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Knowledge management capability and competitive advantage: an empirical study of Vietnamese enterprises

Thi Nguyet Que Nguyen

Southern Cross University

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KNOWLEDGE MANAGEMENT CAPABILITY AND
COMPETITIVE ADVANTAGE: AN EMPIRICAL STUDY
OF VIETNAMESE ENTERPRISES

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Knowledge Management Capability and Competitive Advantage


STATEMENT OF ORIGINAL AUTHORSHIP

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I also certify that, to the best of my knowledge, any help received in preparing this thesis and all sources used have been acknowledged in this thesis.

Nguyen, Thi Nguyet Que (Cindy)
October 2010
DEDICATION

This research thesis is dedicated to my mum, Dr. Xuyen Le, who passed away a long time ago but her unending love and support have always stayed with me. Without the determination, strength and energy she has given to me, I might not have been able to overcome all difficulties to successfully complete the thesis.
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ABSTRACT

In the New Economy characterised by properties such as globalisation, intangibility and interconnectivity, business organisations are required to face new challenges, especially the changing nature of competition coupled with the enhanced dynamism and complexity of the environment in which they operate. One of the current strategic philosophies assisting firms to develop strategic capabilities dealing with uncertainty is knowledge management (KM). Through the systematic acquisition, creation, sharing, and use of knowledge, organisations develop, renew and exploit their knowledge-based resources, thereby allowing them to be proactive and adaptable to external changes and attain competitive success.

Emerging as a powerful means for sustaining organisational competitiveness, KM has been widely investigated from different perspectives. However, only a limited number of studies have adopted the resource based view (RBV) of the firm to empirically examine the relationships between KM infrastructure and competitive advantage (CA). Meanwhile, research on KM processes from a dynamic capability approach has been mostly conceptual in nature. It is proposed here that a failure to apply KM processes may hinder the potentially valuable integrated contribution to organisational CA of the two major components that constitute KM capability, namely infrastructure and process. In addition, a review of the literature shows that most empirical evidence has been obtained in the context of advanced Western countries, or newly industrialised Asian countries. The possibility that such models might need to be customised to fit the specificities of less developed or emerging economies has received very little attention to date.

To fill the identified gaps emerging from a review of prior research, this study seeks to deal with the following three main research questions:

Q1. What are the key dimensions of the KM capability of a firm?
Q2. How do the key dimensions of the KM capability of a firm relate to each other?
Q3. How do the key dimensions of the KM capability of a firm affect its CA?
Relying on social capital theory and the RBV extended by the knowledge and dynamic capability based approaches, this study develops an integrative theoretical model of KM capability based CA of the firm. Empirical examination of the hypothesised relationships among variables is conducted by means of questionnaire surveys in Vietnam, an emerging Asian country. For the pilot study, 600 draft questionnaires were directly distributed to senior managers participating in a national exhibition of construction firms in Ho Chi Minh City. The 148 responses returned with complete data were assessed, using factor analysis and reliability testing, to refine and finalise the questionnaire administered in the main survey. Next, final questionnaires were posted to 1,000 senior managers selected from the Business Directory issued by the Vietnamese Chamber of Commerce and Industry, followed up by two reminders combined with telephone contacts to increase the response rate and speed of return. The processes of data collection for the pilot and main surveys were conducted by FKS Consulting and Research Company Ltd.

The data collected from the main survey were initially assessed for missing values, sample descriptives and normality testing using SPSS version 15.0 with the final number of 362 responses. A two-step approach to structural equation modeling (SEM) was then applied using AMOS version 6.0. Step one was to conduct a confirmatory factor analysis to assess the proposed measurement model fit and construct validity. Step two aimed to develop and estimate the structural model for testing the significance of theoretical relationships. The results of SEM analyses indicated that the proposed measurement model and structural model satisfied the necessary fit conditions. Therefore, nine research hypotheses were tested to address the three research questions.

The empirical evidence confirms that the model is workable in the context of Vietnam, an emerging Asian country with a Confucian culture and a socialist market economy in which a majority of enterprises are small and medium sized. The findings confirm that the KM capability of a firm is a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability. Social KM capability is identified by three dimensions: organisational culture, organisational structure and people (or T-shaped skills). KM process capability is identified by four dimensions, namely knowledge acquisition, conversion, application and protection processes. While social
and technical KM infrastructure capabilities are strongly correlated, they are both enablers for KM process capability with social elements having a dominant influence. KM processes as dynamic capabilities, in turn, take the central role with application process as the most important contributor to firm competitiveness. As a result, the indirect effects of social and technical infrastructure capabilities on organisational CA are fully mediated through KM process capability.

In addition to theoretical contributions, the study also attempts to provide a variety of practical recommendations for business executives, especially those operating in Vietnam, to be successful in applying KM projects to the attainment of strategic business objectives. Two case studies were conducted to illustrate some of these implications. Management, on the one hand, should follow and develop a holistic approach by starting with the development of social and technical KM infrastructure which, in turn, will provide the platform necessary for increasing the effectiveness and efficiency of KM processes. The correlated and complementary factors of KM capability should not be considered in isolation but rather should be integrated and combined to leverage, exploit, improve and sustain firm competitiveness. On the other hand, practising managers need to keep in mind that while social aspects, especially cultural attributes, have the most influence on knowledge-oriented processes, the major source of firm competitiveness rests in its ability to effectively exploit and apply integrated knowledge based resources. Therefore, more effort should be applied to developing and utilising these factors. Within the context of Vietnam, the study also suggests a number of specific implications for a supportive infrastructure of KM activities. Some limitations of the study are also indicated, suggesting opportunities for future research.
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<td>ACP</td>
<td>Acquisition Process</td>
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<tr>
<td>AMOS</td>
<td>Analysis of Moment Structures</td>
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<td>APP</td>
<td>Application Process</td>
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<td>CA</td>
<td>Competitive Advantage</td>
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<td>CFA</td>
<td>Confirmatory Factor Analysis</td>
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<td>CFI</td>
<td>Comparative Fit Index</td>
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<td>CI</td>
<td>Cultural Infrastructure</td>
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<td>CP</td>
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<td>CR</td>
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<td>DCV</td>
<td>Dynamic Capability View</td>
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<td>Degree of Freedom</td>
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<td>Goodness-of-fit Index</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>KM</td>
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<td>KMIC</td>
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<td>KMPC</td>
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<td>LO</td>
<td>Learning Organisation</td>
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<td>OL</td>
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<td>PCA</td>
<td>Principal Component Analysis</td>
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<td>PI</td>
<td>People Infrastructure</td>
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<td>PP</td>
<td>Protection Process</td>
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<td>Q</td>
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<td>RBV</td>
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<td>RMSEA</td>
<td>Root Mean Square Error of Approximation</td>
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<td>SCA</td>
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<td>SCU HREC</td>
<td>Southern Cross University Human Research Ethics Committee</td>
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<td>SEM</td>
<td>Structural Equation Modeling</td>
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<td>Structural Infrastructure</td>
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<td>SKMIC</td>
<td>Social Knowledge Management Infrastructure Capability</td>
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<td>SME</td>
<td>Small or Medium Sized Enterprise</td>
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<td>SPSS</td>
<td>Statistical Package for the Social Sciences</td>
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<td>SWOT</td>
<td>Strengths – Weaknesses – Opportunities – Threats</td>
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<td>TKMIC</td>
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CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION

This chapter provides an introduction to the research by drawing a comprehensive picture of the study as a whole and, as such, sets the foundations for the following chapters. It starts with an overview of the research background. The importance of the study is then discussed and the broad gaps in the literature of strategic management and knowledge management are identified.

The next section defines the research questions and objectives followed by a list of research hypotheses and the proposed conceptual model drawn from the literature review and theoretical development. This is followed by a justification for the research and an explanation of the methodology employed.

The chapter also discusses the delimitations of scope and defines the important terms used in the study followed by an outline of the structure of the thesis. The outline of Chapter 1 is displayed in Figure 1.1.
Figure 1.1 – Chapter Outline

1.1 Introduction

1.2 Background to the Research

1.3 Research Issues

1.4 Justification for the Research

1.5 Methodology

1.6 Delimitations of Scope

1.7 Definitions of Terms

1.8 Structure of Thesis

1.9 Conclusion
1.2 BACKGROUND TO THE RESEARCH

In the old economy, firms had a choice between three generic strategies in their attempts to develop a competitive advantage (hereafter referred to as CA), namely cost leadership, market differentiation, and niche orientation (Porter 1985). In the new economy which is characterised by properties such as globalisation, intangibility, and inter-connectivity, business organisations are required to face new challenges (Coyle 1999; Kelly 1998).

In particular, the globalisation of business activity coupled with the increasingly rapid development and diffusion of technology gradually led to an erosion of traditional sources of CA (Jacome, Lisboa & Yasin 2002), requiring firms to clearly understand the changing nature of competition and adopt complementary and/or supplementary strategic approaches (Jackson, Hitt & DeNisi 2003). One popular approach used to understand competitive dynamics is the resource-based view (hereafter referred to as RBV) of the firm. According to this view, only those resources that are valuable, rare, hard to imitate, and cannot be substituted provide a sustainable competitive advantage (hereafter referred to as SCA) (Barney 1991; 1995; Ferdinand 1999; Hamel & Prahalad 1994; Michalisin, Smith & Kline 1997; Porter 1996; Teece, Pisano & Shuen 1997), leading to higher performance of the firm (Peteraf 1993).

Jackson, Hitt & DeNisi (2003) argue that in any competitive landscape, intangible resources are likely to produce a CA, among which human capital is usually the most important because it is the most difficult to imitate. Moreover, in today’s dynamic environment with its rapid and unpredictable changes, tangible assets have become easily accessible, imitable, and substitutable. As such, the foundations of organisational competitiveness have been shifting to an emphasis on knowledge (Riahi-Belkaoui 2003). According to Walters, Halliday and Glaser (2002), knowledge is considered to be the only strategic asset which increases with use rather than diminishing. The competitive edge of individuals, enterprises, and even nations has increasingly become dependent on their ability to apply knowledge and leverage it in a continuous way (Dimitriades 2005). In accordance with the knowledge-based view (hereafter referred to as KBV) of the firm (Grant 1996a), managing knowledge-based resources has become the key for sustaining a CA and superior performance (Grant 1996b; Grover & Davenport 2001; Jackson, Hitt & DeNisi 2003; Sharkie 2003; Teece, Pisano & Shuen 1997).
In other words, knowledge management (hereafter referred to as KM) has emerged as a strategic philosophy assisting firms to develop strategic capabilities to deal with the enhanced dynamism and uncertainty of the business environment. Through the systematic acquisition, creation, sharing, and use of knowledge, organisations develop, renew, and exploit their knowledge-based resources, thereby allowing them to be proactive and adaptable to external changes and attain competitive success.

Given the critical role of KM for businesses in adding value and attaining strategic objectives, this research will review relevant issues in strategic management and KM as two parent disciplines to draw a comprehensive picture of KM capability-based CA of the firm. In addition, to place the research issues in a specific context, Vietnamese enterprises in the nation’s two biggest cities, Hanoi and Ho Chi Minh City, were selected for empirical examination. This focus has been chosen because there is a lack of studies investigating KM practices in Vietnam. It has also been chosen to find out whether a linkage between the above concepts exists in a developing Asian country with a Chinese Confucian culture and a Socialist-oriented market economy in which a majority of enterprises are small and medium sized enterprises (hereafter referred to as SMEs).

Moreover, it is argued that firms operating in transitional economies are confronted with additional uncertainties and environmental turbulence related to a variety of factors such as changing economic and social conditions (Ramamurti 2000; Jones 2006). Currently in the process of transforming from a centrally-planned to a more market-oriented economy, Vietnam has experienced the increased economic cooperation and integration policies that have created a more intensive and dynamic competition landscape in the country. This situation provides both great opportunities and daunting challenges for businesses, especially with regard to entrepreneurship. To survive and develop, businesses should consider developing a proactive strategy towards new resources and capabilities to achieve and sustain a CA. This raises a question: ‘Does KM help and if so, how?’
1.3 RESEARCH ISSUES

Acknowledging the important role of KM in contributing to organisational CA, especially in the current dynamic marketplace, the extant literature in strategic management and KM has been reviewed (as presented in Chapter 2). This review covers the following key issues:

– Major schools of CA of the firm: the design school, the positioning school, RBV, KBV, and the dynamic capability approach.

– Knowledge management: historical development, theoretical framework, infrastructure capabilities, process capabilities, and organisational benefits.

As a result of the critical review of the extant literature and theoretical development, the main research objectives and research questions are identified, leading to a list of research hypotheses for testing the significance of the proposed theoretical relationships.

1.3.1 Research Objectives

This study aims to fill the identified gaps emerging from a review of prior research in the areas of KM and CA and so achieve the following major objectives:

First, the study attempts to provide a comprehensive measurement model of KM capability and to examine whether this model, which was originally developed in advanced economies, can be applied in the context of an emerging less developed economy.

The second objective of the study is to explain the interrelationships among different components of KM capabilities and their impacts on a firm’s CA.

In dealing with all identified relationships among variables, the last objective is obtained: validating the entire theoretical model and, thereby, adding to the literature empirical evidence in the context of Vietnam. As such, this research can provide a number of practical recommendations for guiding business executives, especially those operating in Vietnam, to be successful in their KM projects and long-term competitive strategies.
1.3.2 Research Questions

To achieve the above research objectives, this study seeks to deal with the following three main research questions:

**Q1.** What are the key dimensions of the KM capability of a firm?

**Q2.** How do the key dimensions of the KM capability of a firm relate to each other?

**Q3.** How do the key dimensions of the KM capability of a firm affect its CA?

1.3.3 Research Hypotheses

Based on the extant literature review and theoretical development discussed in Chapter 2, a number of provisional hypotheses have been developed to answer the three identified research questions.

To address Question 1, the literature on KM is reviewed and the three key components of KM capabilities are proposed, namely technical KM infrastructure capability, social KM infrastructure capability, and KM process capability. In particular, the technical KM infrastructure capability is considered as information technology (hereafter referred to IT) applied within organisations to support their KM activities. The social KM infrastructure capability has three dimensions: organisational culture, organisational structure, and people (or T-shaped skills). Lastly, the KM process capability is composed of four processes, including acquisition, conversion, application, and protection. Accordingly, three hypotheses are developed as follows:

**H1:** KM capability is a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability.

**H2:** Social KM infrastructure capability is a second-order latent construct composed of organisational structure, organisational culture, and people (or T-shaped skills).

**H3:** KM process capability is a second-order latent construct composed of acquisition process, conversion process, application process, and protection process.
Next, based on the review of KM elements, KM processes, and combined with the theory of social capital three hypotheses are proposed to answer Question 2:

**H4:** Technical and social KM infrastructure capabilities are positively correlated.

**H5:** Technical KM infrastructure capability is positively related to KM process capability.

**H6:** Social KM infrastructure capability is positively related to KM process capability.

Finally, to deal with the last research question, the RBV of the firm blended with a KBV and a dynamic capability approach are employed to develop the following three hypotheses:

**H7:** Technical KM infrastructure capability has an indirect positive impact on CA.

**H8:** Social KM infrastructure capability has a positive impact on CA.

**H9:** KM process capability has a positive impact on CA.

### 1.3.4 Research Model

The interrelationships among variables as represented by the above hypotheses can be displayed in the following proposed theoretical model (Figure 1.2):
**Abbreviations:**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>Cultural Infrastructure</td>
<td>ACP</td>
<td>Acquisition Process</td>
</tr>
<tr>
<td>SI</td>
<td>Structural Infrastructure</td>
<td>CP</td>
<td>Conversion Process</td>
</tr>
<tr>
<td>PI</td>
<td>People Infrastructure</td>
<td>APP</td>
<td>Application Process</td>
</tr>
<tr>
<td>SKMIC</td>
<td>Social KM Infrastructure Capability</td>
<td>PP</td>
<td>Protection Process</td>
</tr>
<tr>
<td>TKMIC</td>
<td>Technical KM Infrastructure Capability</td>
<td>KMPC</td>
<td>KM Process Capability</td>
</tr>
<tr>
<td>CA</td>
<td>Competitive Advantage</td>
<td>KM</td>
<td>Knowledge Management</td>
</tr>
</tbody>
</table>

**1.4 JUSTIFICATION FOR THE RESEARCH**

This research can be justified for a number of reasons.

First, KM is a strategic activity that should add value and, as such, a close link between KM and the strategic plans of the organisation ensures that knowledge activities contribute to
profitability and strategic advantage (Duffy 2000). As an emerging discipline, KM has become increasingly critical to organisations seeking to improve their efficiency and competitive abilities (Davenport & Prusak 1998; Rowley 1999). It is the recognition of KM’s importance to business success, especially in the New Economy, that is the first justification for this research.

Second, although considerable research exists to investigate important KM variables, only a limited number of studies have adopted the RBV of the firm to examine the contribution of knowledge infrastructure elements to organisational competitiveness. Moreover, these KM resources have only been examined in isolation which is not consistent with an extensive discussion found in the literature of the interwoven nature of organisational factors (Zheng 2005). Moreover, research on KM processes from a dynamic capability approach has been mostly conceptual in nature. As a result, there is a lack of research aimed at developing a comprehensive picture of strategic KM that explains the entire range of theoretical relationships between KM capabilities and CA of the firm.

In addition, an examination of the literature shows that most measures were originally developed and empirically tested in the context of advanced Western countries or newly industrialised Asian countries such as the USA (Gold, Malhotra & Segars 2001; Hsu 2006; Zheng 2005; Zheng, Yang & McLean 2010), Australia (Migdadi 2005), Canada (Manovas 2004), Taiwan (Chuang 2004), Hong Kong (Khalifa, Lam & Lee 2001; Khalifa & Liu 2003), and Korea (Choi & Lee 2002, 2003; Lee & Choi 2003). The possibility that such models might need to be customised to fit the specificities of less developed or emerging economies has received little attention to date (Gimenez & Rincon 2003). An empirical study of the issue in such a context is therefore required to examine the validity and reliability of the relevant measures.

Vietnam, a South East Asian developing country, has been transforming itself from a centrally planned economy to a socialist market economy since the ‘Doi moi’ (Renovation) process launched in 1986. In the intervening twenty years Vietnam has been subject to the processes of integration and globalisation and has joined the World Trade Organisation (WTO), entering a new environment in which it is subject to the high pressure of total reform and tough
competition. In the face of many great challenges, Vietnamese businesses are required to find new ways to be able to survive and compete. Accounting for almost 95% of the total number of existing firms in Vietnam, SMEs have emerged as a dynamic force in the development of the Vietnamese economy (Nguyen, Neck & Nguyen 2009).

It has been argued that SMEs, due to their lean nature, can implement changes, innovation and executive decisions more quickly than larger firms. In addition, SMEs have closer market proximity and higher adaptation ability for short-term reorientation (Julien & Lafrance 1977). Therefore, this study assumes that managing knowledge-based resources can help Vietnamese firms in general, and SMEs in particular, to accommodate a predictive approach and, thereby, a proactive strategy to develop a SCA and improve their competitiveness. This is another important justification for conducting the research.

1.5 METHODOLOGY

Business research can be exploratory, descriptive, or causal (Zikmund 2003). In seeking to answer the three research questions, this study is designed to provide a comprehensive picture of KM and CA and, thus, describe the characteristics of KM capabilities of the firm from a review of existing literature. In addition, the study aims to explain how different components of KM capabilities relate to each other and affect a firm’s CA, using social capital theory and the RBV of the firm blended with knowledge and dynamic capability based approaches. Thus, a combination of descriptive and causal research is used in this study.

Given the distinguishing characteristics and selection criteria of the two widely accepted research paradigms, quantitative and qualitative research, this study adopts a positivist or quantitative paradigm and uses a deductive approach to empirically test the relationships among the identified variables in the theoretical model. The research hypotheses used to examine these relationships were developed and formulated based on the findings of the relevant existing literature review.

Among the four basic types of business research techniques, namely experiments, surveys, observation, and secondary data studies (Zikmund 2003), the survey was chosen to deal with the research questions and hypotheses for a few reasons. First, surveys provide a quick,
efficient, and accurate means of assessing information about a population, and are more appropriate where there is a lack of secondary data (Zikmund 2003), which is the case in this study. Second, a review of previous empirical studies on KM capabilities shows that surveys are the most popularly used method to measure this concept in the literature. Last, as the study focuses on senior executives of companies covering a wide geographic area in the two biggest cities of Vietnam, Hanoi and Ho Chi Minh City, a mail survey was chosen for data collection due to its cost-efficiency. In addition, telephone contacts were used to overcome the possibility of low response rates and slow speed of return which are the major weaknesses of the survey method.

The research design process for this study followed a three-stage approach, including: (1) questionnaire design, (2) a pilot survey, and (3) the main survey. The first step involved the operationalisation of measures, which was achieved using the literature review to measure the constructs and design the draft questionnaire for pre-testing. In step two, 600 draft questionnaires were directly distributed to senior managers participating in a national exhibition of construction firms in Ho Chi Minh City, Vietnam. The 148 responses returned with complete data were assessed, using factor analysis and reliability testing, to refine and finalise the questionnaire administered to the main survey. For the last step, final questionnaires were posted to 1,000 senior managers selected from the Business Directory issued by the Vietnamese Chamber of Commerce and Industry (VCCI), followed up by two reminders combined with telephone contacts to increase the response rate and speed of return.

The processes of data collection for pilot and main surveys were conducted by FKS Consulting and Research Company Ltd. The selection of the research methodology applied in this study is justified in detail in Chapter 3.

Finally, the collected data were initially assessed for missing values, sample descriptives and normality testing using Statistical Package for Social Sciences (hereafter referred to SPSS) version 15.0 with the final number of 362 responses. A two-step approach to Structural Equation Modeling (hereafter referred to SEM) was next applied using Analysis of Moment Structures (hereafter referred to AMOS) version 6.0. Step one was to conduct a confirmatory factor analysis (hereafter referred to CFA) to assess the proposed measurement model fit and
construct validity. Step two aimed to develop and estimate the structural model for testing the significance of theoretical relationships (Hair et al. 2006). The data analysis and interpretation of findings are presented in detail in Chapter 4. Two case studies of successful KM capabilities were conducted to further illustrate some findings and implications.

1.6 DELIMITATIONS OF SCOPE

As in any research, this study has a few delimitations of scope which need to be identified.

First, the empirical study was only conducted in Vietnam, a developing Asian country dominated by a Chinese Confucian culture, a socialist market economy and SMEs. It is argued that the cultural, economic and political business environment of a country can strongly impact an organisation’s KM infrastructure capabilities and, in turn, support and determine its KM process capabilities. Thus, further cross-validation studies in other contexts would strengthen the generalisation of the research.

Second, due to financial constraints, the sample of the study was limited to businesses listed in the Business Directory issued by the Vietnamese Chamber of Commerce and Industry (VCCI). Although this directory is considered to be the best commercial database available on the Vietnamese market, this sample cannot avoid a few weaknesses. The database was not updated at the time of research and, thus, on the one hand, may have contained old information such as names, addresses, and even businesses which no longer existed and, on the other hand, may also have missed information about newly established entities. The use of this sample, therefore, may have produced some non-response bias and may have limited the generalisability of the findings as it did not include all Vietnamese businesses.

