		*T* value	Significance
	Mean	S.D	Mean	S.D		
Social OKC						
CKC	5.397	0.8671	5.038	1.0934	2.917	.004**
SKC	4.931	0.9426	4.254	1.0966	5.307	.000***
HKC	4.741	0.9201	4.485	1.0954	2.021	.045*
Technical OKC	5.891	0.8003	6.028	0.8491	-1.327	.186
Knowledge Sharing	5.398	0.8247	5.133	0.9342	2.403	.017*

*p<0.05; **p<0.01; ***p<0.001

The data reflect that the mean contribution score on each variable, except technical capability for implementing KM, is significantly higher than the not-implementing KM - that is, the implementation of KM enriches the cultural, structural, and human knowledge capabilities; on the other hand, the difference in knowledge sharing is also significant. Apparently, the firms which implement KM invest a lot of effort and money to improve the environment on knowledge flow (e.g. collaborative culture, employee intention by incentive and reward, and interpersonal understanding by social networks) for the successful KM.

-47-

Based on the investigated findings, implementing KM has an effect on organizational knowledge capabilities and knowledge sharing. Thus, Hypothesis 5a is confirmed and Hypothesis 5b is partially supported by the data (technical OKC is not confirmed).

5.5 Summary

In short, this study summarizes the results of Hypotheses test that shows in Table 5.5.

Table 5.5 Summary of Hypotheses test

	Hypotheses	**Results**
Hypothesis 1	Social OKC have a positive effect on the knowledge sharing behavior in an organization	Support
Hypothesis 1a	Structural knowledge capability has a positive effect on the behavior of knowledge sharing in an organization.	Support
Hypothesis 1b	Cultural knowledge capability has a positive effect on the behavior of knowledge sharing in an organization.	*Not Support*
Hypothesis 1c	Human knowledge capability has a positive effect on the behavior of knowledge sharing in an organization.	Support
Hypothesis 2	Technical OKC have a positive effect on the knowledge sharing behavior in an organization.	Support
Hypothesis 3	Knowledge sharing has a positive effect on the organizational effectiveness.	Support
Hypothesis 4	IT/IS support has a positive effect on the technical OKC in an organization.	Support
Hypothesis 5a	Firms which implement KM will be more participative in knowledge sharing activities than firms which do not.	Support
Hypothesis 5b	Firms which implement KM will be better in social OKC (cultural, structural, and human) and technical OKC than firms which do not.	*Partial Support*

Chapter 6 Discussion and Implication

The main objective of this study is to investigate the influential relationship among IT support, organizational knowledge capabilities, knowledge sharing, and organizational effectiveness within a firm. The findings are contributively to KM by showing how the organizational knowledge capabilities improve the context of knowledge sharing and facilitate the behaviors of knowledge sharing. Based on these results, some interesting propositions are exhibited as follows.

6.1 The Dimensions of Social OKC

First, this study supports that the social OKC is a higher-order construct and comprises structural, cultural, and human knowledge capability. Although the social KM resources and capabilities involve complicated concepts and characteristics, the dimensions of culture, structure, and human resources are worth a more advanced analysis. The aspect of cultural capability drives the common affection and cognition for prompting knowledge in an organization. Furthermore, the capability also provides support for the climate of knowledge innovation. For example, the firms which encourage coordination and cooperation among their members in knowledge communication and exchange will achieve effective project outcomes. The facet of structural competency provides better internal or external inducements for creating and sharing knowledge. For instance, employees contributing their knowledge to organizational repository may ascribe to economic pay or career advancement from the firm's commitments. The view of human capability suggests that an organization should put more attention to construct interpersonal or social networks for enhancing the interaction among organizational members. For example, a knowledge community, which is defined as groups of people with a collective passion to create and share the knowledge network, increases the organizational cohesion and consolidation for interpersonal knowledge collaboration. Correspondingly, the regulative result supports the original conceptualization of the social OKC.

6.2 The relationship between OKC and knowledge sharing

Since knowledge sharing is a challenging task, the results of this study suggest that the enhancement of organizational knowledge capabilities can foster sharing behavior. If an

organization possesses more organizational capabilities in combining knowledge resources to generate new capabilities, then the knowledge sharing is promoted to be more effective. Based on the results, we find that the technical OKC, the social OKC, the structural and human knowledge capabilities all exert significant influences on the knowledge sharing activities.

Technology can support codification and interpretation of information in the behavior of knowledge sharing. Information and communication technology (e.g. e-mail, on-line forums, or search engines) are the important and well-known resources for organizational knowledge sharing; however, the technical knowledge and capabilities are more essential than the information technology itself. The technical OKC emphasizes knowledge integration in an organization through the information infrastructure capability conducted on knowledge sharing – that is, the more technical knowledge the organizations own, the more their members intend to share knowledge.