In addition, the study was also limited to samples from two cities of Vietnam, Hanoi and Ho Chi Minh City. These are the two biggest cities with their total number of enterprises accounting for nearly 50% of the whole country (Number of acting enterprises as of annual 31 Dec by province 2008), and they are also the most dynamic economic centres of Vietnam, attracting a huge number of foreign investors in a variety of industries. Therefore, this context was judged to be suitable to conduct a study of KM and CA.
Lastly, the responses may include a disproportionate number of businesses representing specific industries such as telecommunications, banking and finance, construction, and high technology because these industries are likely to be more aware of the importance of KM and, therefore, more interested in the research. It is also noted that more than 60% of firms did not respond to the request for survey participation which may contribute to a non-response bias.

### 1.7 DEFINITION OF TERMS

Given that the terminology used by businesses and academia may differ according to the context in which they are used, this section provides working definitions of important terms used in this study to add clarity, including two groups in methodology and literature of KM and CA.

A variety of methodological terminologies are adopted from Hair et al. (2006) as follows:

**Structural equation modeling (SEM):** Multivariate technique combining aspects of factor analysis and multiple regression that enables the researcher to simultaneously examine a series of interrelated dependence relationships among the measured variables and latent constructs, as well as between several latent constructs (p. 710).

**Measurement model:** The first of the two major steps in a complete SEM analysis that specifies the indicators for each construct and enables an assessment of construct validity (p. 771).

**First-order factor model:** Covariances between measured variables explained with a single latent factor layer (p. 771).

**Second-order factor model:** Measurement theory involving two ‘layers’ of latent constructs. These models introduce a second-order latent factor that causes multiple first-order latent factors, which in turn, cause the measured variables (p. 772).

**Confirmatory factor analysis:** Use of a multivariate technique to test (confirm) a pre-specified relationship (p. 707).
Structural model: Set of one or more dependence relationships linking the hypothesised model’s constructs that can be depicted with a visual diagram (p. 710, p. 844).

Endogenous constructs: Latent, multi-item equivalent to dependent variables, represented by a variate of dependent variables (p. 707).

Exogenous constructs: Latent, multi-item equivalent to independent variables, determined by factors outside of the model (p. 707).

Construct validity: Extent to which a set of measured variables actually represents the theoretical latent construct those variables are designed to measure (p. 778).

Convergent validity: Extent to which indicators of a specific construct converge or share a high proportion of variance in common (p. 771).

Discriminant validity: Extent to which a construct is truly distinct from other constructs (p. 778).

Content validity: Extent to which the content of the items is consistent with the construct definition, based solely on the researcher’s judgement (p. 771).

Construct reliability: Measure of reliability and internal consistency of the measured variables representing a latent construct (p. 771).

The second group consists of special terms derived and developed from the literature of KM and CA, including:

Technical infrastructure: The systems of the firm which allow the capture, flow, access and use of knowledge through the enterprise (Smith 2006, p. 49).

Structural infrastructure: Rules, policies, procedures, processes, hierarchy of reporting relationships, incentive systems, and departmental boundaries that organise tasks within the firm (Gold, Malhotra & Segars 2001, p. 198).
**Cultural infrastructure**: The shared values, beliefs, and practices of the people in the organisation (McDermott & O'Dell 2001, p. 77).

**People infrastructure** (T-shaped skills): The degree of understanding by workers of their own and others’ task areas, which is both deep (the vertical part of the ‘T’) and broad (the horizontal part of the ‘T’) (Lee & Choi 2003).

**Acquisition processes**: The ability to seek and obtain entirely new knowledge or create new knowledge out of existing knowledge through collaboration (Inkpen 1996).

**Conversion processes**: The ability to make existing knowledge useful (Gold, Malhotra & Segars 2001).

**Application processes**: The ability to apply, exploit, and use knowledge (Gold, Malhotra & Segars 2001).

**Protection processes**: The ability to secure knowledge from inappropriate or illegal use or theft (Gold, Malhotra & Segars 2001).

**Competitive advantage**: The objective of organisational strategies (Porter 1985) which is measured in many dimensions such as innovativeness, market position, mass customisation, and difficulty in duplication (Byrd & Turner 2001).

**1.8 STRUCTURE OF THESIS**

This thesis adopts the standard framework of five chapters discussed by Perry (1998). Figure 1.3 displays the outline of the thesis.
**Figure 1.3 – Thesis Chapters**

<table>
<thead>
<tr>
<th>Chapter 1: Introduction</th>
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<tbody>
<tr>
<td>Chapter 2: Literature Review</td>
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<tr>
<td>Chapter 3: Methodology</td>
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<tr>
<td>Chapter 4: Data Analysis</td>
</tr>
<tr>
<td>Chapter 5: Conclusion and Implications</td>
</tr>
</tbody>
</table>

*Source: Perry (1998)*

**Chapter 1 – Introduction** draws a comprehensive picture of the study as a whole and sets out the foundations for the following chapters. It provides an overview of the research background and a brief description of the research issues, including research objectives, research questions, research hypotheses, and the proposed theoretical model. In addition, this chapter also explains the importance and contributions of the study and the selection of the research methodology. Lastly, the delimitations of scope are acknowledged, the working definitions of terms used in the study and the thesis structure are then presented.

**Chapter 2 – Literature Review** aims to identify a gap in current knowledge and develops a theoretical model through a comprehensive review of existing literature. In so doing, the chapter explores the two parent disciplines: (1) CA which details the major schools of CA to
explain the sources of CA, including the design school, the positioning school, the RBV, the KBV, and the dynamic capability approach; (2) KM which covers a brief summary of the KM development process, the KM theoretical framework, and major benefits KM brings to organisations.

The chapter continues with a discussion of KM capability-based CA, the intermediate discipline as a foundation leading to the development of research model and the related hypotheses used to deal with the research questions proposed in Chapter 1.

**Chapter 3 – Methodology** provides a justification of the research methodology and details of the research design process used to empirically examine the theoretical model developed in Chapter 2. In particular, the chapter first focuses on the design, development, and refinement of the questionnaire through the two stages of item generation and the pilot study. Following the description of the sample design and questionnaire administration used to conduct the main survey, data analysis techniques and ethical considerations are described.

**Chapter 4 – Data Analysis** reports the results of the instrument pre-test followed by the descriptive and inferential analyses for the main study.

First, the instrument is pre-tested, using factor analysis and Cronbach’s alpha calculation on the results of the pilot survey, to assess its validity and reliability. Based on the findings of the pilot survey, the questionnaire was finalised for the main study.

Following data checking and cleaning, normality identification and sample description using SPSS version 15.0, a two-step approach to SEM was applied using AMOS version 6.0. The construct validity and measurement model fit were first assessed through CFA to ensure that the measurement model satisfied the first step of SEM. The structural model was then developed and used to assess the significance of theoretical relationships through related hypotheses, addressing the research questions and completing the second step of SEM.

**Chapter 5 – Conclusions and Implications** is the final chapter of the thesis. It draws conclusions about the research issues by linking the research questions identified in Chapter 2 with the main findings shown in Chapter 4 and being further supported by the two case studies
of successful development of KM capabilities in sustaining CA. In addition, the chapter also discusses the theoretical contributions and practical implications of the research. Limitations of the study and recommendations for future research are also provided.

1.9 CONCLUSION

By drawing a comprehensive picture of the study, this chapter lays the foundations for all chapters of the thesis. It first introduces the background to the research and a brief description of research questions and objectives, leading to a list of research hypotheses and the proposed theoretical model. The chapter next provides a justification for the research based on gaps found in the extant literature and then gives an explanation of the research methodology used in the study. In addition, the delimitations of scope are discussed and the important terms used in the study are defined and an outline of the thesis is provided.

The next chapter will review the literature on KM and CA to develop a preliminary conceptual model that explains the interrelationships between KM capability components and their impacts on organisational CA.
CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

Following Chapter 1 which provided an overview of the research, this chapter aims to identify a gap in current knowledge and develop a theoretical model through a review of existing literature. This review explores the two parent disciplines of CA and KM, and includes definitions of key constructs, major schools of CA, their developmental history, the theoretical framework, as well as the importance of KM in today’s business context. The chapter continues with a discussion of KM capability-based CA, as the intermediate discipline, to provide a foundation leading to the theoretical model and related hypotheses used to deal with the research questions proposed in Chapter 1. The structure of Chapter 2 is presented in the following Figure 2.1.

Figure 2.1 – Chapter Outline
2.2 COMPETITIVE ADVANTAGE

This research seeks to develop theoretical links and empirically examine the association between KM capability and CA. Therefore, the review of the literature in this chapter concentrates initially on providing an understanding of CA and SCA.

2.2.1 The Concept of (Sustainable) Competitive Advantage

The fundamental concept of CA can be traced back to Chamberlin (1933), but Selznick (1957) can be attributed with linking advantage to competency. The next major development came when Hofer and Schender (1978) described CA as the unique position an organisation develops vis-à-vis its competitors through its patterns of resource deployment. Day (1984) and Porter (1985) provided the next generation of conceptualisation which saw CA as the objective of strategy and, thus, the dependent variable. The rationale behind this is that superior performance is correlated with CA, and achieving an advantage will automatically result in higher performance (Porter 1985; Reed & Defillippi 1990).

While a CA can result either from implementing a value-creating strategy not being employed by current or prospective competitors or through the superior execution of a strategy which is also being employed by competitors (Bharadwaj, Varadarajan & Fahy 1993), it is sustained when other firms are unable to duplicate the benefits of this strategy (Barney 1991). So what is a sustained CA?

Although the actual term ‘SCA’ emerged in 1985 when Porter discussed the basic types of competitive strategies firms could employ to achieve SCA, no formal conceptual definition was offered. Based on Barney’s work in 1991, Hoffman (2000, p. 1) defines SCA as ‘the prolonged benefit of implementing some unique value-creating strategy not simultaneously being implemented by any current or potential competitors along with the inability to duplicate the benefits of this strategy’. The fundamental key to the long-term success of a firm is the achievement and maintenance of a SCA (Hoffman 2000).
2.2.2 Major Schools of Competitive Advantage

Because of its importance to the long-term success of firms, many researchers have contributed, directly or indirectly, to the field of strategic management to understand the content and origins of SCA as well as different types of strategies that may be used to achieve it (Barney 1991; 1995; 2001; Hoffman 2000; Porter 1985; Priem & Butler 2001; Rumelt 1984). This section of the thesis reviews the three major schools of CA, including the design school, the positioning school, and the RBV of the firm to trace the sources of SCA.

2.2.2.1 The Design School

Early studies of CA were rooted firmly in historical analyses and careful qualitative research (Cockburn, Henderson & Stern 2000). Chandler (1962), who was among the first scholars to study strategic management during the 1960s, was influential in stimulating further studies such as Ansoff’s (1965) book, Corporate strategy and Learned et al.’s (1965) Business policy: text and cases. This work, along with another book by Andrews (1971), The concept of corporate strategy, formed the basis for the ‘design school’ of strategic management with its fundamental Strengths-Weaknesses-Opportunities-Threats framework (hereafter referred to SWOT) (Barney 1991, 1995; Browne 1994; Feurer & Chaharbaghi 1995). This framework suggests that firms obtain SCA by implementing strategies that exploit their internal strengths, through responding to environmental opportunities, while neutralising external threats and avoiding internal weaknesses (Barney 1991).

According to the SWOT model, strategy development follows both internal and external analysis, which, in turn, is followed by the evaluation and selection of the most viable strategies (Porter 1996). The selected strategies will determine the products and services provided – in effect, the organisation’s position and scope, and the resources required to produce them (Teece, Pisano & Shuen 1997). Effective strategy implementation, on the one hand, requires careful selection and management of the organisational assets and competencies needed to support those strategies. On the other hand, it will deliver SCA resulting in superior long-run performance, which is the ultimate objective of organisations (Porter 1996). Figure 2.2 presents an overview of the design school’s strategic management process.
2.2.2 The Positioning School

Building on the design school model, Porter (1980), in his influential book *Competitive strategy: techniques for analyzing industries and competitors*, focuses on the analysis of the industry and market that a firm operates in. The main thrust of this work is the examination of competitive forces, and opportunities and threats present in the external environment (Barney 1991; Black & Boal 1994; Grant 1991; Leavy 2003). This focus provides a predominantly external explanation for a firm’s CA, based on capitalising on the relative imperfections of the sector in which the firm is competing (Lopez 2005).
In particular, Porter identifies five competitive forces (as shown in Figure 2.3) that determine industry profitability, including rivalry among competitors, threat of new entrants, bargaining power of suppliers, bargaining power of customers, and the threat of substitute products. All of these competitive forces are affected by industry structure or the fundamental economic and technical characteristics of a particular industry (Davidson 2001). The model allowed managers to assess the attractiveness of the market/industry and to establish the most competitive position within that market/industry (Browne 1994; Feurer & Chaharbaghi 1995; Robbins et al. 2000).

**Figure 2.3 – Competitive Forces**

Source: Porter (1980, p. 5)
Porter (1979) asserts that the core of strategy development is coping with competition, and that firms should analyse their competitive environment, choose their strategies, and then acquire the resources needed to implement their strategies (Porter 1980). He suggests that firms have a choice between three generic strategies for achieving above-average performance in a selected industry: cost leadership, differentiation, and focus (or niche orientation). Each of these strategies, being determined by the two factors competitive advantage and competitive scope (Figure 2.4), is a fundamentally different approach to creating and sustaining a CA (Davidson 2001).

**Figure 2.4 – Generic Strategies**

<table>
<thead>
<tr>
<th>COMPETITIVE SCOPE</th>
<th>COMPETITIVE ADVANTAGE</th>
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<tbody>
<tr>
<td>Broad Target</td>
<td>Lower Cost</td>
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<tr>
<td></td>
<td>1. Cost Leadership</td>
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<tr>
<td>Narrow Target</td>
<td>Differentiation</td>
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<td></td>
<td>2. Differentiation</td>
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<td></td>
<td>3. Cost Focus</td>
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<td></td>
<td>4. Differentiation Focus</td>
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</table>

Source: Porter (1985, p. 12)

While the above approach only emphasises the impact of opportunities and threats in a firm’s environment on CA with limitations inherent in analysing CA based on the assumptions that a firm’s resources are homogeneously distributed and highly mobile (Barney 1991), Porter’s (1985) concept of ‘value chain’ (Figure 2.5) was another development to facilitate an internal analysis that allowed managers to determine the potential sources of CA by investigating the activities that their organisation undertook and the links between them (Nonaka 1991). In particular, the value chain disaggregates a firm into its strategically relevant activities grouped into two categories as primary and support activities in order to understand the behaviour of cost and the existing and potential sources of differentiation. Each of the activities and the
linkages between them are potential sources of strengths and weaknesses that may inhibit or enhance CA (Pearce II & Robinson 1994). A firm gains CA by performing these strategically important activities more cheaply or better than its competitors (Porter 1985).

**Figure 2.5 – The Value Chain**

![Value Chain Diagram]

*Source: Porter (1985, p. 37)*

The sustainability of Porter’s three generic strategies requires that a firm’s CA resists erosion by competitor behaviour or industry evolution. In the New Economy, however, the globalisation of business activity and technical development gradually led to an erosion of traditional sources of CA (Jacome, Lisboa & Yasin 2002), demanding the adoption of complementary and/or supplementary strategic approaches. A complete understanding of the sources of CA, especially in a dynamic environment with rapid and unpredictable changes, requires the analysis of a firm’s internal strengths and weaknesses (Barney 1991, 1995; Collis & Montgomery 1995; Rumelt 1984; Wernerfelt 1984).

The RBV of the firm, which regards an organisation as a ‘broader set of resources’ (Wernerfelt 1984, p. 171), is a popular perspective in strategic management with a focus on internal analysis and an attempt to address a perceived imbalance of Porter’s (1980; 1985) ‘positioning school’ (Browne 1994), and to push Porter’s (1985) value chain logic further (Barney 1991).
2.2.2.3 **Resource-based View of the Firm**

The RBV of CA, which examines the link between a firm’s idiosyncratic attributes and performance (Barney 1991), is based on using its internal strengths to take advantage of opportunities and counter threats in the market, with an aim to create SCA through the acquisition, utilisation, and exploitation of firm-specific resources and capabilities (April 2002; Riahi-Belkaoui 2003). It means that explanations for why some firms ultimately succeed and others fail can be found in understanding their resources and capabilities, which influence both the strategic choices that managers make and the implementation of those chosen strategies (Jackson, Hitt & DeNisi 2003).

The RBV does not replace the two previous broad approaches to strategy but attempts to fill in the blank created by the SWOT framework (Barney 1995) and, therefore, was as powerful and as important to strategy in the 1990s as industry analysis was in the 1980s (Collis & Montgomery 1995). The following figure illustrates the relationships between traditional SWOT analysis, the resource-based model, and models of industry attractiveness.

**Figure 2.6 – Relationships between SWOT, RBV and Environmental Models of CA**

![Diagram illustrating the relationships between SWOT, RBV, and Environmental Models of CA](source: Barney (1991, p. 100))
While Porter focuses on the analysis of the industry and market that a firm operates in, the RBV concentrates on firm-specific resources which include ‘assets, capabilities, organisational processes, attributes, information, and knowledge’ (Barney 1991, p. 101).

**Firm resources**

There are many definitions of firm resources contributed by a variety of resource-based scholarly works as presented in Table 2.1:

**Table 2.1 – Firm-specific Resources**

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wernerfelt (1984, p. 172)</td>
<td><strong>Resources:</strong> ‘anything which could be thought of as a strength or weakness of a given firm’; e.g. brand names, in-house knowledge of technology, employment of skilled personnel, trade contacts, machinery, efficient procedures, capital.</td>
</tr>
</tbody>
</table>
| Aaker (1989, p. 91)        | **Asset:** ‘something your firm possesses such as a brand name or retail location that is superior to the competition’  
                          | **Skill:** ‘something that your firm does better than competitors such as advertising or efficient manufacturing’ |
| Reed and Defillippi (1990, p. 89) | **Competency:** particular skills and resources a firm possesses, and the superior way in which they are used. |
| Barney (1991, p. 101)      | **Assets, capabilities, organisational processes, firm attributes, information, knowledge.**  
                          | **Three categories:** (1) Physical capital resources (physical technology, plant and equipment, geographic location, access to raw materials); (2) Human capital resources (the training, experience, judgement, intelligence, relationships, insight of individual managers and workers); and (3) Organisational capital resources (formal reporting structure, formal and informal planning, controlling, and coordinating systems, informal internal, and external relationships). |
### Table 2.1 (Cont.) – Firm-specific Resources

<table>
<thead>
<tr>
<th>Source</th>
<th>Resources:</th>
<th>Capabilities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant (1991, p. 119 &amp; 122)</td>
<td>capital equipment, skills of individual employees, patents, brand names, reputation, financial resources, physical resources, human resources, technological resources, organisational resources.</td>
<td>complex patterns of coordination, routines.</td>
</tr>
<tr>
<td>Collis and Montgomery (1995, pp. 119-20)</td>
<td>Three forms of resources: (1) Physical; (2) Intangible (brand names, technological know-how); (3) Organisational Capability (routines, processes, culture).</td>
<td></td>
</tr>
<tr>
<td>Teece, Pisano and Shuen (1997, p. 516)</td>
<td>‘firm-specific assets that are difficult if not impossible to imitate’; e.g. trade secrets, specialised production facilities, and engineering experience.</td>
<td>‘organisational routines and processes’</td>
</tr>
<tr>
<td>Ferdinand (1999, p. 22)</td>
<td>stocks of available assets that are owned or controlled by a firm; know-how, financial and physical assets, and human capital.</td>
<td>the capacity to deploy resources; information-based, tangible and intangible processes.</td>
</tr>
</tbody>
</table>

**Source:** Developed for this study

Among the above definitions, firm-specific resources refer to assets, skills, different forms of resources such as physical, human, and organisational capital, competencies, and capabilities. Although in management writing, the terms ‘competence’ and ‘capability’ tend to be used interchangeably (Mills, Platts & Bourne 2003) the differences do exist. Competences are people’s basic skills, while capabilities are the combination of such competences that describe a holistic picture of people’s capacity to act (James 2005). Ferdinand (1999)’s definition of capability appears to closely align with this concept and thus, will be used for the study. In this approach, *resources* are stocks of available assets that a firm owns or controls (Ferdinand...
1999, p. 22) while *capabilities* are a firm’s capacity to deploy its resources (Ferdinand 1999, p. 22; Hitt, Keats & DeMarie 1998, p. 108).

To explain further, Grant (1991, p. 119) posits that ‘while resources are the source of a firm’s capabilities, capabilities are the main source of CA’. More simply, Zack (1999) states that what a firm knows is a resource and what a firm knows how to do is a capability.

**Resource distribution in industry**

Contrary to Porter’s (1980; 1985) approach to industry analysis which assumes homogeneous resource distribution and highly mobile resources, the RBV theory substitutes two alternative assumptions in analysing sources of CA: firstly, that the strategic resources that firms control within an industry are heterogeneously distributed and secondly, that these resources are not perfectly mobile across firms and thus, heterogeneity can be long lasting (Barney 1991; Teece, Pisano & Shuen 1997).

However, resource heterogeneity introduces the concept of resource barriers which in part are analogous to Porter’s (1980; 1985) barriers to entry (Wernerfelt 1984). The heterogeneous distribution, when combined with imperfect mobility, is where a firm gains CA. Should resources be homogeneously distributed in an industry, all firms in the industry could conceive of and execute the same strategies and, as a result, SCA, first mover advantages, and barriers to entry could not exist (Barney 1991; Grant 1991).

**Firms resources and SCA**

According to the RBV of the firm, a firm’s resource, in order to hold the potential of sustainable CA, must have four attributes (Barney 1991; 1995; Ferdinand 1999; Hamel & Prahalad 1994; Michalisin, Smith & Kline 1997; Porter 1996; Teece, Pisano & Shuen 1997) as follows:

First, they must be valuable, in the sense that they exploit opportunities and/or neutralise threats in a firm’s environment. Resources are valuable when they enable a firm to conceive of or implement strategies that improve its efficiency and effectiveness.
Second, they must be rare, or if possible unique, among a firm’s current and potential competition. By definition, valuable firm resources possessed by large numbers of competing or potentially competing firms cannot be sources of either a CA or a SCA. In other words, as long as the number of firms that possess a particular valuable resource (or a bundle of valuable resources) is less than the number of firms needed to generate perfect competition dynamics in an industry (Hirshliefer 1980), that resource has the potential of generating a CA.

Third, they must be imperfectly imitable, in the sense that these resources and capabilities are costly to copy or hard to imitate. Firm resources can be imperfectly imitable for one of three reasons or a combination of all of those reasons: (1) the ability of a firm to obtain a resource is dependent upon unique historical conditions, (2) the link between the resources possessed by a firm and a firm’s SCA is causally ambiguous, or (3) the resource generating a firm’s advantage is socially complex (Dierickx & Cool 1989).

The final requirement for a resource to be a source of SCA is that the resource is non-substitutable. Substitutability can take two forms. If a competitor cannot duplicate a firm’s resources exactly, but can substitute similar resources that enable it to formulate and implement identical strategies and use very different resources as strategic substitutes, then a resource cannot be a source of SCA (Bharadwaj, Varadarajan & Fahy 1993).

The relationships between resource distribution, resource attributes, and SCA is summarised in the following framework (Figure 2.7) which can be applied in analysing the potential of a broad range of firm resources to be sources of SCA (Barney 1991).

**Figure 2.7 – Relationships between Resource Distribution, Attributes & SCA**

<table>
<thead>
<tr>
<th>Firm Resource Heterogeneity</th>
<th>Value</th>
<th>Sustained Competitive Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Resource Immobility</td>
<td>Rareness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Imperfect Imitability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- History dependent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Causal ambiguity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Social complexity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Substitutability</td>
<td></td>
</tr>
</tbody>
</table>

Source: Barney (1991, p. 112)
Two approaches within RBV

Within the RBV school, there exist two different perspectives (James 2005). One is the conservative approach which suggests that firms focus on what they are good at, that they already possess the requisite competencies (Browne 1994), and that a firm’s resources determine what it can do (Hitt, Ireland & Hoskisson 2001). The other approach is concerned with the dynamic capabilities required to support strategies (Eisenhardt & Martin 2000; Teece, Pisano & Shuen 1997), suggesting that strategies determine competencies (Grant 1991).

Whereas the conservative viewpoint results in diversification being impossible as it would require new competencies to be developed or acquired, the dynamic perspective sees diversification as an opportunity to generate or acquire new competencies through recruitment, training, mergers and acquisition or integration (James 2005). This dynamic approach of the RBV is further discussed in a following section.

2.2.3 Current Schools of Competitive Advantage

Evolving from the RBV, the KBV and the dynamic capability view (hereafter referred to DCV) of the firm are considered as two extended forms of this theory within the field of strategic management. The following subsections discuss the development, characteristics and nature of each approach.

2.2.3.1 Knowledge-based View of the Firm

Although firms employ both tangible and intangible resources in the development and implementation of strategies, it has been argued that in any competitive landscape, especially in the new economy, intangible assets are more important and likely to produce a CA because they often are state unobservable, truly rare and can be more difficult for competitors to imitate (Black & Boal 1994; Jackson, Hitt & DeNisi 2003; Michalisin, Smith & Kline 1997; Riahi-Belkaoui 2003). Organisations that base their strategies on intangible assets outperform those with strategies based only on tangible assets (Barney 2001). Intangible assets vital for CA comprise ‘consumer trust, brand image, control of distribution, corporate culture, the talent of people, and leadership skills (Evans, Pucik & Barsourx 2002, p. 33), ‘accumulated
learning and experience’ (Bateman & Snell 2002, p. 123) as well as know-how and knowledge which can provide ‘premium value’ (Walters, Halliday & Glaser 2002, p. 826).

Emergent from the RBV, the knowledge-based perspective defines firms as bodies that generate, integrate, and distribute knowledge (McEvily & Chakravarthy 2002; Miller 2002; Narasimha 2000; 2001). According to this approach, knowledge is considered the key or strategic asset to hold the potential of SCA (Argote & Ingram 2000; Grant 1996a; Lopez 2005) and firms gain CA through the acquisition, transfer and subsequent use of strategic assets, in this case, knowledge (Nonaka 1991; Prahalad & Hamel 1990; Riahi-Belkaoui 2003).

Knowledge is in the same context as financial, human, and other resources but the only one which increases with use rather than diminishing (Duffy 2000). Nonaka, Toyama and Nagata (2000) define knowledge assets as firm-specific resources that are indispensable to create value for the firm, including inputs, outputs, and moderating factors of the organisation’s knowledge creating activities, and hence they are constantly evolving (Moustaghfir 2009). Moreover, unlike most traditional resources, knowledge cannot easily be purchased in a ready-to-use form. This asset is difficult to transfer among firms because of transaction and transfer costs and also because of its possible tacit nature. Knowledge, particularly context-specific tacit knowledge, tends to be unique and, therefore, difficult, if not impossible, to imitate (Teece 1998). To obtain similar knowledge, the company’s competitors have to engage in similar experiences, but obtaining knowledge through experience takes time (Becerra-Fernandez, Gonzalez & Sabherwal 2004). In other words, the sustainability of CA is derived from the time constraint on rivals learning what the other organisation already knows (Teece 1998) which creates a sustained knowledge-based barrier to competition (Zack 1999).

To explain why knowledge is considered extremely important for sustaining CA in today’s environment, Jackson, Hitt and DeNisi (2003) offer several reasons. First, the nature of work which has been changing for the past few decades requires both tacit and explicit knowledge and the ability to apply that knowledge to work. When work continues to change in unpredictable ways, the ability to learn and adapt becomes very important to acquire and master new knowledge. Moreover, in the contemporary business environment, the nature of knowledge has dramatically changed due to many scientific developments and other ongoing
discovery processes (Dimitriades 2005) and, thus, CA is achieved only when firms find new continuous ways to leverage knowledge-based resources for higher organisational performance (Jackson, Hitt & DeNisi 2003).

Due to the widely recognised importance of knowledge, James (2005) and Moustaghfir (2009) propose theoretical frameworks of knowledge asset management which delivers SCA and long-term superior performance based on the firm’s knowledge assets, which are defined as ‘stocks of knowledge from which services are expected to flow for a period of time that may be hard to specify in advance’ with an economic life viable within the industry and market context (Boisot 1999, p. 3). Knowledge assets include a firm’s intellectual assets, employees’ skills and know-how (Hall 1993) and are leveraged into a firm’s capabilities which in turn impact on its performance and provide it with a SCA (Grant 1991, 1996b; Moustaghfir 2009; Rouse & Daellenbach 2002). Sharing the same point of view, Jackson, Hitt and DeNisi (2003) state that in today’s complex and challenging environment with high uncertainty, unpredictability and dynamism, managing knowledge-based resources has become the key for gaining SCA and sustained superior performance (Grant 1996a; Sharkie 2003; Teece, Pisano & Shuen 1997).

2.2.3.2 Dynamic Capability View of the Firm

Due to changes in technology, politics, economics and business models, most markets today are dynamic (Robbins et al. 2000). To survive and prosper, organisations need the capacity to match, anticipate or even create market changes (Hamel 2002; Hamel & Prahalad 1994). In other words, the current dynamic market demands a dynamic response (Teece, Pisano & Shuen 1997), requiring organisations to adapt through the development of new knowledge to generate new skills and capabilities (Andriessen 2004), and in the anticipation that the firm’s resource base will suit future requirements (Grant 1996a).

According to Lopez (2005), both RBV and KBV are still of an essentially static nature and, as such, cannot adequately explain the process via which certain firms reach positions of CA in dynamic markets or in situations of rapid and unpredictable change. Consequently, an approach based on dynamic capabilities has emerged with a more dynamic nature. This
approach emphasises the strategic value of dynamic capabilities, which are defined as organisational routines by which firms enhance existing resource configurations in the pursuit of long-term CA (RBV’s logic of leverage) and achieve new resource configurations in the pursuit of temporary advantages (logic of opportunity) when markets emerge, collide, divide, evolve and die (Eisenhardt & Martin 2000). As such, DCV provides adequate conditions for the generation, development, and renewal of firm-specific resources and capabilities, allowing firms to create new products, adapt to changing external conditions and remain competitive (Lopez 2005; Nielsen 2006).

In summary, the organisation’s internal analysis which aims to analyse the process of formulating strategies and the creation of CA has resulted in the evolution of the resource-based theory of the firm. Lopez (2005) concludes that the first stage of development (the RBV and the KBV) focuses on understanding the nature of the varying specific-firm resources and identifying which conditions would possibly turn them into lasting and SCA. However, the second phase of evolution, which emphasises the dynamic processes of generation, development, and accumulation of assets and, as such, the importance of possessing organisational dynamic capabilities, conceived of as higher order resources or meta-resources, must be stressed.

In the turbulent environment of today, the central role of managing knowledge-based resources as a dynamic capability in connection with CA has been strongly emphasised in both theory and practice. To investigate the importance of KM as a critical success factor in today’s business environment (Alazmi & Zairi 2003), the following section discusses different aspects of this emerging discipline.

2.3 KNOWLEDGE MANAGEMENT

The previous section discussed the major schools of CA in strategic management with a focus on the sources of CA. This section provides a review in the discipline of KM. It covers a number of related issues including an overview of knowledge, the developmental history of KM, the concepts of KM, organisational learning, learning organisation, and the framework and benefits of KM.
2.3.1 Overview of Knowledge

Knowledge is a complex and elusive concept. In discussions aimed at formulating a definition of knowledge, knowledge has normally been distinguished from data and information in two ways (Becerra-Fernandez, Gonzalez & Sabherwal 2004). The following section discusses the definition of knowledge and the different types of knowledge to be dealt with in this study.

2.3.1.1 Definition of Knowledge

Some researchers such as Nonaka and Takeuchi (1995) and Wiig (1999) support a more complete perspective, according to which knowledge is fundamentally different from data and information and is defined as being justified beliefs about relationships among concepts relevant to a particular area of knowledge. It may be viewed from five categories or perspectives of knowledge as (1) a state of mind, (2) an object, (3) a process, (4) a condition of having access to information, or (5) a capability (Alavi & Leidner 2001).

A more simplistic view considers knowledge to be at the highest level in a hierarchy with information at the valuable middle level and data to be at the lowest level (Davenport & Prusak 1998; Dilnutt 2000; Earl 2001; Stenmark 2002; Tiwana 2002). According to this view, knowledge is intrinsically similar to information and data, although it is the richest and deepest of the three, and is, consequently, the most important. Alternatively, knowledge can be represented in a circular model because of the iterative nature of knowledge development (Jones 2001). Other researchers (Bollinger & Smith 2001; Vance 1997; Wu 2000) include an additional layer, wisdom, while some (Shankar et al. 2003) explore the concept of a knowledge value chain.

In this study, Shankar et al.’s (2003) knowledge value chain (as shown in Figure 2.8) is utilised to distinguish between these relevant concepts, in particular:

Data is raw unanalysed facts that are measures or attributes of phenomena, which are out of context and have no relation with other facts (Loshin 2001; Robbins et al. 2000; Zikmund 2000). Data is, therefore, objective (James 2005; Tiwana 2002).
Information is analysed and processed data that form a body of objective facts in a format suitable for decision making, or which are viewed in a context that defines the relationships between two or more pieces of data and possibly other information (Loshin 2001; Robbins et al. 2000; Zikmund 2000). Like data, information is also objective in a given context (James 2005).

Davidson and Voss (2002, p.52) conceptualise information as simply ‘data invested with meaning’ while Daveport and Prusak (cited in Tiwana 2002, p. 41) propose a ‘five-C filter’ for converting data to information, consisting of contextualisation, categorisation, calculation, correction, and condensation.

Knowledge, at a higher level, is an awareness, understanding or familiarity gained from a blending of information, experience, skills, principles, rules, value, insight, study, investigation and observation (Bollinger & Smith 2001; Davenport & Prusak 1998; Pemberton & Stonehouse 2000; Robbins et al. 2000). Because knowledge is a mixture of many things, it is usually subjective (James 2005).

The key link between knowledge and information as expressed in the business context is information at work, providing ‘a framework for evaluating and incorporating new experiences and information’ (Davenport & Prusak 1998, p. 5) and ‘the capacity for effective action’ (McElroy 2003, p. 188). Knowledge, unlike information which simply gives the facts, allows for making predictions, causal associations, or predictive decisions about what to do (Tiwana 2002, p. 37). In other words, it is information with a purpose (Davidson & Voss 2002, p. 53).

Wisdom, as the top layer of the hierarchy or value chain, is the judicious application of accumulated knowledge and experience integrated into people, organisations, and society, indicating the ability to see through complexity and discover the fundamental nature of issues or problems (Vance 1997). Wisdom follows reflections after personal or physical experience or action (Bahra 2001; Nonaka & Takeuchi 1995).
2.3.1.2. Knowledge Classifications

Knowledge has been categorised in many different ways. Traditional epistemology identifies three distinct kinds of knowledge: knowledge of things and objects, knowledge of how to do things, and knowledge of statements or propositions (Musgrave 1993).

However, since the emergence of the knowledge economy, the traditional categories of knowledge are both imprecise and difficult to operationalise for management purposes, leading to a number of new classifications being proposed (Blumentritt & Johnston 1999). These authors develop a framework followed by other researchers (as shown in Table 2.2) in which there are four categories of knowledge: codified knowledge, common knowledge, social knowledge, and embodied knowledge. The categories are arranged according to the degree of difficulty involved in transferring knowledge from one individual to another or from an individual to an organisation. In Table 2.2, the difficulty increases from left to right.
Meanwhile, based on another useful framework devised by DeLong and Fahey (2000), Danskin et al. (2005) illustrate the interactions of knowledge context and characteristics (as shown in Table 2.3), which distinguish among human, social, and structured knowledge. Within these classifications lie additional dimensions (Garud & Nayyar 1994), including codifiability, simplicity/complexity, systemic/independent, and velocity/viscosity (Danskin et al. 2005).

Throughout these categories, the most notable and important classification is two kinds of knowledge: tacit (or embodied) and explicit (or codified) (Bollinger & Smith 2001; Debowski 2006; Nonaka 1994; Pemberton & Stonehouse 2000; Polanyi 1967). Explicit knowledge is knowledge that can be documented, categorised, transmitted to others as information, and illustrated to others as through demonstrations, explanations and other forms of sharing. By contrast, tacit knowledge is knowledge which draws on the accumulated experience and learning of a person and which is hard to reproduce or share with others.

Equivalent to these forms of knowledge, Hansen, Nohria and Tierney (1999) have identified two approaches. The first is codification, in which knowledge is encoded and structured prior to being stored in databases and made available. Explicit knowledge (market data, competitor profiles, and customer characteristics) can be codified. The second approach, personalisation, ties information to individuals who provide creative, analytically rigorous advice on high-level strategic problems by channeling individual expertise. Tacit knowledge (scientific expertise, operational know-how, industry experience, and business judgment) requires this person-to-person approach. Although quite distinct, it is possible to convert explicit knowledge into tacit knowledge and vice versa through KM processes.
Table 2.2 – Framework for Categories of Knowledge

<table>
<thead>
<tr>
<th>Codified knowledge</th>
<th>Common knowledge</th>
<th>Social knowledge</th>
<th>Embodied knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective information of all kinds – facts and figures</td>
<td>Knowledge that is accepted as standard without being made formally codified</td>
<td>Knowledge of social links and shared values</td>
<td>Knowledge that is rooted in experience, background and skill of a person, strongly related to the person that holds it</td>
</tr>
</tbody>
</table>
| Explicit knowledge
  (Polanyi 1966; Nonaka & Takeuchi 1995) | Embraied knowledge
  (Collins 1993) | Encultured knowledge
  (Collins 1993) | Tacit knowledge
  (Polanyi 1966; Nonaka & Takeuchi 1995; Williams 2006) |
| Knowledge of things and objects | Embedded knowledge
  (Blackler 1995) | Encultured knowledge
  (Blackler 1995) | Embodied knowledge
  (Collins 1993) |
| Knowledge of statements & propositions
  (Musgrave 1993) | Experiential knowledge
  (Millar, Demaid & Quintas 1997) | Know who (Social knowledge)
  (Lundvall 1996) | Embodied knowledge
  (Blackler 1995) |
| Symbolic knowledge
  (Collins 1993) | Informal knowledge
  (Fleck 1997) | Social knowledge
  (Millar, Demaid & Quintas 1997) | Know how (Process knowledge)
  (Lundvall 1996) |
| Encoded knowledge
  (Blackler 1995) | | | Tacit knowledge
  Instrumentalities
  (Fleck 1997) |
| Know what (Catalogue knowledge) | | | |
| Know why (Explanatory knowledge)
  (Lundvall 1996) | | | |
| Catalogue knowledge
  (Millar, Demaid & Quintas 1997) | | | |
| Explanatory knowledge
  (Millar, Demaid & Quintas 1997) | | | |
| Formal knowledge | Knowledge of how to do things
  (Musgrave 1993) | | These concepts might contribute to either process knowledge or embodied knowledge depending on their content. |
| Contingent knowledge
  (Fleck 1997) | Process knowledge – Know how
  (Millar, Demaid & Quintas 1997) | | |
| Object knowledge

**Source:** Adapted from Blumentritt and Johnston (1999, p. 292)
Table 2.3 – Interactions of Knowledge Context and Characteristics

<table>
<thead>
<tr>
<th>Knowledge characteristics</th>
<th>Knowledge context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple versus complex</td>
<td>Human</td>
</tr>
<tr>
<td></td>
<td>Simple in human context likely to have faster velocity and lower viscosity</td>
</tr>
<tr>
<td></td>
<td>Complex in human context likely to have slow velocity and high viscosity</td>
</tr>
<tr>
<td>Explicit versus tacit</td>
<td>Explicit in human context likely to have faster velocity and lower viscosity</td>
</tr>
<tr>
<td></td>
<td>Tacit in human context likely to have slow velocity and high viscosity</td>
</tr>
<tr>
<td>Independent versus dependent</td>
<td>Independent in human context likely to have faster velocity and lower viscosity</td>
</tr>
<tr>
<td></td>
<td>Dependent in human context likely to have faster velocity and less viscosity</td>
</tr>
<tr>
<td>Velocity versus viscosity</td>
<td>Velocity</td>
</tr>
<tr>
<td></td>
<td>Viscosity</td>
</tr>
<tr>
<td></td>
<td>Knowledge speed/richness</td>
</tr>
</tbody>
</table>

Source: Danskin et al. (2005, p. 93)
2.3.2 Overview of Knowledge Management

Following the above discussion of the knowledge value chain and knowledge categories, this part of the research considers the related topics of the KM discipline, consisting of the KM historical development, the concepts of KM and LO, and the framework and benefits of KM.

2.3.2.1 Knowledge Management Evolution

Gamble and Blackwell (2001, pp. 5-6) and Tiwana (2002, p. 7) as cited in Wong (2006, pp. 19-20) provide an overview of the development process of KM as follows:

– The 1950s was the decade of electronic data processing associated with quantitative management, management by objectives, program evaluation and review technique and diversification.

– The 1960s focused on the effect of centralisation or decentralisation, an early attempt to harness the power of people working as a community, theory Y, conglomerate and T-groups.

– The 1970s was the decade of portfolio management, the strategic planning (Mintzberg 1978), the experience (Porter 1979) and automation.

– The 1980s was the decade that focused on the basis of competition. Management took more interest in corporate culture, downsizing, and management by walking around, theory Z, and total quality management (TQM).

– The 1990s focused more strongly on releasing the competitive potential of human resources. Management was more concerned with the learning organisation, reengineering, core competencies, market valuation and strategic information systems, intranets and extranets. It became increasingly apparent that traditional organisations based on the strategy–structure–system approach were no longer likely to be as successful as they had been previously. Business process reengineering (BPR), therefore, led to a shift towards the three ‘P’s’ – purpose, people, process – of Bartlett and Ghoshal (1998).
The 2000s revealed that KM has emerged as a unifying corporate goal. The intention is to create enterprise integration through a knowledge-sharing culture, to recognise the value of intellectual capital and to understand that competition does not depend on the differential possession of physical assets, or even information, but depends on the ability to deploy and exploit knowledge. KM has, over the last decade, been progressively brought into centre stage, driven by the networked economy through increased competition, mergers, and acquisitions and the all-pervasive Internet presence.

Bayyavarapu (2005), who adapted concepts from Ponzi’s (2002) doctoral thesis, also asserts that the expression of KM has been used in the literature for over a decade since the early 1990s, grew exponentially from 1996, contracted in 2000, and rebounded in the following year.

During the early origin and formulation of KM research (1991–1995), computer science and business strategy played a principal part with the former contributing a major share and the latter contributing a minor share (Ponzi 2002). While the computer science literature viewed knowledge as an object that could be managed better with the help of IT, business strategy viewed KM as a social process rather than an IT-driven concept (Ponzi 2002).

During the growth and expansion phase (1996–1999) the disciplinary breadth increased from three disciplines (computer science, business strategy, and library and information sciences) to thirteen disciplines (Bayyavarapu 2005). While the most prolific publication sources during this period were computer-related popular press publications which emphasised IT tools for managing knowledge, the most commonly cited publications originated from the organisation science literature which emphasised the process aspects of KM (Ponzi 2002; Vera & Crossan 2003). In the context of KM, this period marked a shift from IT as databases to IT as a communication and collaborative technology (Ponzi 2002).

In the year 2000, the decreased interest in KM in the popular press was attributable to two factors: KM investments were not yielding returns and the dot-com bubble had burst. However, the academic literature continued to grow at a steady rate and rebound one year later (Ponzi 2002).
2.3.2.2 Definition of Knowledge Management

Despite the voluminous literature on KM, there is no widely accepted definition of KM (Earl 2001; Manovas 2004). Some of the definitions found in the literature are presented in Table 2.4 which indicates that while some focus on technology-driven KM, most define KM as a set of activities or processes of developing and exploiting knowledge to achieve or enhance a variety of outcomes such as organisational objectives, value, long-term performance, overall success, or CA.

‘Knowledge management can be defined as the organisational capability which identifies, locates (creates or acquires), transfers, converts and distributes knowledge into competitive advantage’ (Walters 2002, p. 7).

Table 2.4 – Definitions of Knowledge Management

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kongpichayanond (2009, p. 382) Massa and Testa (2009, p. 131)</td>
<td>A process in general system theory with four categories including knowledge acquisition and creation, knowledge capture, storage and retrieval, knowledge dissemination, transfer and sharing, and knowledge application that organisations decide to manage to gain CA.</td>
</tr>
<tr>
<td>Debowski (2006, p. 16)</td>
<td>‘the process of identifying, capturing, organising and disseminating the intellectual assets that are critical to the organisation’s long-term performance’</td>
</tr>
<tr>
<td>Jennex and Olfman (2006)</td>
<td>Management’s thorough efforts to use tools and approaches to locate, refine, transfer, and apply the knowledge and experience available to the organization.</td>
</tr>
<tr>
<td>James (2005, p. 51)</td>
<td>‘the identification, acquisition, utilisation, support, maintenance and disposal of knowledge assets for the purpose of adding value and benefiting all stakeholders’</td>
</tr>
<tr>
<td>Becerra-Fernandez, Gonzalez and Sabherwal (2004, p. 31)</td>
<td>‘performing the activities involved in discovering, capturing, sharing, and applying knowledge so as to enhance, in a cost-effective, the impact of knowledge on the unit’s goal achievement’</td>
</tr>
</tbody>
</table>
### Table 2.4 (Cont.) – Definitions of Knowledge Management

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walters (2002, p. 7)</td>
<td>‘the organisational capability which identifies, locates (creates or acquires), transfers, converts and distributes knowledge into competitive advantage’</td>
</tr>
<tr>
<td>Darroch and McNaughton (2002)</td>
<td>The management function that creates, locates, and manages the flow of knowledge within an organisation to ensure that knowledge is used effectively and efficiently for the long-term benefit of the organisation.</td>
</tr>
<tr>
<td>Rasgoti (2000, p. 40)</td>
<td>‘a systematic and integrative process of coordinating organisation-wide in pursuit of major organisational goals’ including the acquisition, creation, storage, sharing, diffusion, development, and deployment of knowledge.</td>
</tr>
<tr>
<td>Wiig (1999, p. 1)</td>
<td>The objectives of KM are ‘(a) to make the enterprise as intelligently as possible to secure its viability and overall success and (b) to realise the best value of its knowledge assets’</td>
</tr>
<tr>
<td>APQC (1998, pp. 8-9)</td>
<td>‘the management discipline concerned with the systematic acquisition, creation, sharing and use of knowledge in organisations, aiming to improve a firm’s competitiveness via continuous, rapid innovation’</td>
</tr>
<tr>
<td>Duhon (1998, p. 9)</td>
<td>‘a combination of technology supporting a strategy for sharing and using both the brain power resident within an organisation’s employees and internal and external information found in information containers…’</td>
</tr>
<tr>
<td></td>
<td>‘…the goal of KM is to simultaneously manage data, information, explicit knowledge while leveraging the information resident within in people’s head (tacit knowledge) through a combination of technology and management practices’</td>
</tr>
<tr>
<td>Knapp (1998, p. 3)</td>
<td>‘a set of processes for transferring intellectual capital to value such as innovation and knowledge creation, knowledge acquisition, organisation, application, sharing, and replenishment’</td>
</tr>
</tbody>
</table>
Table 2.4 (Cont.) – Definitions of Knowledge Management

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>O’Leary (1998, p. 34)</td>
<td>‘the formal management of knowledge for facilitating creation, access, and reuse of knowledge, typically using advanced technology’</td>
</tr>
<tr>
<td>Bassi (1997, p. 26)</td>
<td>‘the process of creating, capturing and using knowledge to enhance organisational performance’</td>
</tr>
<tr>
<td>Liebowitz and Wilcox (1997, p. i)</td>
<td>‘the ability of organisations to manage, store, value, and distribute knowledge’</td>
</tr>
<tr>
<td>Van der Spek and Spijkervet (1997, p. 43)</td>
<td>‘the explicit control and management of knowledge within an organisation aimed at achieving the company’s objectives’</td>
</tr>
</tbody>
</table>

Source: Developed for this study

**2.3.2.3 Knowledge Management and Learning Organisation**

 Theriou and Chatzoglou (2008, p. 190) summarise the definitions adopted by different academics that the learning organisation (hereafter referred to as LO) is ‘an organisation which adopts specific strategies, mechanisms, and practices that encourage its members to learn continuously so that they can adapt to the changing business environment’. These strategies, mechanisms and practices are defined as the learning capability of the organisation (Goh 1998). Dimitriades (2005) argues that to make learning more effective, a strategic learning capability should be developed by linking organisational learning (hereafter referred to as OL) and KM. In other words, to become a LO in today’s global knowledge economies, firms need to combine the two complementary processes of OL and KM, thereby improving organisational performance and competitiveness (Cavaleri, Seivert & Lee 2005; Theriou & Chatzoglou 2008).