The social OKC, an integrated second-order construct, has a positively effect on knowledge sharing. Compared with the technical OKC, the influence of the social OKC is superior to the technical OKC on the behavior of knowledge sharing. In other words, technical enablers are useful in lifting a few barriers to motivate people to share their knowledge, but it can hardly be expected to promote the willingness of knowledge sharing. As the survey of Mason and Pauleen (2003), the social enablers (soft aspects of KM), including sharing culture, trust, and people relationship, can attain knowledge collaboration within organizational colleagues, which are the primary supports when firms implement KM programs. The results are consistent with Handzic's findings. Handzic (2004) revealed that a perceived importance of KM system on social aspect is relatively greater than that on technical concept. However, at the most cases, when the firms implement KM still focus on the technical view, the firms will fail in knowledge transfer and sharing. The awareness of KM has to put more concerns on the social factor such as sharing culture, motivation mechanism, and collaboration relationship.

In addition, the structural knowledge capability accents on the development of a mechanism including organizational regulation and an incentive system. The incentive system, including reward, compensation, promotion, and prizes, can encourage individuals to contribute their professional knowledge to the organization. The organizational regulation, a common ordinance to foster knowledge sharing behavior within the firm's members, is composed of a subjective norm, political directive, and a procedure design. A fine structural knowledge capability enriches the individual's motivation for knowledge sharing. Beyond identified effects, the human knowledge capability concentrates on establishing the

relationship between people and social network for the effective knowledge sharing. At the Toyota's case, a highly interconnected and strong tie network is created for encouraging firm members to participate the activities of knowledge sharing, which is effective at the diffusion of tacit knowledge (Dyer and Nobeoka, 2000). Thus, the quality relationships could improve the trust among a firm's members and they might further promote the members' attitude and intention of knowledge sharing in an organization.

The cultural knowledge capability has a non-significant influence on knowledge sharing behaviors, which is contradictory to the proposed hypothesis. Three reasons might explain this result. First, in an organization, culture is an intangible resource which can affect many organizational activities (e.g. organizational learning, marketing strategy, or decision making), but it is difficult to form, cultivate, and measure. Although the cultural knowledge capability stresses the support of the collaborative atmosphere, it is helpless for establishing an organizational culture. In other words, the cultural knowledge capability has a non-significant effect on business culture, which in turn further affects knowledge sharing to be ineffective. Second, culture could be an indirect factor to drive knowledge sharing by means of other resources or capabilities. For example, some researchers reveal that a knowledge sharing culture is affected by organizational commitment (Connelly and Kelloway, 2003) and creates a context for social interaction (De Long and Fahay, 2000). Bock et al. (2005) demonstrated that an organizational climate has both direct and indirect effects (mediated by a subjective norm) on knowledge sharing. Third, culture consists of multi-faceted concepts. This study adopts building up organizational collaborative contexts and valuing organizational knowledge as the measurements of cultural knowledge capability. Although the content validity of this variable is acceptable, it might not be suitable to solve the problem of knowledge sharing in this study. The societal culture which might affect knowledge sharing behavior is elaborated, i.e. the tendency of knowledge sharing in East Asian and Western societies is different (Lee and Suliman, 2002; Moller and Svahn, 2004). The respondents of this study are an independent case in Taiwan, and further exploration into other countries is suggested. Summarily, the cultural knowledge capability has a positive relationship with knowledge sharing which is not supported. Advanced research to test the mediated variables between cultural capability and knowledge sharing is a path for future work.

6.3 IT/IS Support and Technical OKC

Combining with the concept of RBV, we might conclude that if the firms provide more

resources, more mature capabilities would be developed. In this study, the technical OKC is considered as a capability to integrate and deploy knowledge by using ICT effectively. The firm members use information technology effectively to perform knowledge processes which involve many technical supports, including automobile QA system, on-line practical communities, content management system, corporate yellow page, data mining, and intelligent agent. Based on the result of empirical test, we can conclude that the more supportive on KM technologies, the more powerful on KM capabilities. The positive result between IT/IS support and technical OKC shows that the company provides more IT/IS support to KM activities, the firm will accumulate more technical capabilities to knowledge organization. The finding not only verifies the theory of RBV through empirical design, but also enhances the importance of organizational knowledge capabilities.

However, providing static IT/IS systems and tools is not enough. The complete training on the use of IT resources is more important. The organization should encourage employees to utilize IT/IS effectively for achieving their works.

The RBV of the firm would suggest that the firms should attempt to establish IT capabilities through deploying resources effectively. The behavior of knowledge sharing occurs when the technological capability is mature in an organization.