According to Theriou and Chatzoglou (2008), on the one hand, a LO develops a culture which emphasises the importance of learning and creates the right conditions to promote the generation of new knowledge through its OL process. On the other hand, KM process, within this environment of the LO, is primarily concerned with the accumulation, sharing, utilisation, and use of knowledge assets throughout the organisation. In other words, OL seems to be
about managing the creation of the organisation’s knowledge, while KM is about managing created knowledge efficiently and effectively, thereby optimising the economic value delivered (Spender 2008).

2.3.2.4 Knowledge Management Framework

A common framework for KM includes the following elements (Becerra-Fernandez, Gonzalez & Sabherwal 2004; Callahan 2002; Dilnutt 2000; James 2005; Jones 2001):

- A business strategy which guides knowledge strategy through the articulation of objectives and the identification of assets and competencies (Callahan 2002).

- KM principles which are the underlying value for the knowledge strategy (Callahan 2002). Instead, Becerra-Fernandez, Gonzalez and Sabherwal (2004) use KM systems which are the integration of KM mechanisms and technologies and support KM processes.

- KM mechanisms are organisational or structural means to promote KM, such as learning by doing, on-the-job training, learning by observation, face-to-face meetings, and some other more long-term strategies like hiring a chief knowledge officer, cooperative projects across departments, traditional hierarchical relationships, organisational policies, standards, initiation process for new employees, and employee rotation across departments.

- Similar to KM mechanisms, KM technologies constitute a key component of KM systems, including (1) artificial intelligence technologies encompassing those used for knowledge acquisition and case-based reasoning systems, electronic discussion groups, computer-based simulations, databases, decision support systems, enterprise resource planning systems, expert systems, management information systems, expertise locator systems, and videoconferencing; and (2) information repositories encompassing best practices databases and lessons learned systems (Becerra-Fernandez, Gonzalez & Sabherwal 2004).

- A knowledge management process which is a value chain of activities that generate (create and acquire) knowledge, represent (codify and store) and make it accessible so that it can be utilised or transferred (Dilnutt 2000; Jones 2001). Some other researchers add more activities
such as coordination or accumulation (Davenport & Prusak 1998; Drucker 1985; Nonaka & Takeuchi 1995), application, exploitation, use or deployment (Drucker 1985; Hoffman 2000; Nonaka & Takeuchi 1995; Prusak 1996) and sharing (Nielsen 2006; Nonaka & Takeuchi 1995).

A knowledge management environment which underpins the KM process, comprising (1) physical infrastructure such as people, information technology and building; and (2) non-physical or virtual infrastructure such as leadership, culture, structure, roles, routines and practices (Marr 2004). One of KM’s aims is to manage intangible assets, like competencies, through managing the abstract elements of the organisational environment (James 2005).

2.3.2.5 Benefits of Knowledge Management

Knowledge management is a strategic activity that should add value and, thus, is a close link between KM and the strategic plans of the organisation which ensures that knowledge activities contribute to profitability and strategic advantage (Duffy 2000). Sharing this view, Walters, Haliday and Glaser (2002) state that KM within strategic operations enables an organisation (or combination of organisations) to make more effective decisions about how to structure value chain operations to maximise customer satisfaction. The importance of KM for value chain (virtual organisation) management is also emphasised by Blumentritt and Johnston (1999, p. 287) who state that ‘the ability to identify, locate, and deliver information and knowledge to a point of valuable applications is transforming existing industries and facilitating the emergence of entirely new industries’.

In terms of specific organisational impacts of KM, Becerra-Fernandez, Gonzalez and Sabherwal (2004) suggest four levels, consisting of people, processes, products, and the overall performance. First, KM can (1) facilitate employees’ learning in a variety of ways, including externalisation, internalisation, socialisation, and communities of practice; and (2) engender greater adaptability among employees and their job satisfaction. Second, KM enables improvements in organisational processes in the three dimensions of effectiveness, efficiency and innovation. At the product level, the impact of KM can be seen in two respects: value-added products and knowledge-based products. Finally, the benefits to the overall organisational performance of using KM is divided into two types: direct (improvements in
return of investment – ROI) and indirect (achievement of economies of scale and scope, and generation of SCA).

Similarly, Leng and Shepherson (2000) as cited in James (2005) posit that KM can improve efficiency and effectiveness, along with responsiveness and flexibility to market changes. It can also be used to improve product development, innovation and quality, and develop a better understanding of customer and stakeholder relationships (Davenport & Prusak 1998; Hauschild, Licht & Stein 2001; Martensson 2000; Skyrme & Amidon 1998).

In terms of SCA, many authors (e.g. Grant 1996b; Hamel & Prahalad 1994; Ho 2008; Powell & Snellman 2004; Sharkie 2003; Teece, Pisano & Shuen 1997; and Verona & Ravasi 2003) support the viewpoint that in the current complex and challenging environment with high uncertainty and dynamism, the ability to acquire, develop, share and apply knowledge has become the key for gaining sustained CA and sustained superior performance. Knowledge itself can be reused and new knowledge can be integrated with current knowledge to develop even more valuable knowledge and strategically valuable new insights, creating a unique valuable synergy to improve the firm’s performance (Sharkie 2003). Moreover, it is superior knowledge that enables organisations to exploit, combine, and develop other traditional tangible and intangible resources in new and distinctive ways and, thereby, provide superior value to customers, enhance the fundamental ability to compete and allow an organisation to develop SCA and do better than rivals, even if its other resources are not unique (Teece, Pisano & Shuen 1997).

2.3.3 Knowledge Management Capability

This section provides a review of prior research in a particular aspect of KM – that is, KM capability, leading to the development of an intermediate discipline in the study.

2.3.3.1 Definition

KM capability has been recognised as a key factor for gaining and sustaining a CA (Corsoa et al. 2006). Extending the traditional notion of organisational resource-based capability to a firm’s KM function, a firm’s KM capability is defined as ‘its ability to mobilise and deploy
KM-based resources in combination with other resources and capabilities’, leading to SCA (Chuang 2004, p. 460).

2.3.3.2 Previous Studies

A review of the current literature has identified a variety of KM-related resources or capabilities. In general, the KM capability of a firm is combined with the presence of KM infrastructure (some authors name it ‘enablers’) and KM processes (Gold, Malhotra & Segars 2001). Table 2.5 presents a summary of previous empirical studies conducted since 1995, discussing different dimensions of KM capability, such as KM infrastructure elements (or enablers) and knowledge oriented processes. The research objectives, as displayed in the last column, are mainly to investigate the inter-connections among KM capability components and their impacts on organisational outcomes such as KM effectiveness, organisational effectiveness, CA, and firm performance.

An observation from the summary table indicates that Gold, Malhotra and Segars (2001) are among the first scholars in the field of KM to provide a comprehensive model of KM capability dimensions from the perspective of organisational capabilities. According to this model, the KM capability of a firm includes two key components: KM infrastructure and KM process capabilities. In particular, KM infrastructure capability consists of technology, structure, and culture which form ‘a definitional basis for the theoretical framework of social capital’, while KM process capability is comprised of acquisition, conversion, application and protection processes which form ‘an operational perspective for the framework of knowledge combination and exchange that underlies the theory of knowledge integration’ (Gold, Malhotra & Segars 2001, p. 206).

Following this model, Manovas (2004) investigates the relationship between KM capability and knowledge transfer success, Smith (2006) explores the contribution of KM capability linked to the business strategy for organisational effectiveness, while Hsu (2006) examines the links between intellectual capital, KM process capability, organisational effectiveness, and CA. With modified dimensions of KM infrastructure capabilities, including leadership, culture, KM strategy, and technology fit, Khalifa and Liu (2003), instead of treating these elements independently without a consideration of their interrelationships, attempt to overcome this
limitation, to some extent, by explaining an indirect effect of information technology on KM effectiveness through KM process capabilities.

Another significant model is derived from Lee and Choi (2003) and developed by Migdadi (2005). This model emphasises both technical and social perspectives of KM infrastructure or enablers and their impacts on organisational performance through the knowledge creation process and organisational creativity. KM enablers in this research include organisational structure (centralisation and formalisation), organisational culture (collaboration, trust, and learning), people (T-shaped skills), and information technology (IT support). Knowledge creation process adopts Nonaka’s (1994) SECI model which explores knowledge creation through the four knowledge conversion modes between tacit and explicit knowledge. The SECI modes consist of socialisation (the process of converting new tacit knowledge through shared experiences), externalisation (the process of transferring tacit knowledge into explicit concepts through the use of different metaphors, analogues, concepts, hypotheses and models), combination (the process of converting explicit knowledge into more complex and systematic sets of explicit knowledge through social processes), and internalisation (the process of embodying explicit knowledge into tacit knowledge through actions and practice) (Lee & Choi 2003; Migdadi 2005; and Nonaka, Toyama, & Nagata 2000).

One of the newest works on this theme conducted by Zheng, Yang, and McLean (2010) adapt the relevant measures from a number of authors, including Gold, Malhotra and Segars (2001) and Lee and Choi (2003). Specifically, the study examines the possible mediating effect of KM processes (i.e. knowledge generation, knowledge sharing, and knowledge utilisation) on the relationship between organisational culture, structure, strategy and organisational effectiveness. One of the main contributions of this study is that while previous research focuses on exploring the aspects of organisational culture, structure, and technology that are directly related to KM as its antecedents, Zheng, Yang and McLean (2010) take a new perspective on KM in its potential capacity to transmit the influence of the general contextual environment of the whole organisation onto organisational effectiveness.
### Table 2.5 – A Summary of Previous Empirical Studies in KM Capabilities / Infrastructure / Enablers / Processes

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>KM Enablers/Infrastructure</th>
<th>KM Process</th>
<th>Research Objective/Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donate and Guadamillas (2010)</td>
<td>- Organisational culture</td>
<td>- Knowledge storage - Knowledge transfer</td>
<td>To analyse the effect of the knowledge-centered organisational culture on the relationship between knowledge storage and transfer practices and firms’ technological/innovative performance.</td>
</tr>
<tr>
<td>Tseng (2010)</td>
<td>- Organisational culture</td>
<td>- Knowledge conversion</td>
<td>To investigate the correlation between organisational culture and knowledge conversion on corporate performance.</td>
</tr>
<tr>
<td>Huang and Li (2009)</td>
<td>- Social Interaction: • Trust • Communication • Coordination</td>
<td>- Knowledge acquisition - Knowledge sharing - Knowledge application</td>
<td>To examine the mediating role of KM in the relationship between social interaction and innovation performance.</td>
</tr>
<tr>
<td>Magnier-Watanabe and Senoo (2009)</td>
<td>N/A</td>
<td>- Knowledge creation process: • Socialisation • Externalisation • Combination • Internalisation</td>
<td>To investigate how different perceptions and behaviours related to KM affect the perceived contribution of certain types of organizational knowledge acting as sources of CA.</td>
</tr>
</tbody>
</table>
Table 2.5 (Cont.) – A Summary of Previous Empirical Studies in KM Capabilities / Infrastructure / Enablers / Processes

<table>
<thead>
<tr>
<th>Author(s)</th>
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<th>KM Process</th>
<th>Research Objective/Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>● Copier</td>
<td>● Codification</td>
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<tr>
<td></td>
<td>● Skill acquirer</td>
<td>● Personalisation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Continuous improver</td>
<td>● Integration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Innovator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choi, Poon, and Davis (2008)</td>
<td>- KM Strategy:</td>
<td>N/A</td>
<td>To explore the synergistic relationship between KM strategies and their impact on organisational performance.</td>
</tr>
<tr>
<td></td>
<td>● Tacit-internal-oriented KM strategy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Explicit-external-oriented KM strategy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lee and Lee (2007)</td>
<td>- KM Capabilities:</td>
<td>- KM Processes:</td>
<td>To examine structural relationships among the capabilities, processes, and performance of KM, and suggest strategic directions for the successful implementation of KM.</td>
</tr>
<tr>
<td></td>
<td>● Culture (Learning organisation)</td>
<td>● Generating</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● People (T-shaped skills)</td>
<td>● Accessing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Structure (Centralisation)</td>
<td>● Facilitating</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Information technology (IT support)</td>
<td>● Representing</td>
<td></td>
</tr>
<tr>
<td>Hsu (2006)</td>
<td>- Intellectual Capital:</td>
<td>Adapted from Gold, Malhotra and Segars (2001)</td>
<td>To examine the links between intellectual capital, KM process capability, organisational effectiveness, and CA.</td>
</tr>
<tr>
<td></td>
<td>● Structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Human</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Innovation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith (2006)</td>
<td>Adapted from Gold, Malhotra and Segars (2001)’s model with an additional construct of Business Strategy</td>
<td>To examine the KM capabilities linked to the business strategy for organisational effectiveness.</td>
<td></td>
</tr>
<tr>
<td>Bayyavarapu (2005)</td>
<td>- KM Strategy:</td>
<td>N/A</td>
<td>To examine the effect of three complementary KM strategies on short and long-term firm performance.</td>
</tr>
<tr>
<td></td>
<td>● IT-centered KM strategy</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>● Capture-based KM strategy</td>
<td></td>
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<tr>
<td></td>
<td>● Learning-based KM strategy</td>
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</table>
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<th>KM Enablers/Infrastructure</th>
<th>KM Process</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Migdadi (2005)</td>
<td>Adapted from Lee and Choi (2003)’s model with an additional construct of Transformational Leadership</td>
<td>- KM Capability (KMC):</td>
<td>To find the relationships among KM components such as KM enablers, knowledge creation process, organisational creativity, and organisational performance.</td>
</tr>
<tr>
<td>Tanriverdi (2005)</td>
<td>- IT Relatedness: • IT infrastructure • IT strategy making processes • IT HR management processes • IT vendor management processes</td>
<td>- Product KMC • Customer KMC • Managerial KMC (each KMC manifests through the creation, transfer, integration and leverage of knowledge)</td>
<td>To examine how the IT resources of a firm should be organised and managed to enhance the firm’s KM capability and whether and how KM capability influences firm performance.</td>
</tr>
<tr>
<td>Chuang (2004)</td>
<td>- Technical KM resource: IT • Social KM resource: • Structure • Culture • Human (Adapted from Lee &amp; Choi (2001))</td>
<td>N/A</td>
<td>To employ the RBV to develop the theoretical links and empirically examine the association between KM capability and CA.</td>
</tr>
<tr>
<td>Harlow (2004)</td>
<td>- KM Strategy: • Tacit • Explicit</td>
<td>N/A</td>
<td>To determine the relationship between KM strategies, firm financial, and innovation outcomes.</td>
</tr>
<tr>
<td>Choi and Lee (2003)</td>
<td>- KM Styles</td>
<td>N/A</td>
<td>To investigate a variety of KM methods and their effect on corporate performance.</td>
</tr>
</tbody>
</table>
# Table 2.5 (Cont.) - A Summary of Previous Empirical Studies in KM Capabilities/Infrastructure/Enablers/Processes

<table>
<thead>
<tr>
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<th>KM Enablers/Infrastructure</th>
<th>KM Process</th>
<th>Research Objective/Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gimenez and Rincon (2003)</td>
<td>- Leadership&lt;br&gt;- Technology&lt;br&gt;- Culture</td>
<td>- Knowledge creation&lt;br&gt;- Knowledge organisation&lt;br&gt;- Knowledge sharing&lt;br&gt;- Knowledge application</td>
<td>To predict what aspects/components of KM would be successful in diverse cultural contexts.</td>
</tr>
<tr>
<td>Khalifa and Liu (2003)</td>
<td>Adapted from Khalifa, Lam and Lee (2001)</td>
<td></td>
<td>To account for the interrelationships between KM infrastructure (IT) and KM process capabilities.</td>
</tr>
<tr>
<td>Lee and Choi (2003)</td>
<td>- KM Enablers:&lt;br&gt;• Structure&lt;br&gt;• Culture&lt;br&gt;• People&lt;br&gt;• IT</td>
<td>- Knowledge creation process:&lt;br&gt;• Socialisation&lt;br&gt;• Externalisation&lt;br&gt;• Combination&lt;br&gt;• Internalisation</td>
<td>To find the relationships among KM components such as KM enablers, knowledge creation process, organisational creativity, and organisational performance.</td>
</tr>
<tr>
<td>Choi and Lee (2002)</td>
<td>- KM Strategy</td>
<td>- Knowledge creation process</td>
<td>To depict the links between KM strategy with knowledge creation process.</td>
</tr>
<tr>
<td>Becerra-Fernandez and Sabherwal (2001)</td>
<td>- KM Enablers:&lt;br&gt;• Broad and process-oriented tasks&lt;br&gt;• Focused and content-oriented tasks&lt;br&gt;• Broad and content-oriented tasks&lt;br&gt;• Focused and process-oriented tasks</td>
<td>- Knowledge creation process:&lt;br&gt;• Socialisation&lt;br&gt;• Externalisation&lt;br&gt;• Combination&lt;br&gt;• Internalisation</td>
<td>To match different type-oriented tasks with knowledge creation sub-processes and to examine their effect on KM satisfaction.</td>
</tr>
<tr>
<td>Gold, Malhotra and Segars (2001)</td>
<td>- Infrastructure Capabilities:&lt;br&gt;• Technology&lt;br&gt;• Structure&lt;br&gt;• Culture</td>
<td>- Process Capabilities:&lt;br&gt;• Acquisition&lt;br&gt;• Conversion&lt;br&gt;• Application&lt;br&gt;• Protection</td>
<td>To examine knowledge infrastructure and knowledge process as essential organisational capabilities or preconditions for effective KM and their effect on organisational effectiveness.</td>
</tr>
</tbody>
</table>
### Table 2.5 (Cont.) - A Summary of Previous Empirical Studies in KM Capabilities/Infrastructure/Enablers/Processes

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>KM Enablers/Infrastructure</th>
<th>KM Process</th>
<th>Research Objective/Outcome</th>
</tr>
</thead>
</table>
| Khalifa, Lam and Lee (2001) | - KM Structures:  
  - KM Strategy  
  - Technology Fit  
  - Culture  
  - Leadership | N/A | To identify the antecedents of KM structures adequacy and the consequence on KM effectiveness. |
| Bennet and Gabriel (1999) | - KM Enablers:  
  - Structure  
  - Culture  
  - Size  
  - Environment  
  - KM method | N/A | To investigate the effect of change-friendly culture on the number of KM methods employed. |
| Hansen (1999) | - KM Enablers:  
  - Weak ties  
  - Knowledge characteristics | - Transfer (percentage of a project’s total knowledge that comes from other division) | To examine the impact of weak ties and knowledge characteristics on knowledge transfer. |
| Appleyard (1996) | - KM Enablers:  
  - Industry and national characteristics | - Transfer (number of times the respondents provided and received knowledge in a given period) | To examine the impact of industry and national characteristics on knowledge transfer. |
| Bierly and Chakrabarti (1996) | - KM Strategy | N/A | To investigate the relationship between KM strategy and performance. |
| Szulanski (1996) | - KM Enablers:  
  - Characteristics of the knowledge transferred (source, recipient, context) | - Transfer (four-stage transfer process) | To examine the impact of knowledge characteristics on knowledge transfer. |
| Zander and Kogut (1995) | - KM Enablers:  
  - Characteristics of social knowledge | - Transfer (time to transfer) | To examine the effects of knowledge characteristics on the time to transfer. |

**Source:** Developed for this study
Using the above review table, the next section will identify the perceived gaps in the relevant literature and develop the research questions and hypotheses to deal with these gaps.

2.4 KNOWLEDGE MANAGEMENT CAPABILITY-BASED COMPETITIVE ADVANTAGE

The previous sections dealt with two parent disciplines: strategic management with a focus on sources of CA of the firm and KM reviewing the studies on KM capability dimensions. This section will look at a nexus between these two parent disciplines to explore the intermediate discipline of KM capability-based CA of the firm. In particular, the underlying theories are discussed and gaps in the literature are identified, resulting in the development of research questions and hypotheses.

2.4.1 Theoretical Foundation and Development

This study is based on three main theories underlying the inter-relationships amongst KM capability components and the impact of KM capability components on CA – that is, the social capital theory, the RBV of the firm blended with a knowledge-based perspective and the DCV of KM.

2.4.1.1 Social Capital Theory and Knowledge Management

Nahapiet & Ghoshal (1998, p. 243) define that social capital is ‘the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by the individual or social unit’. By affecting the conditions necessary for the process of exchange and combination to occur within the social network of an organisation, social capital facilitates the development of intellectual capital or knowledge (Boland & Tenkasi 1995; Nahapiet & Ghoshal 1998).

According to Cohen & Levinthal (1990), four conditions must be met to enable the occurrence of the combination and exchange process. First, the opportunity for the combination and exchange must exist that refers to the accessibility of social knowledge and its possibility to draw on existing and different forms of knowledge. Second, the parties involved must be available to that opportunity and expect their participation to create value. Third, they must
view such an opportunity as worthwhile, and finally the capability to combine and exchange knowledge must exist (Cohen & Levinthal 1990).

Gold (2001) argues that the conditions for the process of combination and exchange of knowledge emphasise the importance of infrastructure elements in providing a mechanism for social interaction of individuals. Thus, an organisation must have the necessary resources and capabilities to manage knowledge effectively, such as organisational structure, organisational culture, people and technology.

2.4.1.2 Resource-based View of Knowledge Management

In accordance with the RBV, Grant (1991, p.191) posits that ‘while resources are the source of a firm’s capabilities, capabilities are the main source of CA’. Therefore, it has been emphasised that the key to achieving an SCA from the firm’s stock of resources lies in the ability to integrate different resources to form strong organisational capabilities (Grant 1996b; Verona & Ravasi 2003; Zollo & Winter 2002). It is a firm’s core capabilities, those that create major value (Robbins et al. 2000), that make the most significant contribution to CA (Prahalad & Hamel 1990).

The RBV of the firm, blended with a knowledge-based perspective, highlights the effective ways of coordinating individuals’ activities within the firm and integrating their knowledge (Grant 1996a; Lopez 2005). Gold, Malhotra and Segars (2001) argue that it is how effectively firms leverage and combine their KM resources to create a unique KM capability that determines their overall effectiveness. In other words, firms can and do differentiate themselves on the basis of their valuable resources of KM capability which are complex to acquire and difficult to imitate, thereby, providing them with a sustained CA (Chuang 2004).

The question of whether KM infrastructure capability, which is an integration of various KM resources such as organisational structure, organisational culture, human skills, and information technology, can significantly contribute to organisational CA will be discussed in a later section.
2.4.1.3 Dynamic Capability View of Knowledge Management

In the dynamic markets of today, firms are not only competing on their ability to exploit their existing resources and organisational capabilities that form the basis for the products and services they offer, but are also competing on their ability to constantly renew and develop these resources and organisational capabilities (Teece, Pisano & Shuen 1997), enabling the firm to react to changing market conditions (Winter 2003), thereby, achieving and sustaining a CA (Teece, Pisano & Shuen 1997).

Adopting a knowledge-based perspective, dynamic capabilities are seen as integrated sets of KM activities that change, renew, and exploit the knowledge-based resources of the firm, equivalent to knowledge development capability, knowledge (re)combination capability, and knowledge use capability (Nielsen 2006). Similarly, Cepeda and Vera (2007) define KM as the formalised approach of managing the creation, transfer, retention, and utilisation of a firm’s explicit and tacit knowledge assets and so they describe the KM processes associated with dynamic capability development and utilisation.

From the above two approaches to KM (the RBV and the DCV) it can be assumed that KM is an organisational capability and, at a higher level, a dynamic capability because KM focuses not only on the use of KM-based resources (as an organisational capability) but also on the creation or acquisition and (re)combination of knowledge (as a dynamic capability). Furthermore, KM capabilities create a flow to and from the firm’s stock of knowledge, supporting the generation, renewal, and use of organisational capabilities, thereby, contributing to the creation of value in the firm (Nielsen 2006).

As such, from the resource-based theory with knowledge and dynamic capability-based approaches, KM resources and capabilities are explicitly recognised to be central to the creation of CA in the dynamic market places of today (Hamel & Prahalad 1994; Powell & Snellman 2004; Verona & Ravasi 2003). While KM resources and capabilities tend to be heterogeneously distributed across firms, leading to different patterns of KM use and effectiveness (Chuang 2004), a key to understanding the success and failure of KM within organisations is the identification and assessment of preconditions or organisational resources/capabilities that are necessary for the effort to flourish (Gold, Malhotra & Segars...
Knowledge Management Capability and Competitive Advantage  Chapter 2: Literature Review

2001). The following section will discuss the definitions and components or determinants of this concept.

2.4.2 Gaps in the Literature

While the role of KM in creating SCA for organisations has been strongly emphasised in the literature (Chakravarthy et al. 2005; Grant 1996a; Ho 2008; Johannessen & Olsen 2003; Lado & Wilson 1994; Zheng, Yang & McLean 2010), work in this area is empirically and theoretically underdeveloped (Chuang 2004). It is noted that no studies have been found which explore all critical theoretical links simultaneously. Adapted from Gold, Malhotra and Segars (2001) and Lee and Choi (2003), Chuang’s (2004) model as shown in Figure 2.9 comes from one of a limited number of empirical studies employing the RBV of KM to develop theoretical links and empirically examine the relationship between a firm’s KM capability and CA.

Figure 2.9 – KM Capability and CA of the Firm

Source: Chuang (2004)

Although Chuang’s research is one of only a few endeavours in the development of a critical framework on KM capability-based CA of the firm, it possesses several limitations for future studies.
First, the model examines the four elements of KM infrastructure resources and capability of a firm in isolation (namely organisational structure, organisational culture, and people as a social perspective, and information technology as a technical perspective). This approach is not consistent with an extensive discussion in the literature of the interwoven nature found among organisational factors (Zheng 2005).

Second, the model does not account for the KM process capability in association with a firm’s CA and, consequently, ignores the interrelationships between KM infrastructure and process capabilities. While KM infrastructure is supported by and possibly stimulates critical KM processes (Gold, Malhotra & Segars 2001; Lee & Choi 2003) the capability of KM infrastructure cannot be fully leveraged without the presence of KM process capability (Gold, Malhotra & Segars 2001). The combination of knowledge infrastructure elements and knowledge oriented processes is ‘critical to reach the intended KM objectives’ (Khalifa & Liu 2003, p. 569). In addition, KM processes are considered to be the foundation of organisational advantage (Nahapiet & Ghoshal 1998) and, therefore, may influence a firm’s CA (Chakravarthy et al. 2005). Consequently, an absence of KM process capability may restrict a valuable integrated contribution of the two major components of KM capability, namely infrastructure and process, to the organisational CA.

A review of the literature also shows that Chuang’s (2004) approach, as well as most of the other conceptual models of KM variables, are directed toward and empirically tested in the context of developed Western countries, or newly industrialised Asian countries such as USA (Gold, Malhotra & Segars 2001; Smith 2006; Zheng 2005; Zheng, Yang & McLean 2010), Australia (Migdadi 2005), Canada (Manovas 2004), Taiwan (Chuang 2004), Hong Kong (Khalifa, Lam & Lee 2001; Khalifa & Liu 2003), and Korea (Choi & Lee 2002, 2003; Lee & Choi 2003; Lee & Lee 2007). The possibility that such models might be applicable or need to be customised to fit the specificities of emerging Asian countries has received little attention to date (Gimenez & Rincon 2003).

Therefore, this study attempts to fill the identified gaps by employing the RBV of the firm blended with the knowledge and dynamic capability-based approaches to develop an integrative theoretical model that explains the relationships among KM capability components
and their impacts on organisational CA. The study also aims to provide empirical evidence by examining the model in the context of Vietnam, a developing Asian country with a Confucian culture and a socialist market economy in which most enterprises are SMEs.

In doing so, the study intends to address the following three main questions:

**Q1** – What are the key dimensions of the KM capability of a firm?

**Q2** – How do the key dimensions of the KM capability of a firm relate to each other?

**Q3** – How do the key dimensions of the KM capability of a firm affect its CA?

### 2.4.3 Conceptualisation of KM Capability Components

This section deals with the relevant key components of KM capability by providing a brief theoretical foundation for each dimension. Adapted from Gold, Maholtra and Segars (2001) and Lee and Choi (2003) this study hypothesises that:

**H1**: KM capability is a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability.

#### 2.4.3.1 Knowledge Management Infrastructure Capability

Knowledge management infrastructure capabilities or KM enablers (or influencing factors) are the overall organisational activities or mechanisms that can stimulate knowledge creation, protect knowledge, and facilitate the sharing of knowledge in an organisation (Lee & Choi 2003; Migdadi 2005). In other words, they refer to modular products and organisational designs which enable KM activities in an organisation (Sanchez & Mahoney 1996). A broad range of these factors has been identified in the literature (as presented in Table 2.5). The model for this research incorporates four elements (Figure 2.10), three of them - including organisational structure, organisational culture, and information technology - are adopted from Gold, Maholtra and Segars (2001) and the remaining element - people - is adopted from Lee and Choi (2003).
Following Pan and Scarbrough’s (1998) classification scheme for resources, these elements are categorised into two perspectives: social and technical views. The next subsection presents a brief outline of each component of KM infrastructure capability of a firm in terms of social and technical perspectives.

**Figure 2.10 – KM Infrastructure Capability incorporated into the research model**

![Knowledge Management Infrastructure Capability of a Firm](image)

Source: Adapted from Gold, Maholtra and Segars (2001) and Lee and Choi (2003)

- **Social perspective**

In terms of social perspective, the KM infrastructure capabilities of a firm encompass three components: organisational structure, organisational culture, and people (or T-shaped skills) (Chuang 2004; Lee & Choi 2003). These key dimensions of social KM infrastructure capability are adapted from the literature and tested in the study through the following hypothesis:
H2: Social KM infrastructure capability is a second-order latent construct composed of organisational structure, organisational culture, and people (or T-shaped skills).

Organisational structure

In systems thinking, an organisation is conceived of as being composed of elements and relations between elements. These relations as a whole constitute an organisation (Checkland 1999). According to Miller and Droge (1986), organisational structure involves centralisation of authority, formalisation, complexity, and integration. It is the way in which responsibility and power are allocated and work procedures are carried out among organisational members (Nahm, Vonderembse & Koufteros 2003).

Since it provides the skeletal structure for all organisational decisions and processes, organisational structure is the primary driver of change (Wang & Ahmed 2003). Among various ways of categorising shifts of organisational structure, Schein (1971; 1988) identifies three dimensions: the hierarchical dimension which contains the ranks within an organisation in a manner similar to an organisational chart; the functional dimension which identifies the different types of work to be done; and the inclusion and centrality dimension which shows the distance of any given person from the central core of the organisation.

Considerable attention has been paid to the relationships of contingency between environments, organisational form and function, and a number of studies have examined the impact of changing external circumstances and the need to develop appropriate structural forms (Chandler 1962). In particular, the common trajectory of structural transition involves a scenario in which a traditional hierarchical structure is replaced by flatter and more flexible one in the post-modern world of business (Piercy & Cravens 1994, 2000). In other words, hierarchical structures in turbulent business environments become deficient (Drucker 1995), displaying their unwanted side effects of rigid bureaucracy which hinders the flow of information and promotes excessive specialisation of work processes which hinder the integration of expert knowledge and speedy responses to the competitive environment (Cross 2000). Instead, it is argued that organic structures are better suited because of their ability to create and adapt, providing organisations with high flexibility without degenerating into chaos.
(Sawhney & Prandelli 2002). Consequently, a range of new forms of organisational structures have emerged in the new economy such as network organisations, knowledge-based organisations, virtual organisations, modular organisations, and hypertext organisations (Wang & Ahmed 2003). These organisational structures are created on the basis of core competence or knowledge creation which is inherently dynamic, sensitive to the environment and can easily adapt to external pressures as well as actively meet or even exceed internal demands (Prahalad & Hamel 1990).

Since KM initiatives can be structurally organised as separate organisational units, as projects, or as informal initiatives (Maier & Remus 2002), the organisational structure within an organisation may encourage or inhibit KM (Gold, Malhotra & Segars 2001; Hedlund 1994; Nonaka & Takeuchi 1995). Supporting the above arguments, many KM authors also suggest that organisations need to change from having hierarchical departmentalised structures to flatter, organic, network styles which facilitate transferring and creating knowledge for the firm (Beveren 2003; Gehani 2002; Pemberton & Stonehouse 2000) and that successful organisations of the future will be characterised by simplicity and flexibility of organisational design (Beveren 2003). Due to the impact of the knowledge age with its rapid development and diffusion of technology, organisations are eliminating many layers so that information and work processes can flow efficiently (Drucker 1993) and the strategic business units (SBUs) become more responsive to their markets, supporting and enhancing their competitive strategies (Aaker 2001; Mintzberg 1996a).

While agreeing that organisational structure is one important independent variable affecting the facilitation of the knowledge processes, Dilnutt (2000) also concludes that organisational structure can inhibit or enable effective KM through the influence of the structural framework in place, the way this framework facilitates knowledge creation and innovation, the impact of this framework on corporate behaviour, and the provision of access to knowledge to foster creativity with the allocation of responsibility to individuals.
Organisational culture

Organisations are made up of individuals, each with their own unique behaviours, norms, and values (Prusak 1996), and the accumulation of those individuals creates the organisational culture (Dilnutt 2000). In other words, organisational culture is an aggregate of the shared understandings of individuals which influence the collective behaviour of the organisation (Lyles & Schwenk 1992).

There are many definitions of organisational culture, some of which have an anthropological foundation and some of which have a sociological foundation (Roman-Velazquez 2004). According to Schein (1992, p. 9), organisational culture refers to ‘a pattern of basic assumptions that the group learns as it solves its problems of external adaption and internal integration’. Moreover, this pattern of assumptions should ‘work well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems’ (Schein 1992, p. 9). Schein argues that there are three basic levels to the way in which the culture is visible to the observer, namely artifacts, exposed values, and basic underlying assumptions. The last level refers to unconscious, taken-for-granted beliefs, perceptions, thoughts, and feelings, which are the deeper level of culture and source of values and actions. While the concept of organisational culture is hard to define, analyse, measure, and manage, efforts to understand it are worthwhile because many of the complex and mysterious problems in organisations suddenly become clear when the culture is understood (Schein 1992).

With regard to the functions of organisational culture, Martin and Terblanche (2003) summarise them as internal integration and coordination. In particular, internal integration can be described as the socialising of new members in the organisation, creating the boundaries of the organisation, and the feeling of identity among personnel and commitment to the organisation. The coordination function refers to creating a competitive edge, making sense of the environment in terms of acceptable behaviour and social system stability (Migdadi 2005).

In relation to the concept of KM, DeLong and Fahey (2000) identify four comprehensive ways in which culture influences the behaviours central to knowledge creation, sharing, and use.
First, culture shapes assumptions about what knowledge is and which knowledge is worth managing. Second, culture defines relationships between individual and organisational knowledge, determining who is expected to control specific knowledge, as well as who must share it and who can hoard it. Third, culture creates the context for social interaction that determines how knowledge will be used in particular situations. Finally, culture shapes the processes by which new knowledge with its accompanying uncertainties is created, legitimated, and distributed in organisations.

To stimulate the development and application of knowledge within an organisation, a culture of confidence and trust is required (Moffett, McAdam & Parkinson 2002). Similarly, Martin (2000) indicates that the key elements of a knowledge culture are a climate of trust and openness in an environment where constant learning and experimentation are highly valued, appreciated and supported. Cultures that explicitly favour knowledge sharing and knowledge integration encourage debate and dialogue in facilitating contributions from individuals at multiple levels of the organisation (Davenport & Prusak 1998). In particular, dialogue between individuals or groups is often the basis for the creation of new ideas and can, therefore, be viewed as having the potential for creating knowledge. Moreover, employee interaction and collaboration, especially among those not working side by side, are very important when an organisation attempts to transmit tacit knowledge between individuals or convert tacit knowledge into explicit knowledge, thereby transforming it from the individual to the organisational level (Nonaka 1990, 1994; Nonaka & Konno 1998, Nonaka & Takeuchi 1995; O'Dell & Grayson 1998).

Dilnutt (2000) in his doctoral thesis on KM investigates how the independent variable of organisational culture inhibits or enables KM processes. While McDermott and O’Dell (2001) conclude that culture is a key inhibitor to effective knowledge sharing, Turban and Aronson (2001, p.355) add that ‘the ability of an organisation to learn, develop memory, and share knowledge is dependent on culture’. Organisations should establish an appropriate culture that encourages people to create and share knowledge within an organisation (Holsapple & Joshi 2001; Leonard-Barton 1995). Consequently, organisational culture becomes one of the most important factors for the successful implementation of KM efforts (Davenport & Prusak 1998; Gold, Malhotra & Segars 2001; Lee & Choi 2003; Martin 2000; Roman-Velazquez 2004).
is the development of a culture that promotes and encourages the KM practices toward organisational objectives that are essential to enhance corporate performance and achieve CA based on innovation (Donate & Guadamillas 2010; Tseng 2010).

The role of organisational culture as a source of SCA has also been strongly stated in the literature. Barney (1986, p.646) concludes that ‘firms that do not have the required cultures cannot engage in activities that will modify their culture and generate sustained superior performance because their modified culture typically will be neither rare nor imperfectly imitable’. Moreover, he adds that organisations which have a culture that supports and encourages cooperative innovation should try to understand what it is about their culture that gives them a CA and develop and nurture those cultural attributes (Barney 1986). Similarly, Hibbard (1998) argues that strong culture is a determinant of organisational performance and organisations, to remain competitive, must be able to utilise their knowledge of customers, products, services, and resources, or in other words, they must be able to overcome cultural barriers in knowledge sharing (Soley & Pandya 2003). In fact, most successful companies (those with sustained profitability and the above-normal financial returns) such as Coca-Cola, Disney, General Electric, Microsoft, and Toyota, have a major distinguishing characteristic – their organisational culture, that is their most important CA (Cameron & Quinn 1999).

People (T-shaped skills)

People of organisations are recognised to be the key enabler in successful KM (Lee & Choi 2003). Since knowledge resides in people’s heads, human resources are at the heart of creating organisational knowledge (Chase 1997; Holsapple & Joshi 2001; Ndlela & Toit 2001; Lee & Choi 2003). In addition, human interaction is the critical source of intangible value in the intellectual age (O’Donnell & Berkery 2003). To stay competitive, organisations need to capitalise on their intellectual assets, especially the intellectual capacity of their workers (Hung 1998). Thus, managing people who are willing to create and share knowledge is an important task and finding new sources of motivation to increase people participation in knowledge sharing is a real challenge for organisations (O'Dell & Grayson 1999; Migdadi 2005).
According to Leonard-Barton (1995), the skills and knowledge embodied in employees is the dimension most often associated with core capabilities and thus, the most important factor in sustaining organisational CA. He argues that there are at least three types of skills and knowledge constituting this dimension of a core capability, including public or scientific, industry-specific, and firm-specific knowledge. The first two kinds of skills and knowledge can be easily duplicated through formal educational and training programs or by hiring consultants and luring industry specialists from competitors. However, firm-specific or in-house knowledge is not so easily imitated and it must be cultivated overtime (Leonard-Barton 1995).

Skills have been classified in the broad and deep knowledge areas with functional or disciplinary skills relate to deep knowledge and those skills that can be applied across situations and interdepartmentally are termed broad knowledge (Truran 1998). People possessing both knowledge areas would be said to have T-shaped skills where the stem of the T shows deep knowledge and the cross of the T represents broad knowledge (Figure 2.1). T-shaped skills enable their possessors to explore the interfaces between their particular knowledge domain and various applications of that knowledge in particular products (Leonard-Barton 1995). People with T-shaped skills would have a desired ability to understand the technical facets of their discipline and also understand the operation of the organisation as a whole (Migdadi 2005).

For example, in his research, Iansiti (1993) found that these people not only have a deep knowledge of a discipline like ceramic materials engineering but also know how their discipline interacts with others such as polymer processing. In addition, he found that team members with T-shaped skills constituted the underpinnings of the systems-focused approach used by superior-performing firms who needed fewer than one-third the engineers and completed their projects an average of 2.6 years sooner than competitors designing directly competing products in the same business.

In other words, people with T-shaped skills are able to expand their competence across several functional areas and thus, they are capable of convergent, synergistic thinking (Leonard-Barton 1995). They can also combine theoretical and practical knowledge and integrate
diverse knowledge sets. As a result, the presence of employees with T-shaped skills has a significant and positive impact on knowledge creation process (Leonard-Barton 1995; Johannessen, Olsen & Olaisen 1999; Madhavan & Grover 1998; Migdadi 2005). However, these people will attempt to create new knowledge only if their organisation has an environment that encourages forming T-shaped skills and provides a systematic management of these skills (Lee & Choi 2003; Migdadi 2005).

**Figure 2.11 – T-shaped Skills**

![T-shaped Skills Diagram]

**Source:** Leonard-Barton (1995, p.76)

**Technical perspective (Information Technology)**

In the rolling out of KM efforts, organisations generally ‘start with the implementation of a technological capability, which allows them (at least in principle) to capture and share corporate know-how’ (Ruggles 1998, p.87). According to Moffett, McAdam and Parkinson (2003), technology within KM can be seen to have evolved through three cumulative and interdependent phases, namely mainframe, personal computers, and networking, among which networking has become the dominant process.

Information technology (IT) is relevant to KM for a few fundamental reasons (Dilnutt 2000; James 2005). Firstly, information systems are now essential for the storage and retrieval of information and explicit knowledge (Davenport & Prusak 1998). Moreover, IT is particularly
useful in overcoming the barriers of distance and time which affect some knowledge workers (Nonaka 1991; Ruokonen 2001; Stough, Eom & Buckenmyer 2000), an increasingly important issue due to the impacts of globalisation, enabling collaborative teamwork, knowledge sharing and integration (Chesbrough & Teece 1996). In addition, IT is related to KM because the availability and advances in technological capability have often resulted in reductions in staffing levels which, if not carefully and effectively managed, can result in loss of knowledge within organisations (Dilnutt 2000; James 2005).

The role of IT in supporting KM processes has been emphasised by many authors such as Davenport and Prusak (1998), Zack (1999), Alavi and Leidner (2001), Gold, Mahlbra and Segars (2001), Schultze and Leidner (2002), and Alavi and Tiwana (2005). While several studies focus on the effects of IT on specific KM processes, from knowledge acquisition and representation to knowledge sharing and application, others mainly examine the impacts of IT on KM in general (Khalifa & Liu 2003). Leonard-Barton (1995) and Grant (1996a) propose that the technological dimensions that are part of effective KM include business intelligence, collaboration, distributed learning, knowledge discovery, knowledge mapping, opportunity generation, as well as security. Meanwhile, adopting the KM framework developed by Alavi and Leidner (2001), Alavi and Tiwana (2005) categorise key information technology tools that may be applied to support the various organisational KM processes (Table 2.6). They suggest that KM technologies are not mutually exclusive and in some large-scale organisational KM initiatives, a combination of various technical tools is used synergistically.

Although IT is an enabler of KM, poor implementation or over emphasis on this capability can inhibit the effectiveness of KM programs (Leonard-Barton 1995), especially if it results in an exclusion of the human element (Moffett, McAdam & Parkinson 2002). Further, Dilnutt (2000) also concludes that the technology itself cannot become the driver of KM initiatives and for KM to be effective, the technical infrastructure must enable each of the individual KM processes.
Table 2.6 – Information Technology Tools for support of KM Processes

<table>
<thead>
<tr>
<th>Information Technology Tools</th>
<th>Knowledge Management Processes</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Creation</td>
</tr>
<tr>
<td></td>
<td>Storage and Retrieval</td>
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<tr>
<td></td>
<td>Transfer</td>
</tr>
<tr>
<td></td>
<td>Application</td>
</tr>
<tr>
<td>E-learning</td>
<td>Data warehousing and data mining</td>
</tr>
<tr>
<td>Collaboration support systems</td>
<td>Repositories</td>
</tr>
<tr>
<td></td>
<td>Communication support systems</td>
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<tr>
<td></td>
<td>Enterprise information portals</td>
</tr>
<tr>
<td>Expert system</td>
<td>Decisions system</td>
</tr>
</tbody>
</table>

Source: Alavi and Tiwana (2005)

2.4.3.2 Knowledge Management Process Capability

A process capability is ‘any performance characteristics or attributes of a process (that is) required if the process goal is to be consistently and reliably achieved’ and an organisation can achieve true CA by maintaining ‘unparalleled excellence in not just one, but several core processes’ (Cascella 2002, pp. 64-5).