6.4 The effects for a firm implementing KM

The most important concern in KM is to acquire strategic advantages by performing knowledge effectively. Therefore, KM tends to develop organizational capabilities for achieving effective knowledge sharing. This study reveals that the firms performing a KM program help improve the organizational knowledge capabilities and knowledge sharing. Since knowledge sharing is the primary object when firms conduct KM program, the result is obvious that a firm implementing KM can lead to more employees participating in the activities of knowledge sharing. Therefore, implementing KM is an effective program to help knowledge exchange in an organization. However, knowledge sharing behavior is affected by a variety of factors, an organization need to discover the better drivers to encourage the behavior of shared knowledge.

The distances in the structural knowledge capability are the most significant and in cultural knowledge capability they are secondary. This shows that businesses conduct more efforts and invest more money to improve organizational structure (i.e. encourage the sharing of knowledge by an incentive system) and organizational culture (i.e. establish friendly and

collaborative surroundings) when firms plan to implement KM. Moreover, the human knowledge capability is also significant. The KM program usually enhances the understanding among employees. Then, it encourages the learning, cooperation, and collaboration, and further creates the organizational profits.

In contrast, the technical knowledge capability does not be improved when implementing KM into a business, but its mean score is higher than the other knowledge capabilities – that is, the technical knowledge capability belongs to firms' owning mutual skills, which are easy to form and accumulate within organizations. Following the development of information technology, many firms already have established IT-based systems to support business related activities and IT acceptance has been improved increasingly in the past decade. Therefore, the technical knowledge capability is a fundamental necessary skill, but is not a sufficient condition in a knowledge organization.

Consequently, the implementation of KM program is actually contributive to the improvement of knowledge sharing and organizational knowledge capabilities.

Chapter 7   Conclusion

The contribution of this study is to propose an integrated knowledge sharing framework to explore the relationship among IT/IS support, organizational knowledge capability, knowledge sharing, and organizational effectiveness. The framework is based on the theories of RBV, KBV, socio-technical view, organizational capability view, and KM. The proposed framework is tested using the statistics analysis with questionnaire data collected from the different industries and institutions. Consequently, seven hypotheses are fully supported as expected, but one hypothesis is not confirmed and another hypothesis is partial support. The results also provide an important viewpoint for developing organizational knowledge capability in order to acquire the strategic advantage during the implementation of the knowledge activities.

A knowledge-based organization focuses on developing interpersonal, structural, and network relationships to achieve effective knowledge sharing and to further generate new knowledge or capabilities for organizational competitiveness and success. The purpose of this study is to elaborate upon some capability variables which can affect the knowledge sharing behavior and organizational effectiveness through the socio-technical view. By identifying these capability factors as the determinants of shared knowledge, firms can deploy and significantly reorganize their resources and capabilities for the organizational activities of knowledge sharing. Besides, IT/IS support is helpful to improve the technical knowledge capability.

This study emphasizes the importance of social and technical OKC on knowledge sharing, but it does not address the issue of how the organizational knowledge capability should be carried out. In fact, this is a significant organizational and managerial research issue in how to form and create organizational knowledge capability in a firm. An application of this study in the future work may be in identifying the antecedents of organizational knowledge capability (e.g. the effects of various incentives on SKC), constructing the interactions among the knowledge capabilities (e.g. integrating HKC and SKC to create social network), and exploring the other capabilities or competencies dimensions (e.g. taking the influence of process knowledge capability into account or extending the constructs of technical capability). Furthermore, the other statistics technology (e.g. multivariate analysis) can be applied to an advanced analysis on the relationship among the organizational knowledge capabilities, knowledge sharing, and organizational performance through a detailed model. This study

focuses on the investigation over the intra-organizational capabilities and sharing behaviors. The future research might be to explore the knowledge activities from knowledge sharing to knowledge creation, or to conduct the behavior of knowledge sharing on the cross-organizational or the multinational corporations.