A process capability in KM is the organisation’s ability to create new knowledge through the process of converting tacit to explicit knowledge and eventually transforming it to organisational knowledge (Nonaka & Takeuchi 1995), and new knowledge stems from a firm’s combinative processes (Kogut & Zander 1996). Similarly, Pentland (1995) defines KM processes as ‘an ongoing set of practices embedded in the social and physical structure of the organisation with knowledge as their final product’. Effective KM processes should be conducted frequently, consistently, and flexibly (Grant 1996a).

Gold, Malhotra and Segars (2001) assert that knowledge processes can be thought of as a structured coordination created in order to manage knowledge effectively. In particular, KM process capability is essential to ‘enable the organisation to capture, reconcile, and transfer knowledge in an efficient manner’, thereby, providing ‘a useful theoretical foundation for defining important aspects of organisational capability’ (Gold, Malhotra & Segars 2001, p.187).
A variety of aspects to the KM process identified in the literature are illustrated in the following Table 2.7.

**Table 2.7 – Different perspectives of KM Processes**

<table>
<thead>
<tr>
<th>Authors</th>
<th>KM Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davenport and Prusak (1998)</td>
<td>generate, codify, coordinate, transfer</td>
</tr>
<tr>
<td>Drucker (1985)</td>
<td>acquire, create, accumulate, exploit</td>
</tr>
<tr>
<td>Nonaka and Takeuchi (1995)</td>
<td>accumulate, store, share, use</td>
</tr>
<tr>
<td>Prusak (1996)</td>
<td>create, represent, apply, deploy</td>
</tr>
<tr>
<td>Becerra-Fernandez, Gonzalez and Sabherwal (2004)</td>
<td>discover, capture, share, apply</td>
</tr>
<tr>
<td>Leonard-Barton (1995)</td>
<td>acquire, collaborate, integrate, experiment</td>
</tr>
<tr>
<td>Teece (1998)</td>
<td>create, transfer, assemble, integrate, and exploit</td>
</tr>
<tr>
<td>Ruggles (1998)</td>
<td>generate, access, facilitate, represent, embed, use, transfer, measure</td>
</tr>
</tbody>
</table>

**Source:** Developed for this study

By examining all of the above characteristics, Gold, Malhotra and Segars (2001) group them into four broad dimensions of KM process capability: acquisition, conversion, application, and protection processes. These categories have been adapted by several followers such as Khalifa and Liu (2003), Manovas (2004), and Smith (2006) and are also incorporated into this research model (Figure 2.12). Thus, we have the following hypothesis:

**H3:** KM process capability is a second-order latent construct composed of acquisition process, conversion process, application process, and protection process.
Figure 2.12 – KM Process Capability incorporated into the research model

Source: Gold, Malhotra and Segars (2001)

Acquisition Processes

Acquisition-oriented KM processes are those oriented toward obtaining knowledge which can be described by many other terms such as acquire, seek, generate, create, capture, and collaborate, all with a common theme – the accumulation of knowledge (Gold, Malhotra & Segars 2001, p.190). According to Chakravarthy (2005, p. 307) ‘knowledge is accumulated when units within the firm or the organisation as a whole gains new understanding’.

Knowledge creation and acquisition are both important sources of new knowledge for a firm. The former is concerned with the development of new organisational knowledge in the firm, including the improved use or new application of existing knowledge, while the latter represents a flow of knowledge from external stocks of knowledge into the firm (Massa & Testa 2009; Nielsen 2006). The full value-creating potential of new knowledge can only be realised through knowledge capture (Boisot 1999) which can include both knowledge personalisation and codification strategies (Hansen, Nohria & Tierney 1999).

Discussing these processes, Gold, Malhotra and Segars (2001) concentrate on two aspects: benchmarking and collaboration. In particular, through benchmarking, an organisation
identifies outstanding practices from organisations (including itself), assesses the current state of a particular process to identify gaps and problems and then captures the knowledge for use internally (O'Dell & Grayson 1998). Collaboration can take place at two levels within the organisation: between individuals and between the organisation and its network of business partners and both are potential sources of knowledge (Inkpen 1996; Inkpen & Beamish 1997; Inkpen & Dinur 1998; Nonaka & Takeuchi 1995).

Conversion Processes

Conversion-oriented KM processes are those oriented toward making existing knowledge useful (Gold, Malhotra & Segars 2001, p. 191), which can be enabled by some of the processes such as organise (Davenport & Klahr 1998; Gimenez & Rincon 2003; O'Dell & Grayson 1998), represent (Marshall, Prusak & Shpilberg 1996), integrate (Grant 1996a; Nielsen 2006), combine, structure, coordinate (Miller & Friesen 1984; Moore 1996; Sanchez & Mahoney 1996), or distribute knowledge (Davenport, Jarvenpaa & Beers 1996; Davenport & Klahr 1998; Zander & Kogut 1995).

According to Lee and Suh (2003), knowledge is something not to be easily shared and collected but needs to be converted for use in the business environment. First, without common representation standards, no consistent dialogue of knowledge would exist, and this would make it hard to effectively manage (Davenport & Klahr 1998; Gimenez & Rincon 2003; O'Dell & Grayson 1998). Secondly, knowledge needs to be integrated and combined if strong organisational capabilities are to emerge (Zahra, Nielsen & Bogner 1999). In particular, integration focuses on making the assembled knowledge resources function together to create an organisational capability that can form the basis for new products or services (Teece, Pisano & Shuen 1997; Winter 2003), serving as a platform for expansion into new competitive arenas (Prahalad & Hamel 1990). Finally, knowledge should be distributed to the organisational unit where it is needed (Massa & Testa 2009; Nielsen 2006).

Application Processes

Application-oriented KM processes are those oriented toward the actual use of the knowledge (Gold, Malhotra & Segars 2001), making knowledge ‘more active and relevant for the firm in
creating value’ (Bhatt 2001, p. 72-73). Process characteristics that have been associated with the application of knowledge within the literature include storage, retrieval, application, contribution, and sharing (Almeida 1996; Appleyard 1996; Massa & Testa 2009).

According to Nielsen (2006), application processes are related to knowledge leverage and exploitation, among which knowledge leverage entails the search for new ways to exploit the integrated knowledge-based resources of the firm in as many ways and in as many competitive arenas as possible (Hamel & Prahalad 1994; Wang & Ahmed 2004). Meanwhile, the performance of a firm is dependent on the ability to exploit its integrated knowledge resources in order to create and deliver products and services to its customers utilising its organisational capabilities (Nielsen 2006).

The knowledge-based theory of the firm posits that the major source of competitiveness rests in the ability to apply knowledge and not in the ability to create new knowledge per se (Grant 1996a). Effective application of knowledge has helped companies improve their efficiency and reduce costs (Davenport & Klahr 1998).

**Protection Processes**

Security-oriented KM processes are those oriented toward the protection of knowledge within an organisation from illegal or inappropriate use or theft (Gold, Malhotra & Segars 2001). More specifically, according to Appleyard (1996), protection encompasses activities that seek to maintain the proprietary nature of a firm’s knowledge stocks which include seeking legal protection, designing policies to limit turnover, and educating employees about the types of knowledge they should not share with their peers in other organisations. Firms can also take a variety of actions to shape the characteristics of their knowledge base which increase stickiness and imitation barriers, including tacitness, complexity, and specificity (Dierickx & Cool 1989; Doz, Santos & Williamson 2001; McEvily & Chakravarthy 2002; Reed & Defillippi 1990).

When knowledge is applied to existing ends, the size and durability of a firm’s CA will be defined by how well it protects its knowledge (Chakravarthy et al. 2005). This is because
knowledge as an asset is the source of a CA only when it is rare and inimitable (Barney 1991). Therefore, protection processes are very important for an organisation.

2.4.4 Relationships among KM Capability Components

This section discusses theoretical issues related to developing the interrelationships among the three key components of KM capability, namely technical KM infrastructure capability, social KM infrastructure capability, and KM process capability.

2.4.4.1 Technical and Social KM Infrastructure Capabilities

The interwoven nature of organisational knowledge infrastructure elements is extensively discussed in the literature (Zheng 2005). Lee and Lee (2007) confirm that there are positive correlations among organisational factors, including T-shaped skills, decentralised organisational structure, learning organisational culture, and IT support. For example, Nonaka and Takeuchi (1995) develop a new organisational structure that is intricately tied to the knowledge culture of the organisation. Zheng, Yang and McLean’s (2010) study also shows that organisations that are adaptive, consistent in their values, engaging to employees, and embracing common missions in their cultures are more likely to have a decentralised structure that facilitates a knowledge-friendly environment.

Without a supportive culture stressing why the application of a technology is vital to the organisation, no matter what technology base is established, the adoption rate can remain very low (Gold 2001). Technology, on the other hand, is also able to assist in negating some cultural issues especially in international markets (Soley & Pandya 2003) and in overcoming space and time barriers for group interactions, enabling knowledge workers to share their expertise and improve collaboration and communication among employees at all levels and all locations, regardless of structural boundaries and even across organisations (Weill & Broadbent 1998). However, in shaping the technical infrastructure capability for CA, the human skills which creatively and effectively combine, integrate, coordinate, and utilise IT components are the more important factor, not the IT infrastructure itself (Kim 2001).

The following hypothesis displays the correlation between the technical and social aspects of KM infrastructure capability.
**H4**: Technical and social KM infrastructure capabilities are positively correlated.

### 2.4.4.2 KM Infrastructure and Process Capabilities

Although little research has been undertaken to explore the relative importance of KM infrastructure capability in relation to KM process capability (Khalifa & Liu 2003), a central proposition has been examined that the characteristics of knowledge enablers/infrastructure should influence KM processes (Gold, Malhotra & Segars 2001). Whereas knowledge processes represent the basic operations of knowledge (Spek & Spijkervet 1997), enablers (or influencing factors) are the overall organisational activities or mechanisms that provide the infrastructure necessary to stimulate knowledge creation, facilitate the sharing of knowledge, and protect knowledge in an organisation, increasing the efficiency of KM processes (Lee & Choi 2003; Migdadi 2005; Sarvary 1999).

According to the theory of social capital, infrastructure elements enable maximisation of social capital by providing a mechanism for the social interaction of individuals (Gold, Malhotra & Segars 2001). Knowledge, or intellectual capital, is created through the process of exchange and combination that occurs within the social network of an organisation. Closely tied to the theory of social capital, the KBV of the firm also highlights the effective means of coordinating individuals’ activities within the firm and integrating their knowledge (Grant 1996a; Lopez 2005). This is where the role of organisational infrastructure elements comes into play to effectively manage the firm’s knowledge (Gold 2001).

Lee and Choi (2003) empirically examine the impact of various KM enablers on the knowledge creation process. Some other researchers such as Appleyard (1996), Hansen (1999), Lee and Lee (2007), Szulanski (1996), and Zander and Kogut (1995) recognise KM enablers or infrastructure as preconditions of KM processes. Smith (2006) also finds empirical evidence for the causal relationship between these two dimensions of KM capability. Specifically, knowledge infrastructure capability is the driver of knowledge process capability across firms and, consequently, improvements in the former will lead to strong and positive improvements in the latter.
In addition, the role of each KM infrastructure element from social and technical perspectives (including culture, structure, people, and IT) in support of KM processes has been broadly discussed in the literature. Specifically, organisational structure, culture, people, and IT are important independent variables affecting the facilitation of the knowledge processes. For example, with regard to *organisational structure*, it is argued that organisational structure can inhibit or enable effective KM through the influence of the structural framework in place and the way this framework facilitates knowledge creation and innovation (Dilnutt 2000). In the New Economy, successful organisations are characterised by simplicity and flexibility of organisational design (Beveren 2003). Thus, organisations need to change from having hierarchical departmentalised structures to flatter, organic, network styles which facilitate transferring and creating knowledge for the firm (Beveren 2003; Gehani 2002; Pemberton & Stonehouse 2000), resulting in more activated KM activities (Lee & Lee 2007).

In relation to the functions of *organisational culture*, it is argued that organisational culture is one of the most important factors for the successful implementation of KM efforts (Davenport & Prusak 1998; Gold, Malhotra & Segars 2001; Lee & Choi 2003; Martin 2000; Roman-Velazquez 2004). Organisations should establish an appropriate culture that encourages people to create and share knowledge within an organisation (Holsapple & Joshi 2001; Leonard-Barton 1995). The key elements of a knowledge culture are a climate of trust and openness in an environment where constant learning and experimentation are highly valued, appreciated and supported (Martin 2000; Moffett, McAdam & Parkinson 2002). Moreover, a knowledge culture also encourages debate and dialogue between individuals or groups to facilitate the creation of new ideas and knowledge as well as the transmission of tacit knowledge between individuals or the conversion of tacit knowledge into explicit knowledge, thereby transforming it from the individual to the organisational level (Davenport & Prusak 1998; Nonaka 1990, 1994; Nonaka & Konno 1998, Nonaka & Takeuchi 1995; O’Dell & Grayson 1998).

*Human resources* have been also recognised to be at the heart of creating organisational knowledge. Since knowledge resides in people’s heads, managing people who are willing to create and share knowledge is an important task (Chase 1997; Holsapple & Joshi 2001; Ndlela & Toit 2001; O’Dell & Grayson 1999). Thus, organisations need to find new sources of
motivation to increase the participation in knowledge creation and sharing (O’Donnell & Berkery 2003). As discussed earlier, among the different kinds of skills and knowledge that make up the dimension most often associated with a core capability, T-shaped skills and knowledge of employees are the most critical element as the possessors can explore the interfaces between their particular knowledge domain and various applications of that knowledge in particular products, thereby facilitating the process of knowledge creation, sharing and application (Leonard-Barton 1995).

Finally, there are a number of fundamental reasons to justify the role of information technology as an enabler of KM. For example, Davenport and Prusak (1998) argue that information systems are essential for the storage and retrieval of information and explicit knowledge. Moreover, due to the impacts of globalisation, IT is particularly useful in overcoming the barriers of distance and time which affect some knowledge workers (Nonaka 1991; Ruokonen 2001; Stough, Eom & Buckenmyer 2000, enabling collaborative teamwork, knowledge sharing and integration (Chesbrough & Teece 1996). Leonard-Barton (1995) and Grant (1996a) propose that the technological dimensions that are part of effective KM include business intelligence, collaboration, distributed learning, knowledge discovery, knowledge mapping, opportunity generation, and security. More specifically, Alavi and Tiwana (2005) categorise key information technology tools that may be applied to support the various organisational KM processes, including (1) e-learning and collaboration support systems for the creation process, (2) data warehousing, data mining, and repositories for the process of storage and retrieval, (3) communication support systems and enterprise information portals for the transferring process, and (4) expert and decisions systems for the process of applying knowledge.

The above arguments in terms of the role of KM infrastructure elements from both social perspective (including culture, structure, and people) and information technology in supporting KM processes have led to the following two hypotheses:

**H5**: Technical KM infrastructure capability is positively related to KM process capability.

**H6**: Social KM infrastructure capability is positively related to KM process capability.
2.4.5 Relationships between KM Capability Components and CA

This section discusses theoretical issues to investigate the impact of each KM capability component, namely technical KM infrastructure capability, social KM infrastructure capability, and KM process capability on organisational CA.

2.4.5.1 KM Infrastructure Capability and Competitive Advantage

Employing the RBV of KM, the empirical findings of Chuang’s (2004) study confirm that while the relationship between social KM resources and CA is positive and significant, technical KM resource is found to be an insignificant predictor for CA. With a similar approach, the following subsections will discuss the contribution of KM infrastructure capability to CA from social and technical perspectives separately.

❖ Technical KM Capability (IT) and CA

In the literature on IT research, while some studies have found a significant link between IT and firm performance, others have failed to do so (Kohli & Devaraj 2003). Moreover, if such direct effects exist, the frequently found negative correlations suggest that IT did weaken some firms’ competitive positions (Powell & Dent-Micallef 1997). According to Porter (1985, p. 165), ‘not all technological change is strategically beneficial; it may worsen a firm’s competitive position and industry attractiveness. High technology does not guarantee profitability’. Chuang’s (2004) research on the resource-based perspective of KM and CA supports this finding, indicating that technical KM resource is negatively related with CA.

One explanation for the inconsistent findings of IT and firm performance correlation is that the causal link from IT to firm performance is too long and that most studies have overlooked important intermediate organisational capabilities that mediate this relationship (Barua & Mukhopadhyay 2000; Sambamurthy, Bharadwaj & Grover 2003). In an empirical study on the resource-based approach of IT and CA, Powell and Dent-Micallef (1997) agree with Kettinger et al. (1994, p. 50) that ‘the information resources of a firm must be driven by business strategy and integrated into the product and process dimensions of the enterprise based on an understanding of core competencies’. In particular, owing to IT imitation by competitors, IT per se does not generate sustainable performance advantages and firms must use technologies
to leverage or exploit firm-specific, intangible resources such as organisational leadership, culture, and business processes (Clemons & Row 1991; Henderson & Venkatraman 1993).

To explain this phenomenon, Khalifa and Liu (2003) use the theory of technology assimilation stating that technologies must be infused and diffused into business processes to enhance organisational performance (Cooper & Zmud 1990; Fichman & Kemerer 1997). In the context of KM, therefore, IT should become the enabler of KM processes to indirectly improve its effect on firm performance as well as CA. In other words, technical KM infrastructure capability does not affect a firm’s CA or performance directly but instead, its impact is fully mediated through KM process capability (Tanriverdi 2005). Firms that improve their technological capability will realise improvements in processes for creating CA (Smith 2006).

The following hypothesis illustrates the impact of technical KM infrastructure capability on organisational CA:

**H7**: Technical KM infrastructure capability has an indirect positive impact on CA.

**Social KM Capability and CA**

According to Lee and Choi (2003), organisations with strong social KM resources are able to (1) integrate the KM and business planning processes more effectively, (2) develop reliable and innovative applications that support the business needs of the firm faster than competition, and (3) predict future business needs of the firm and introduce valuable new product features before competitors. The social KM resources ability to encourage the faceted activities associated with the successful implementation of KM has been found to be a key distinguishing factor of successful firms.

Organisational structure, organisational culture, and people are resources which typically evolve over a long period of time through the accumulation of organisational operations (Gold, Malhotra & Segars 2001). While each of the individual KM resources is difficult to acquire and complex to imitate, firms that achieve CA through KM have also learned to combine effectively their KM resources to create an overall KM capability. The valuable
resources combined with the difficulty of imitating such capabilities should provide a sustained CA (Chuang 2004). Therefore, we hypothesise that:

**H8**: Social KM infrastructure capability has a positive impact on CA.

### 2.4.5.2 KM Process Capability and Competitive Advantage

The contribution of KM processes in gaining and sustaining CA has been broadly discussed in the literature of KM and CA. Chakravarty et al. (2005, p. 305) posit that while ‘the characteristics of knowledge are primarily valuable defending existing advantages, the processes it uses to accumulate and leverage knowledge have greater implications for creating new sources of advantage’. Each of the three KM activities plays a distinctive role in providing a firm its CA: knowledge leverage is necessary for growth; knowledge accumulation is needed to ensure that this growth is profitable; and knowledge protection is needed to sustain this profitable growth.

Using the dynamic capabilities approach, Nielsen (2006) illustrates a link between dynamic capabilities and KM according to which dynamic capabilities are seen as integrated sets of KM activities including the creation, acquisition, capture, assembly, sharing, integration, leverage, and exploitation of knowledge. A combination of these well-known processes into three important types of dynamic capabilities relates to the development, (re)combination, and use of knowledge-based resources of the firm. Similarly, Cepeda and Vera (2007) describe the KM processes associated with dynamic capability development and utilisation, enabling firms to achieve and sustain a CA in the dynamic marketplaces of today (Eisenhardt & Martin 2000; Hamel & Prahalad 1994; Powell & Snellman 2004; Verona & Ravasi 2003; Winter 2003). This critical role of KM processes is tested using the following hypothesis:

**H9**: KM process capability has a positive impact on CA.

### 2.4.6 Proposed Theoretical Model

Based on the literature review, research questions and theoretical development, a number of research hypotheses and a conceptual model of KM capability-based CA of the firm have been developed. Table 2.8 provides a summary of three research questions and nine research
hypotheses while Figure 2.13 presents a variety of interrelationships among relevant variables to be offered in this study.

The key components are identified as the technical KM infrastructure capability (IT), the social KM infrastructure capability, and the KM process capability contributing to the organisational CA. The hypotheses are presented in the theoretical model to test whether KM infrastructure capabilities from social and technical perspectives are positively correlated and act as enablers to significantly improve KM process capability. In addition, the model also indicates that while social KM infrastructure and process capabilities have direct positive effects on a firm’s CA, the impact of technical KM infrastructure capability (IT) on this outcome variable is fully mediated through KM process capability.

**Table 2.8 – Research Questions and Hypotheses**

<table>
<thead>
<tr>
<th>Q1. What are the key dimensions of the KM capability of a firm?</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: KM capability is a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability.</td>
</tr>
<tr>
<td>H2: Social KM infrastructure capability is a second-order latent construct composed of organisational structure, organisational culture, and people (or T-shaped skills).</td>
</tr>
<tr>
<td>H3: KM process capability is a second-order latent construct composed of acquisition process, conversion process, application process, and protection process.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q2. How do the key dimensions of the KM capability of a firm relate to each other?</th>
</tr>
</thead>
<tbody>
<tr>
<td>H4: Technical and social KM infrastructure capabilities are positively correlated.</td>
</tr>
<tr>
<td>H5: Technical KM infrastructure capability is positively related to KM process capability.</td>
</tr>
<tr>
<td>H6: Social KM infrastructure capability is positively related to KM process capability.</td>
</tr>
</tbody>
</table>
Q3. How do the key dimensions of the KM capability of a firm affect its CA?

H7: Technical KM infrastructure capability has an indirect positive impact on CA.

H8: Social KM infrastructure capability has a positive impact on CA.

H9: KM process capability has a positive impact on CA.

Source: Developed for this study.

Figure 2.13 – Theoretical Model of KM Capability-based CA of the Firm
Abbreviations:

<table>
<thead>
<tr>
<th>CI</th>
<th>Cultural Infrastructure</th>
<th>ACP</th>
<th>Acquisition Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI</td>
<td>Structural Infrastructure</td>
<td>APP</td>
<td>Application Process</td>
</tr>
<tr>
<td>PI</td>
<td>People Infrastructure</td>
<td>PP</td>
<td>Protection Process</td>
</tr>
<tr>
<td>SKMIC</td>
<td>Social KM Infrastructure Capability</td>
<td>CP</td>
<td>Conversion Process</td>
</tr>
<tr>
<td>TKMIC</td>
<td>Technical KM Infrastructure Capability</td>
<td>KMPC</td>
<td>KM Process Capability</td>
</tr>
<tr>
<td>CA</td>
<td>Competitive Advantage</td>
<td>KM</td>
<td>Knowledge Management</td>
</tr>
</tbody>
</table>

Source: Developed for this study

2.5 CONCLUSION

This chapter has reviewed the two parent disciplines of CA and KM along with the intermediate discipline of KM capability-based CA of the firm to identify gaps in the extant literature. Nine hypotheses were developed to address three main research questions. An integrative theoretical model was proposed to display a variety of interrelationships among relevant variables to be offered in the study.

The key components are identified as the technical KM infrastructure capability, the social KM infrastructure capability, and the KM process capability contributing to the organisational CA. The social KM infrastructure capability is identified by the three dimensions of organisational structure, organisational culture, and people (or T-shaped skills) and the KM process capability is identified by the four dimensions of knowledge acquisition, conversion, application, and protection processes.