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Appendix A. The exploratory literature review about KM studies

Author(s)	Approach	Factors (Enablers/Drivers)	System (Processes/Activities)	Outcome KM	Outcome Organization
Arthur Anderson & APQC (1995)	Conceptual	Strategy and leadership / Culture / Technology / Measurement	Identify / Collect / Organize / Share / Adapt / Use / Create	Knowledge effectiveness	
Davenport et al. (1998)	Conceptual	Linking to economic performance / Infrastructure (tech. & organ.) / Knowledge structure / Friendly culture / Clear purpose / Motivational practices / Channels / Manager support	KM project		
Meso and Smith (2000)	Conceptual	Organizational KMS (Knowledge / Technological & organizational infrastructure / Human resources / Culture)	Organizational learning	New knowledge / Continuous innovation	Sustainable competitive advantage
Yli-Renko et al. (2001)	Empirical	Social interaction / Relationship quality / Customer network ties	Knowledge acquisition		New product development / Technical distinctiveness / Sales costs
Gold et al. (2001)	Empirical	Technology / Structure / Culture / Acquisition / Conversion / Application / Protection	Knowledge infrastructure capability / Knowledge process capability		Organizational effectiveness
Choi and Lee (2002)	Empirical	KM strategy (System / Human)	Knowledge creation process (Socialization / Externalization / Combination / Internalization)		
Calantone et al. (2002)	Empirical		Learning orientation (Commitment to learning / Shared vision / Open mindedness / Intra-organizational knowledge sharing)	Innovativeness	Firm performance

Appendix A. The exploratory literature review about KM studies (Cont.)

Author(s)	Approach	Factors (Enablers/Drivers)	System (Processes/Activities)	Outcome	
				KM	Organization
Lee and Choi (2003)	Empirical	Culture (Collaboration / Trust / Learning), Structure (Centralization / Formalization), People (T-shaped skills), IT (support)	Knowledge creation (Socialization / Externalization / Combination / Internalization)	Creativity	Organizational performance
Tippins and Shoi (2003)	Empirical	IT competency (IT knowledge / IT operations / IT objects)	Organizational Learning (Acquisition / Dissemination / Shared interpretation / Organizational memory)		Firm performance
Janz and Prasarnphanich (2003)	Empirical	Knowledge-centered culture (Autonomy / Climate)	Corporative learning		Work satisfaction / Work performance
Chuang (2004)	Empirical	KM resources & capabilities (Structure / Culture / Human / Technology)			Competitive advantage
Ritter and Gemunden (2004)	Empirical	Business strategy	Technological competence / Network competence	Innovation success	
Lee et al. (2005)	Empirical		KMPI (Creation / Accumulation / Sharing / Utilization / Internalization)		Stock price / R&D expenditure / Price earnings ratio (PER)
Ko et al. (2005)	Empirical	Knowledge factors Communication factors Motivational factors	Knowledge transfer		
Tanriverdi (2005)	Empirical	IT relatedness (IT infrastructure / IT strategy making / IT HR management / IT vendor management)	KM capability (Product / Customer / Manager)		Corporate performance

Appendix B. Questionnaire Items

Table B1. The items of organizational knowledge capabilities

Questionnaire Items	Sources
Social OKC	Chuang (2004); Gold et al. (2001)
Cultural Knowledge Capability	
Organizational employees are valued for their individual expertise	
Organizational employees understand the importance of knowledge	
Organizational employees are encouraged to interact with other groups	
The benefits of sharing knowledge outweigh the costs	
Structural Knowledge Capability	
Our organization has a reward system for sharing knowledge	
Our organization structure facilitates the discovery of new knowledge	
Our organization structure facilitates the creation of new knowledge	
Our organization facilitates knowledge exchange across functional boundaries	
Human Knowledge Capability	
Organizational employees can make suggestion about others' tasks.	
Organizational employees can communicate not only with their own department members, but also with other department members	
Organizational employees can understand not only their own tasks, but also others' tasks	
Technical OKC	Chuang (2004); Gold et al. (2001)
Organizational employees use technology to search for new knowledge	
Organizational employees use technology to retrieve knowledge about its product and process	
Organizational employees use technology to retrieve knowledge about markets and competition	
Organizational employees use technology to cooperate with an inside person	

OKC: Organizational knowledge Capability

Table B2. The items of IT, Sharing, and Effectiveness

Questionnaire Items	Sources
IT / IS Support Our company provides IT/IS for collaborative works regardless of time and place Our company provides IT/IS for communication among organizational members Our company provides IT/IS for searching for and accessing necessary information Our company provides IT/IS for simulation and predication Our company provides IT/IS for systematic storing	Lee and Choi (2003)
Knowledge Sharing Organizational employees share business proposals and reports with each other Organizational employees share business manuals, models, and methodologies with each other Organizational employees share each other's success and failure stories Organizational employees share business knowledge gained from news, magazines, and journals Organizational employees share know-how from work experiences with each other Organizational employees share each other's know-where and know-whom Organizational employees share expertise obtained from education and training	Bock et al. (2005); Lee (2001)
Organizational Effectiveness *(compared to competitors)* …more successful overall … has greater market share … has faster growth … has higher profits … has more innovativeness … has better quality in products … has better service for customers	Tippins and Shoi (2003); Gold et al. (2001); Lee and Choi (2003)