The next chapter will discuss the methodology employed to validate and examine this theoretical model.
CHAPTER THREE: METHODOLOGY

3.1 INTRODUCTION

The previous chapter identified a gap in the current knowledge about the interrelationships among KM infrastructure capabilities, KM process capabilities and CA of the firm, and developed a theoretical model through a critical review of existing literature. The model is composed of nine first-order latent constructs, namely technical KM infrastructure capability (IT), organisational culture, organisational structure, people (T-shaped skills), acquisition process, conversion process, application process, protection process, and competitive advantage; and two second-order latent constructs including KM process capability and social KM infrastructure capability. Nine hypotheses were proposed to answer three research questions and carry out an empirical study of Vietnamese enterprises.

This chapter aims to justify and outline the research methodology applied for testing the theoretical model developed in Chapter 2. The chapter’s outline is presented in Figure 3.1.
Figure 3.1 – Chapter Outline

3.1 Introduction

3.2 Purpose of the study

3.3 Justification of quantitative paradigm

3.4 Justification of survey research method

3.5 Questionnaire design

3.6 Pilot survey

3.7 Main survey

3.8 Data analysis techniques

3.9 Ethical considerations

3.10 Conclusion
3.2 PURPOSE OF THE STUDY

Business research studies based on function or purpose of the research can be classified into exploratory, descriptive, or causal studies (Hart 1998; Zikmund 2003).

3.2.1 Exploratory research

An exploratory study is ‘initial research conducted to clarify and define the nature of a problem’ (Zikmund 2003, p. 54) or ‘a valuable means of finding out what is happening and gaining insights to assess phenomena in a new light’ (Saunders, Lewis & Thornhill 2006, p. 96). Therefore, exploratory research is usually undertaken when there is not enough information available about the research subject. It is often framed as a pilot study by focusing on the ‘how’, ‘what’, ‘when’, and ‘where’ questions which rarely yield definitive answers and is usually conducted in advance of some subsequent and more detailed study (Neuman 2006).

A quantitative researcher may use this approach to define certain concepts, to formulate hypotheses, or to operationalise variables. As a result of this explorative study, hypotheses are developed and subsequently tested. Qualitative studies where data are collected from library searches, case studies, expert consultations, interviews, focus groups, or observations are usually exploratory in nature (Sekaran 2003).

3.2.2 Descriptive research

Descriptive research is ‘designed to describe the characteristics of a population or phenomena’ (Zikmund 2003, p. 55), presenting ‘a picture of the specific details of a situation, social setting, or relationship’ (Neuman 2006, p. 35). Descriptive research is less ambiguous and requires more structured design than exploratory research. The most commonly used research technique for this form of research is a survey questionnaire (Davis 2004).

Carried out against a backdrop of prior knowledge of the research problem, a descriptive study seeks to deal with who, what, when, where, and how questions (Sekaran 2003). According to Cavana, Delahaye, and Sekeran (2001), the outcomes of descriptive research are to become aware of the characteristics of a group or situation, to be able to gauge aspects of a situation, to provide information for further research, and to assemble data around possible change.
3.2.3 Explanatory research

Causal or explanatory research is conducted to identify cause-and-effect relationships among variables where the research problem at hand has already been narrowly defined (Sekaran 2003; Zikmund 2003). It builds on exploratory and descriptive research and goes on to look for causes and reasons to explain why events occur and to build, elaborate, extend, or test a theory (Neuman 2006). When the relationships have been proven, the discovered causality can be used to understand and predict outcomes of the investigated problem (Zikmund 2003). The most common methodological tools of this type of research are experiments and surveys.

In seeking to answer the three research questions in this study, the characteristics of the KM capability of a firm, including KM infrastructure and processes, have been investigated and described using a review of existing literature. In addition, the study aims to explain the interrelationships between different components of KM capability and their impacts on the firm’s CA. Using social capital theory, the RBV of the firm blended with knowledge and dynamic capability based approaches, the study develops a set of hypotheses to empirically test a theoretical model in the context of Vietnam. Thus, a combination of descriptive and causal research was undertaken in this study.

3.3 JUSTIFICATION OF THE QUANTITATIVE PARADIGM

A research paradigm is a framework or set of basic beliefs about the nature of reality that the researcher needs to identify the relationships between variables and to specify appropriate methods for conducting particular research (Guba & Lincoln 1994).

The two most widely employed research paradigms are quantitative (positivist) research and qualitative (constructivist, phenomenological or interpretivist) research (Collis & Hussey 2003). Table 3.1 contrasts the main differences between these two research paradigms in terms of their assumptions about reality, research purpose, researcher role, methodology, data collection and data analysis techniques.

Divergent assumptions about social reality are the most fundamental differences that determine and underpin other discrepancies between these alternative paradigms. In the quantitative paradigm, reality is real, single and exists ‘out there’ (Neuman 2006, p. 82), and
therefore, general laws and principles are used to give causal explanations of external social phenomena through accurate numerical data. In contrast, the qualitative approach states that ‘the social life exists as people experience it and give it meaning’ (Neuman 2006, p. 89), consequently, there are multiple realities and this approach seeks to use the subjective experience of individuals to explain meaning or to deepen understanding in the form of words and images.

Another key difference between the two research paradigms is researcher’s role. The researcher in the quantitative or positivist paradigm is objective, distant, non-interactive, value- and bias-free, and has no influence on either the research outcomes or the data they collect and analyse. The qualitative or interpretive approach admits and appreciates the subjective, ‘up close and personal’ role of researchers, especially when they attempt to capitalise on their insider perspective as participant observers.

From the angle of methodology which refers to the ways the researcher discovers or creates knowledge, Neuman (2006, pp. 41-5) states that in quantitative research, hypotheses are created and subjected to rigorous empirical testing (called hypothetico-deductive testing), using experiments, surveys, content analysis, existing statistics and secondary data analysis. A large sample is used to test a theory, in order to check validity and reliability and achieve generalisable conclusions.

In the qualitative approach, research methods might include ethnography, case studies, action research and grounded theory with field research and historical-comparative research (Neuman 2006, pp. 46-7). By inductive theorising using a small number of cases to build up a theory, it aims at contextualisation and is concerned with the trustworthiness of findings in terms of their credibility, transferability, dependability and confirmability (Lincoln & Guba 1985).
Table 3.1 – Characteristics of Quantitative and Qualitative Research Paradigms

<table>
<thead>
<tr>
<th>Features</th>
<th>Quantitative paradigm</th>
<th>Qualitative paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumptions of reality</td>
<td>Objective, real, independent of the observer, single, characterised by natural laws</td>
<td>Subjective, socially constructed, multiple, arising out of social interaction</td>
</tr>
<tr>
<td>Purpose</td>
<td>Generalisability</td>
<td>Contextualisation</td>
</tr>
<tr>
<td>Researcher role</td>
<td>Objective, distant, non-interactive, value and bias free, no influence on research outcomes and data collected and analysed</td>
<td>Subjective, up close, personal values, beliefs and attitudes biasing the way of collecting and analysing data</td>
</tr>
<tr>
<td>Methodology</td>
<td>Hypothetico-deductive</td>
<td>Inductive/interpretive</td>
</tr>
<tr>
<td>Data collection</td>
<td>Reduction/aggregation of data to numbers</td>
<td>Capture of lived experience of informants</td>
</tr>
<tr>
<td>Data analysis</td>
<td>Falsification of null hypotheses with statistical tests</td>
<td>Identification of recurring themes and patterns to search for meaning</td>
</tr>
</tbody>
</table>


To choose a research paradigm, Creswell (2003) suggests a variety of criteria for consideration as outlined in the following Table 3.2.

Table 3.2 – Reasons for Selecting Quantitative or Qualitative Research Paradigm

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Quantitative paradigm</th>
<th>Qualitative paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researcher’s world view</td>
<td>A researcher’s comfort with the ontological, epistemological, axiologial, rhetorical and methodological assumptions of the quantitative paradigms</td>
<td>A researcher’s comfort with the ontological, epistemological, axiologial, rhetorical and methodological assumptions of the qualitative paradigms</td>
</tr>
<tr>
<td>Training and experience of the researcher</td>
<td>Technical writing skills, computer statistical skills, library skills</td>
<td>Literary writing skills, computer text analysis skills, library skills</td>
</tr>
</tbody>
</table>
Table 3.2 (Cont.) – Reasons for Selecting Quantitative or Qualitative Research Paradigm

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Quantitative paradigm</th>
<th>Qualitative paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researcher’s psychological attributes</td>
<td>Comfort with rules and guidelines for conducting research; low tolerance for ambiguity; time for a study of short duration</td>
<td>Comfort with lack of specific rules and procedures for conducting research; high tolerance for ambiguity; time for lengthy study</td>
</tr>
<tr>
<td>Nature of problem</td>
<td>Previously studied by others so that body of knowledge exists; known variables, existing theories</td>
<td>Exploratory research; variables unknown; context important; may lack theory base for study</td>
</tr>
<tr>
<td>Audience for the study</td>
<td>Individuals accustomed to be supportive of quantitative studies</td>
<td>Individuals accustomed to be supportive of qualitative studies</td>
</tr>
</tbody>
</table>

Source: Creswell (2003, p. 9)

After considering the options summarised in the above two tables, this study adopted a positivist or quantitative approach. Neuman (2006) states that variables and relationships among variables (usually expressed in hypotheses) are the central ideas in quantitative research. Quantitative researchers primarily follow a deductive route moving from abstract ideas or variables to specific data collection techniques (measurement process) and to precise numerical information, and an empirical representation of the abstract ideas produced by the techniques (Neuman 2006).

This study aims to empirically test hypotheses about the relationships among the variables in the theoretical model developed from the findings of the relevant existing literature review. Therefore, it was undertaken employing quantitative research with a deductive approach.

3.4 JUSTIFICATION OF THE SURVEY RESEARCH METHOD

Business research based on quantitative research techniques can be classified into four basic types: experiments, surveys, observation, and secondary data studies (Zikmund 2003).

Experimental research is ‘research in which the researcher manipulates conditions for some research participants but not others, then compares group responses to see whether it made a
difference’ (Neuman 2006, p. 41). Thus, experiments hold the greatest potential for testing cause-and-effect relationships among variables, however, they require that the researcher is able to take control of at least one variable in the study which is often not possible or practical in business research. As a result, correlation studies are usually conducted, including observational and survey research (Manning 2006).

Observation allows the researcher to observe and record the behaviour of others without relying on reports from respondents (Zikmund 2003). Observation can be structured or unstructured. An unstructured approach is appropriate when a research question has not yet been formalised and the researcher may be aiming to develop a theory of what is going on in a certain situation, while a structured approach may be more suitable when the researcher is trying to test hypotheses (Manning 2006).

One of the most popular research techniques in quantitative business research is the survey (Manning 2006) in which ‘the researcher systematically asks a large number of people the same questions and then records their answers’ (Neuman 2006, p. 43). In other words, it is a research technique in which information is gathered from a sample of people by using a questionnaire (Zikmund 2003). While surveys and experiments are the most common methodological tools in explanatory studies, survey research is more commonly found under the banner of descriptive research (Manning 2006).

The last basic type of quantitative research methods is secondary data study which uses data previously collected and assembled for some project other than the one at hand (Zikmund 2003).

Among the above techniques, survey research was chosen to deal with the research questions and hypotheses in this study for two main reasons. First, surveys provide a quick, efficient, and accurate means of assessing information about a population, and are more appropriate where there is a lack of secondary data (Zikmund 2003) which is the case in this study. In addition, a review of empirical studies on KM capability shows that the survey has been the most popularly used method to measure this concept in the literature.
Neuman (2006) categorises four basic types of surveys: face-to-face interviews, telephone interviews, mail and self-administered questionnaires, and web surveys.

The face-to-face interview, which is also known as the personal interview, is a versatile survey method in which a direct face-to-face communication between the researcher and the respondent takes place (Zikmund 2003). It is considered the oldest form of interview since it does not rely on modern communication technologies (Biemer & Lyberg 2003).

The telephone interview is a popular survey method in which an interviewer calls a respondent, asks questions, and records answers (Neuman 2006). Mail surveys are the most commonly used data collection method (Kotler 2003) in which a self-administered questionnaire is mailed to potential respondents who take the responsibility of reading and answering the questions.

Finally, an emerging alternative set of approaches to the distribution of questionnaires involves the Internet with two methods usually employed: email or web-page questionnaires, according to which the questionnaire is either delivered as an email and returned via email or is posted as a web page (or sets of web pages) and the respondent goes to the website and completes the questionnaire online (Manning 2006).

Aaker, Kumar, and Day (1995) state that the choice between these different survey methods is not an easy task because each method has its own advantages and disadvantages as indicated by Neuman (2006) in the following Table 3.3.

Table 3.3 – Types of surveys and their features

<table>
<thead>
<tr>
<th>Administrative issues</th>
<th>Features</th>
<th>Mail questionnaire</th>
<th>Telephone interview</th>
<th>Face-to-face interview</th>
<th>Web-page survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Cheap</td>
<td>Moderate</td>
<td>Expensive</td>
<td>Cheapest</td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td>Slowest</td>
<td>Fast</td>
<td>Slow to moderate</td>
<td>Fastest</td>
<td></td>
</tr>
<tr>
<td>Length (number of questions)</td>
<td>Moderate</td>
<td>Short</td>
<td>Longest</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Response rate</td>
<td>Lowest</td>
<td>Moderate</td>
<td>Highest</td>
<td>Moderate</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.3 (Cont.) – Types of surveys and their features

<table>
<thead>
<tr>
<th>Features</th>
<th>Mail questionnaire</th>
<th>Telephone interview</th>
<th>Face-to-face interview</th>
<th>Web-page survey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probes possible</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Specific respondent</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Question sequence</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Only one respondent</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Visual observation</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Success with different questions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual aids</td>
<td>Limited</td>
<td>None</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Open-ended questions</td>
<td>Limited</td>
<td>Limited</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Contingency questions</td>
<td>Limited</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Complex questions</td>
<td>Limited</td>
<td>Limited</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sensitive questions</td>
<td>Some</td>
<td>Limited</td>
<td>Limited</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Sources of bias</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social desirability</td>
<td>No</td>
<td>Some</td>
<td>Worse</td>
<td>No</td>
</tr>
<tr>
<td>Interviewer bias</td>
<td>No</td>
<td>Some</td>
<td>Worse</td>
<td>No</td>
</tr>
<tr>
<td>Respondent’s reading skill</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Some</td>
</tr>
</tbody>
</table>

Source: Neuman (2006, p. 300)

Of the different types of surveys, the face-to-face interview yields the highest response rate and allows the researcher to use physical stimuli to facilitate the interviews and clarify the meanings of ambiguous or complex questions. However, the interference of interviewers may cause bias. Moreover, as this study focuses on senior executives of Vietnamese enterprises covering a wide geographic area in the two biggest cities of Vietnam, Hanoi and Ho Chi Minh City, personal interviews are hardly feasible due to their high cost, speed constraints and the difficulty of accessing this kind of respondent who are usually time limited.
Although the telephone survey appears to be less expensive and may overcome the time and speed disadvantages of the face to face method, it is questionable whether respondents would be willing to reveal information over the phone to a stranger. In addition, a long questionnaire would be a problem due to the limited length of time available to spend on a call (Zikmund 2000). It might be also difficult to reach the right respondents over the phone.

It has been suggested that electronic or Internet survey (via e-mail or web-page) has some advantages compared to the above methods, and is considered to be the most cost-efficient and fastest data collection technique (Neuman 2006; Schaeffer & Dillman 1998; Summers et al. 2003) and, thus, the sample can be larger than others (Zikmund 2003). In addition, due to automatic data collection and direct data entry into a database, potential administrative errors are minimised (Brennan, Rae & Parackal 1999) and the real-time data capture also allows for real-time data analysis (Zikmund 2003). However, the biggest problem of the web-page survey is a possibility of unequal access and use of the Internet (Neuman 2006). In particular, some Vietnamese managers might not be familiar with the Internet access needed for online surveys and might also be concerned about the privacy and confidentiality issues of this method, thereby, worsening its low response rate. Another issue is that personal email addresses are not always readily available and therefore, it would be hard to access the right respondents (the same problem with phone interviews).

Similarly, the mail survey is a relatively inexpensive data collection method (Ilieva, Baron & Healey 2002) and is also suitable if the researcher wants to reach a widely geographically dispersed sample (Zikmund 2003). In addition, this method may yield more accurate results because respondents can answer the questionnaires at their discretion without the presence of interviewers. They can also consult with other staff for necessary information. More importantly, respondents can absolutely control their privacy and confidentiality by not disclosing their personal details on mailing questionnaires.

Based on the balance of various factors such as the costs involved, availability of time, accessibility of research facilities, the expertise of the researcher, the research objective, the availability and characteristics of respondents, the sample design and the complexity of the questionnaire (Ranchhod & Zhou 2001; Sekaran 2003; Skjak & Harkness 2003), this study
used a mail survey to conduct the research. Mail surveys are also considered to be the most popular data collection method in Vietnam. The study utilised the advantages of the mail survey method, including its low cost, its ability to reach a widely dispersed population in Hanoi and Ho Chi Minh City and, and its ability to allow senior executives, the survey respondents, to consult lower levels of management. In addition, the study was able to overcome the major weaknesses of this method, which are its slow return speed and a generally low response rate which can produce biases if non-responses are not randomly distributed. Details on this matter are presented in Section 3.7.2 which deals with the administration of the questionnaire.

The research design process for this study follows a three-stage approach, including: (1) questionnaire design, (2) the pilot survey, and (3) the main survey. This process is described in Figure 3.2. The next sections will explain each stage of the process.
Figure 3.2 – Research Design Process

CFA: Confirmatory factor analysis
SEM: Structural equation modeling
3.5 QUESTIONNAIRE DESIGN

The first step in the research design process involved the design and development of the questionnaire. The main task was to generate and operationalise measurement items based on the findings of the literature review in order to measure the constructs in the proposed theoretical model.

3.5.1 Operationalisation of Measures

All eleven constructs of the theoretical model are latent constructs among which social KM infrastructure capability (identified by the three dimensions of structure, culture, and people) and KM process capability (identified by the four dimensions of knowledge acquisition, conversion, application, and protection processes) were deemed to be second-order latent constructs, derived from social KM infrastructure and KM process sub-dimensions, respectively.

Nine first-order latent constructs were measured by multi-items to improve the reliability and validity of the measures with a seven-point Likert-type scale anchored by 1 (strongly disagree) and 7 (strongly agree) to provide the advantage of standardising and quantifying relative effects. In addition, Hair et al. (2006) suggest that due to the identification issue each construct should be measured by at least three indicators. The following section discusses the item measures for each variable of interest, seven of which (including structure, culture, information technology, acquisition, conversion, application, and protection) are based on the work of Gold, Malhotra and Segars (2001) and Smith (2006), while the variable of people (or T-shaped skills) is adapted from Lee and Choi (2003) and competitive advantage from Chuang (2004), leading to a list of 50 candidate measurement items.

3.5.1.1 Measuring Information Technology (Technical KM Infrastructure Capability)

Technology refers to the systems of the firm that allow the capture, flow, access and use of knowledge through the enterprise (Smith 2006, p. 49). The technical systems within an organisation determine how knowledge travels throughout the enterprise and how knowledge is accessed (Leonard-Barton 1995). Based on numerous aspects of technological infrastructure that are part of effective KM within an organisation, including business intelligence,
collaboration, knowledge discovery, knowledge mapping, knowledge application, and opportunity generation technologies generated through literature, Gold, Malhotra and Segars (2001) developed a twelve-item measure of this construct which was refined by Chuang (2004) and Smith (2006) in different contexts. Smith (2006)’s measure of the information technology variable is adopted in the current study (presented in Table 3.4).

**Table 3.4 – Item Measures of Information Technology**

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>TI1</td>
<td><em>My organisation uses technology that allows …</em>… employees to collaborate with other persons inside the organisation</td>
</tr>
<tr>
<td>TI2</td>
<td>… people in multiple locations to learn as a group from a single source or at a single point in time</td>
</tr>
<tr>
<td>TI3</td>
<td>… people in multiple locations to learn as a group from a multiple source or at multiple points in time</td>
</tr>
<tr>
<td>TI4</td>
<td>… it to map the location (e.g. an individual, specific system, or database) of specific types of knowledge</td>
</tr>
</tbody>
</table>

Source: Smith (2006, p.49)

### 3.5.1.2 Measuring Organisational Structure

Organisational structure is defined as ‘the rules, policies, procedures, hierarchy of reporting relationships, incentive systems, and departmental boundaries that organise tasks within the firm’ (Gold, Malhotra & Segars 2001, p. 198). Based on the formal organisational structure and incentive systems that make up an organisation’s overall KM structure, Gold, Malhotra and Segars (2001) developed a twelve-item measure of this construct which was refined by Chuang (2004) and Smith (2006) in different contexts. Smith (2006)’s measure of the organisational structure variable is used in the current study (presented in Table 3.5).
Table 3.5 – Item Measures of Organisational Structure

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>My organisation (’s) …</em></td>
</tr>
<tr>
<td>SI1</td>
<td>… structure facilitates the discovery of new knowledge</td>
</tr>
<tr>
<td>SI2</td>
<td>… structure facilitates the creation of new knowledge</td>
</tr>
<tr>
<td>SI3</td>
<td>… bases our performance on knowledge creation</td>
</tr>
<tr>
<td>SI4</td>
<td>… has a standardised reward system for sharing knowledge</td>
</tr>
<tr>
<td>SI5</td>
<td>… designs processes to facilitate knowledge exchange across functional boundaries</td>
</tr>
<tr>
<td>SI6</td>
<td>… managers frequently examine knowledge for errors/mistakes</td>
</tr>
<tr>
<td>SI7</td>
<td>… structure facilitates the transfer of new knowledge across structural boundaries</td>
</tr>
</tbody>
</table>

Source: Smith (2006, p.50)

3.5.1.3 Measuring Organisational Culture

The most significant hurdle to effective KM is organisational culture (Gold, Malhotra & Segars 2001) which is defined as ‘the shared values, beliefs and practices of the people in the organisation’ (McDermott & O'Dell 2001, p.77). Relying on the important components of organisational culture, including employee interaction, corporate vision, and senior management support, Gold, Malhotra and Segars (2001) developed a thirteen-item measure of this construct which was refined by Chuang (2004) and Smith (2006) in different contexts. Smith (2006)’s six measure items of the organisational culture variable are adopted in the current study (presented in Table 3.6).
Table 3.6 – Item Measures of Organisational Culture

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI1</td>
<td>In my organisation, … employees understand the importance of knowledge to corporate success</td>
</tr>
<tr>
<td>CI2</td>
<td>… high levels of participation are expected in capturing and transferring knowledge</td>
</tr>
<tr>
<td>CI3</td>
<td>… on-the-job training and learning are valued</td>
</tr>
<tr>
<td>CI4</td>
<td>… overall organisational vision is clearly stated</td>
</tr>
<tr>
<td>CI5</td>
<td>… overall organisational objectives are clearly stated</td>
</tr>
<tr>
<td>CI6</td>
<td>… senior management clearly supports the role of knowledge in our firm’s success</td>
</tr>
</tbody>
</table>

Source: Smith (2006, p.51)

3.5.1.4 Measuring People (T-shaped skills)

While the effect of human resources on creating organisational knowledge has been the main focus of many studies (Chuang 2004), this study relies on task-shaped skills of employees which imply the degree of understanding by workers of their own and others’ task areas (Lee & Choi 2003) that are both deep (the vertical part of the ‘T’) and broad (the horizontal part of the ‘T’) (Leonard-Barton 1995). The operationalisation of this construct was developed by Lee and Choi (2003), followed by Chuang (2004) and Migdadi (2005) and has been adopted in the current study to access knowledge domains of employees and their various applications in particular products (presented in Table 3.7).

Table 3.7 – Item Measures of People (T-shaped Skills)

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI1</td>
<td>My organisation’s members … can understand not only their own tasks but also others’ tasks</td>
</tr>
<tr>
<td>PI2</td>
<td>… can make suggestions about others’ tasks</td>
</tr>
<tr>
<td>PI3</td>
<td>… can communicate well not only with their department members but also with other department members</td>
</tr>
</tbody>
</table>
Table 3.7 (Cont.) – Item Measures of People (T-shaped Skills)

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>My organisation’s members</em> …</td>
</tr>
<tr>
<td>PI4</td>
<td>… are specialists in their own field of expertise</td>
</tr>
<tr>
<td>PI5</td>
<td>… can perform their own task effectively without regard to environmental changes</td>
</tr>
</tbody>
</table>

Source: Lee and Choi (2003, p.224)

3.5.1.5 Measuring the KM Acquisition Process

Knowledge acquisition refers to the ability to seek and acquire entirely new knowledge or create new knowledge from existing knowledge through collaboration (Inkpen 1996). This study adopts the six measure items of this construct from Smith (2006) who refined Gold, Malhotra and Segars (2001)’s scale measurement in the context of a developing country (presented in Table 3.8):

Table 3.8 – Item Measures of Acquisition Process

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>My organisation</em> …</td>
</tr>
<tr>
<td>ACP1</td>
<td>… has processes for acquiring knowledge about our customers</td>
</tr>
<tr>
<td>ACP2</td>
<td>… has processes for generating new knowledge from existing knowledge</td>
</tr>
<tr>
<td>ACP3</td>
<td>… has processes for acquiring knowledge about our suppliers</td>
</tr>
<tr>
<td>ACP4</td>
<td>… has processes for distributing knowledge throughout the organisation</td>
</tr>
<tr>
<td>ACP5</td>
<td>… has processes for acquiring knowledge about new products/services within our industry</td>
</tr>
<tr>
<td>ACP6</td>
<td>… has processes for exchanging knowledge between individuals</td>
</tr>
</tbody>
</table>

Source: Smith (2006, p.52)
3.5.1.6 Measuring KM Conversion Process

An organisation must have the ability to make knowledge useful (i.e. to convert it into a useful form) (Gold, Malhotra & Segars 2001). Based on numerous aspects of this process – characteristics such as a capacity to organise, structure, access, combine, integrate, coordinate and convert knowledge into a useful form, Gold, Malhotra and Segars (2001) developed the scale measurement of this construct which was refined by Smith (2006) in the context of a developing country. The refined six measure items of the KM conversion process variable are adopted in this study (presented in Table 3.9).

Table 3.9 – Item Measures of Conversion Process

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP1</td>
<td>… has processes for filtering knowledge</td>
</tr>
<tr>
<td>CP2</td>
<td>… has processes for transferring organisational knowledge to individuals</td>
</tr>
<tr>
<td>CP3</td>
<td>… has processes for absorbing knowledge from individuals into the organisation</td>
</tr>
<tr>
<td>CP4</td>
<td>… has processes for integrating different sources and types of knowledge</td>
</tr>
<tr>
<td>CP5</td>
<td>… has processes for organising (storing/filing) knowledge</td>
</tr>
<tr>
<td>CP6</td>
<td>… has processes for replacing outdated knowledge</td>
</tr>
</tbody>
</table>

Source: Smith (2006, p.53)

3.5.1.7 Measuring KM Application Process

Knowledge application process within an organisation refers to how knowledge is used and applied (Gold, Malhotra & Segars 2001) which involves a variety of characteristics such as storage, retrieval, application, contribution, and sharing (Almeida 1996; Appleyard 1996). Adapted from Gold, Malhotra and Segars (2001)’s scale measurement, Smith (2006) refined the measure of this construct with seven items that is used in this study (as shown in Table 3.10).
Table 3.10 – Item Measures of Application Process

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>APP1</td>
<td>… has processes for using knowledge in development of new products/services</td>
</tr>
<tr>
<td>APP2</td>
<td>… has processes for using knowledge to solve new problems</td>
</tr>
<tr>
<td>APP3</td>
<td>… matches sources of knowledge to problems and challenges</td>
</tr>
<tr>
<td>APP4</td>
<td>… uses knowledge to improve efficiency</td>
</tr>
<tr>
<td>APP5</td>
<td>… uses knowledge to adjust strategic direction</td>
</tr>
<tr>
<td>APP6</td>
<td>… is able to locate and apply knowledge to changing competitive conditions</td>
</tr>
<tr>
<td>APP7</td>
<td>… takes advantage of new knowledge</td>
</tr>
</tbody>
</table>

Source: Smith (2006, p.53)

3.5.1.8 Measuring the KM Protection Process

Knowledge protection processes aim to secure knowledge against inappropriate or illegal use or from theft (Gold, Malhotra & Segars 2001) which is especially important if the knowledge is used for creating and preserving CA within the firm (Porter-Liebskind 1996). Adopting the scale developed by Gold, Malhotra and Segars (2001) and Smith (2006), this study measures KM protection processes with seven items indicated in Table 3.11.

Table 3.11 – Item Measures of Protection Process

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP1</td>
<td>… has processes to protect knowledge from inappropriate use inside the organisation</td>
</tr>
<tr>
<td>PP2</td>
<td>… has processes to protect knowledge from inappropriate use outside the organisation</td>
</tr>
<tr>
<td>PP3</td>
<td>… has processes to protect knowledge from theft from within the organisation</td>
</tr>
<tr>
<td>PP4</td>
<td>… has processes to protect knowledge from theft from outside the organisation</td>
</tr>
<tr>
<td>PP5</td>
<td>… has extensive polices and procedures for protecting trade secrets</td>
</tr>
</tbody>
</table>
Table 3.1 (Cont.) – Item Measures of Protection Process

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP6</td>
<td>... values and protects knowledge embedded in individuals</td>
</tr>
<tr>
<td>PP7</td>
<td>... clearly communicates the importance of protecting knowledge</td>
</tr>
</tbody>
</table>

Source: Smith (2006, p.54)

3.5.1.9 Measuring Competitive Advantage

Competitive advantage is considered the objective of strategy (Porter 1985) and is described as the unique position that an organisation develops over its competitors by employing its resources (Hofer & Schendel 1978). Using multi-dimensions of the construct defined by Byrd and Turner (2001), including innovativeness, market position, mass customisation, and difficulty in duplicating, Chuang (2004) developed a scale to measure a firm’s CA which is adopted in this study (presented in Table 3.12).

Table 3.12 – Item Measures of Competitive Advantage

<table>
<thead>
<tr>
<th>Item code</th>
<th>Item wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA1</td>
<td>My organisation often uses knowledge-based innovation</td>
</tr>
<tr>
<td>CA2</td>
<td>My organisation’s market position can provide strong barriers to entry for other firms</td>
</tr>
<tr>
<td>CA3</td>
<td>My organisation uses knowledge management to widen the array of products without increasing costs</td>
</tr>
<tr>
<td>CA4</td>
<td>The knowledge management capability in the organisation would be difficult and expensive for rivals to duplicate</td>
</tr>
</tbody>
</table>

Source: Chuang (2004, p.462)
3.5.2 Preparation of Draft Questionnaire

Principles and guidelines of good questionnaire design were followed to avoid potential biases and improve the accuracy and validity of the collected data. In terms of the content and length of the questionnaire, apart from those questions required for measuring relevant variables in the theoretical model, only a brief section of demographic information was included. Sensitive questions such as income and revenue were avoided.

With respect to the wording and language used, the questionnaire was initially designed in English. As English is not a commonly used language in Vietnam and the research issue was relatively new and complex in this market place, the original English version was translated into Vietnamese by one translator which was then translated back into English by another translator. These two translators are fluent in both languages. The original and back-translated English versions of the questionnaire were then compared with each other to ensure the equivalence of the meanings of questions, and were revised where necessary (Craig & Douglas 2000).

The structure of the questionnaire was also made as clear as possible (Bourque & Fielder 1995). In particular, it started by clearly indicating the two main sections of the survey and providing the definitions and explanation of the key terms used in the survey. Section one consisted of all main questions in Likert-type scales. Questions that addressed the same subject were grouped together. In section two, respondents were asked about their personal details and information about the company which they represented.

Lastly, the English version of the draft questionnaire was reviewed by a methodology expert and experienced researchers at Southern Cross University while the Vietnamese version was reviewed by a Vietnamese methodology expert at Economics University, Ho Chi Minh City.

3.6 PILOT SURVEY

After being developed, the draft questionnaire should be pre-tested. The main purpose of conducting a pilot study is to detect and remedy any possible errors in questionnaire design prior to administering the main survey (Cavana, Delahaye & Sekaran 2001; Diamantopolos & Winklhofer 2001; Litwin 1995; Malhotra 2004; Polit, Beck & Hungler 2005) and typically, to
refine and revise the questionnaire to help ensure the validity and reliability of the measures, as well as making it more user-friendly (Flynn et al. 1990). In addition, the pre-test can also be used to estimate response rates for the questionnaire and determine the sample size of the main study. Thus, the pilot study is widely recognised as an indispensable part of the development of survey instruments (Green, Tull & Albaum 1988). Van Teijlingen and Hundley (2002, p. 35) summarise the main reasons why a pilot study is important. These reasons are presented in Table 3.13.

**Table 3.13 – Reasons for Conducting a Pilot Study**

- Developing and testing adequacy of research instruments
- Assessing the feasibility of a (full-scale) study/survey
- Designing a research protocol
- Assessing whether the research protocol is realistic and workable
- Establishing whether the sampling frame and technique are effective
- Assessing the likely success of proposed recruitment approaches
- Identifying logistical problems which might occur using proposed methods
- Estimating variability in outcomes to help determining sample sizes
- Collecting preliminary data
- Determining what resources (finance, staff) are needed for a planned study
- Assessing the proposed data analysis techniques to uncover potential problems
- Developing a research question and research plan
- Training a researcher in as many elements of the research process as possible
- Convincing funding bodies that the research team is competent and knowledgeable
- Convincing funding bodies that the main study is feasible and worth funding
- Convincing other stakeholders that the main study is worth supporting

Source: Van Teijlingen and Hundley (2002, p. 35)

In regard to SEM analysis, Hair et al. (2006) emphasise that pretesting is particularly important when measures are taken from various sources and applied in specific contexts. The
measurement scales of constructs in this study were originally developed in the context of advanced developed or newly industrialised countries viewed from a large company perspective. Therefore, some type of pretest needed to be performed to revise the measures in the context of Vietnam, an emerging economy where a majority of enterprises are SMEs.

In terms of a pilot sample, Hunt, Parkman and Wilcox (1982) and Green, Tull and Albaum (1988) share the opinion that pre-test subjects should be as similar as possible to the final group, representative but with extreme as well as typical respondents, or more succinctly, should mirror the composition of the main survey. However, convenience sampling is also often used to generate a sample for the pilot study (Calder, Philips & Tybout 1981) with a recommended sample size of between 12 and 30 (Hunt, Parkman & Wilcox 1982) or between 25 and 100 (Emory & Cooper 1991). Thus, in this pilot survey, assuming a response rate of between 20–30%, 600 draft questionnaires were directly distributed to senior managers participating in a national exhibition of construction firms in Ho Chi Minh City, Vietnam.

To provide a preliminary evaluation and refinement of the measurement scales of the draft questionnaire, item-total correlations and principal component analysis (hereafter referred to as PCA) were applied to check the construct validity and coefficient alpha was calculated to assess the reliability of composite variables. SPSS software version 15.0 was employed to conduct these analyses.

The validity of a measure is ‘the degree to which it measures what it claims to measure’ (Manning & Munro 2006, p. 25). If a composite variable really does represent a single underlying property (or ‘concept’) the component items will be homogenous (also referred to as internally consistent). Gregory (2000, p. 108) reports that the most common approach to estimate the homogeneity of a composite variable is to correlate every component item with the composite variable made up by adding the components together. This measure of homogeneity is referred to as the item-to-total correlation (or item-total correlation). The rationale is that if each item is measuring the same thing as the total, then the scale will be homogenous or internally consistent. Rules of thumb suggest that the item-to-total correlations should exceed 0.50 (Hair et al. 2006) or 0.30 (Nunnally 1978). As a result, all items found to display correlations lower than the respective criteria should be deleted.
A more sophisticated way of checking the homogeneity of a scale is to run a PCA, a type of factor analysis which can be used to ‘summarise the relationships between variables displayed in a correlation matrix’ (Manning & Munro 2006, p. 159). If the items are measuring a single underlying concept, PCA should extract only one underlying component with eigenvalues greater than 1.0. It is suggested that items with absolute values of component loadings greater than 0.50 (Hair et al. 2006) or 0.40 (Gerbing & Anderson 1988) provide better measures of the underlying construct and, thus, all items with component loadings lower than this value should be deleted from the measurement instrument. If a PCA extracts more than one component with eigenvalues greater than 1.0, the scree plot would typically be used to further reduce the number of components from the number that might be accepted on the basis of eigenvalues. Varimax rotation would then be performed to interpret the meaning of theoretical underlying components (or ‘dimensions’ or ‘factors’) produced by PCA (Hair et al. 2006; Manning & Munro 2006).

Different from validity, the reliability of a measure is the consistency of the results each time the same thing is measured using Coefficient (or Cronbach’s) alpha (Hair et al. 2006). Coefficient alpha is ‘an index of the internal consistency of the items’ and also ‘a useful estimate of reliability’ (Gregory 2000, p. 85). Reliability will be high if the scale items are highly correlated. As a standard of reliability, values of coefficient alpha above 0.70 are considered to represent acceptable reliability, those above 0.80 to represent good reliability, and those above 0.90 to represent excellent reliability. However, in the early stages of a study or in exploratory research, a lower acceptable limit of 0.60 may be used (Hair et al. 2006; Nunnally 1978).

3.7 MAIN SURVEY

Following the pilot study and its findings, the draft questionnaire was revised, finalised and administered in the main survey. This section deals with the process of main survey sampling and questionnaire administration.
3.7.1 SAMPLE DESIGN

Adopted from Zikmund (2003), the sampling process mainly involves defining the target population, identifying the sampling frame, selecting a sampling method, determining the sample size, and selecting the sample elements.

(1) Defining the target population

The target population is the complete group of the specific population elements relevant to the research project (Zikmund 2003). Population is defined as ‘the complete set of units of analysis that are under investigation while element is the unit from which the necessary data is collected’ (Davis 2000, p. 220). This study conducted an empirical test in the context of Vietnam to examine the relationships between KM capability and CA of the firm. The target population, therefore, included senior management of Vietnamese enterprises across different industries located in Hanoi and Ho Chi Minh City, the two major economic and commercial centers of Vietnam.

(2) Identifying the sampling frame

A sampling frame is the list of population elements from which the sample may be drawn in order to represent the target population (Davis 2004; Dillman 2000; Zikmund 2003). It is also known as the working sample. In this study, the sampling frame was based on the list of all enterprises located in Hanoi and Ho Chi Minh City selected from the Business Directory issued by the Vietnamese Chamber of Commerce and Industry (VCCI). This is the best commercial database available with most of Vietnam’s businesses updated and included.

(3) Selecting the sampling method

There are two major techniques of sampling: probability sampling and non-probability sampling (Zikmund 2003). In probability sampling, the elements in the population have some known chance or probability of being selected as sample subjects, while in non-probability sampling the elements do not have a known or predetermined chance of being selected as subjects.
In this study, the probability method was chosen due to its universal acceptance and the high generalisability of results based on the availability of the sampling frame. Among a variety of probability sampling methods, consisting of simple random, systematic, stratified, cluster, and multistage area sampling, stratified sampling was chosen to select the sample elements in this study because: (1) it enabled a more efficient sample to be selected than could be chosen on the basis of simple random sampling; and (2) it ensured that the sample accurately reflected the population on the basis of the criterion or criteria used for stratification (Zikmund 2003). Stratified sampling is a modification of simple random and systematic sampling designed to produce more representative and, thus, more accurate samples (DeVaus 2002).

In particular, the enterprises in Hanoi and Ho Chi Minh City were divided into districts. The number of enterprises selected from each district was proportional to the number of enterprises located in that district.

(4) Determining the sample size

Based on large-sample distribution theory, SEM analysis requires a large sample in order to obtain reliable estimates (Joreskog & Sorbom 1996; Raykov & Widaman 1995). While the issue of how large a sample should be has not been entirely resolved (Hair et al. 2006), it does depend on the statistical methods used. However, Hair et al. recommend that the ratio of sample size to the number of indicators should be at least 5:1 for use of SEM. As a result, based on the number of items in the structural model and the conservatively assumed response rate of 20–30%, a sample of 1,000 respondents was selected using stratified sampling method for the main survey.

(5) Selecting the sample elements

The last stage in the process of sampling is to select actual sample units before conducting fieldwork (Zikmund 2003). This involves the enumeration and designation of specific units of analysis for data collection (Davis 2004).
In this study, based on the list of enterprises located in Hanoi and Ho Chi Minh City derived from the Business Directory issued by the VCCI and using the Directory’s division of the two cities into districts, the sample elements were 1,000 firms selected.

The use of key informants from organisations for data collection has been a popular and effective approach in a wide range of research contexts (Huber & Power 1985). These respondents are usually in the senior ranks of the organisation and are knowledgeable about the organisation and its strategy. For the purpose of this study, the key informants needed to be those who had a good understanding of their organisation’s KM infrastructure and process capabilities as well as its CA. Thus, the ideal respondents for this study were senior executives (such as chief executive officer, vice president, or chief knowledge officer) similar to those targeted in studies of strategic management.

3.7.2 QUESTIONNAIRE ADMINISTRATION

To administer the questionnaire in this study, the mail survey technique was adopted as justified in Section 3.4. In order to deal with several disadvantages of this method, the study applied the following process to conduct the mail survey effectively.

First, to address the risk of a low response rate, participants were initially contacted by email or phone and only those who showed a willingness to cooperate were sent an invitation letter to participate. A participant information sheet and questionnaire (presented in Appendices 2a, 2b, 3a, 3b) was sent with the invitation. The information sheet included the university’s official logo, a description of the background of the study and a request for the potential participants to participate in the study. A letter of introduction from the VCCI was included to convey the reliability and importance of the project study. This letter emphasised the study’s contribution to the long-term strategic development direction of Vietnamese enterprises in the New Economy.

The incentive for participants was the promise to send them a summary of the results of the study in return for their completion of the questionnaire. A pre-paid, addressed envelope was also enclosed for return of the completed questionnaire. Additionally, emphasis was placed on
the protection of respondents’ privacy, the confidentiality and voluntary nature of the study, and the proposed use of the survey results.

Furthermore, to achieve a high response rate and speed of return, follow-up reminders by mail and telephone were sent after pre-determined periods of time: a postcard and phone call follow-up two weeks after the initial mailing, confirming the receipt of the questionnaire and reminding the potential respondent to do the survey; a replacement questionnaire package five weeks after the initial mailing, informing the potential respondent that the initial questionnaire had not been received and placing more emphasis on the importance of completing and returning the questionnaire (reminder letter presented in Appendices 4a, 4b); a phone call follow-up seven weeks following the first mail, politely reminding them to complete and return the questionnaire.

3.8 DATA ANALYSIS TECHNIQUES

After data collection was completed, data analysis strategies were applied to analyse the collected data. The forms were firstly checked for the accuracy of data entry and for missing values. Descriptive statistics analyses were next conducted to provide an overview of the sample, summarising demographic details of the participating organisations and respondents. The data were then checked for distribution of variables, using SPSS software version 15.0.

Finally, SEM utilising AMOS software version 6.0 was employed to test the theoretical model. Hair et al. (2006) state that SEM is an extension or a unique combination of several multivariate techniques such as multiple regression analysis and factor analysis. Thus, SEM allows the researcher to assess the contribution of each scale item, incorporate how well the scale measures the concept and estimate the relationship between the independent and dependent variables (Sanchez et al. 2005).

Sanchez et al. (2005, p. 1443) define structural equation models as ‘a flexible class of models that allow complex modeling of multivariate data’. With the same point of view, Hair et al. (2006, p. 710) emphasise that SEM is ‘the most efficient approach to simultaneously examine a series of inter-related dependence relationships among the measured variables and latent constructs as well as between several latent constructs’. The authors further distinguish
structural equation models according to three major characteristics: (1) whether they allow the simultaneous estimation of multiple and inter-related dependence relationships; (2) their ability to represent unobserved concepts in these relationships and correct for measurement error in the estimation process, and (3) the model’s ability to explain the entire set of relationships.

SEM has become an extremely popular and powerful multivariate technique in the social sciences due to its performance according to these criteria and, therefore, SEM was the analytical tool used to address the research questions and hypotheses in this study.

Anderson and Gerbing (1988) and Hair et al. (2006) suggest there are two major steps in a complete SEM analysis. With a specified measurement model, the first major step is to assess or confirm its validity by assessing the goodness-of-fit of the measurement model and testing for specific evidence of construct validity. This is where CFA is used to provide a confirmatory test of the measurement theory that specifies a series of relationships suggesting how sets of measured variables represent a set of latent constructs. When a CFA model exhibits goodness-of-fit and displays construct validity, the validity of the measurement theory is supported. This is the prerequisite for the structural theory testing, the second step in SEM (Hair et al. 2006). The fit statistics of the overall structural model are assessed and the individual parameter estimates are examined to test the hypothesised theoretical relationships. The following subsections present more details relating to these steps.

3.8.1 Goodness-of-Fit Assessment

Goodness-of-fit (hereafter referred to GOF) indicates ‘how well the specified model reproduces the covariance matrix among the indicator items’ (Hair et al. 2006, p. 745). Chi-square ($\chi^2$) is the fundamental measure of fit used in SEM to quantify the differences between the observed and estimated covariance matrices. In addition, there are a number of alternative GOF measures, including (1) absolute fit indices, (2) incremental fit indices, and (3) parsimonious fit indices (Hair et al. 2006).
3.8.1.1 Absolute Fit Measures

Absolute fit indices are a direct measure of how well the model specified by the researcher reproduces the observed data (Kenny & McCoach 2003). The most important absolute fit indices are the Chi-square ($\chi^2$) statistic, the goodness-of-fit index (GFI), the root means square residual (RMSR), the standardised root mean residual (SRMR), the root mean square error of approximation (RMSEA), normed Chi-square, the expected cross-validation index (ECVI), the actual cross-validation index (CVI), and Gamma Hat. These indices and their characteristics are summarised in Table 3.14 below.

### Table 3.14 – Absolute Fit Indices

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Acceptable level</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Chi-square statistic           | $\chi^2$    | p>0.05 (insignificant)  
                               |               | p<0.05 (N>250, m>12)  | Sensitive to sample size and model complexity. Likely to be greater when sample size or the number of observed variables increases even if the difference between the observed and estimated covariance matrices are identical. |
| Goodness of fit index          | GFI          | > 0.90 (N>250, m>30) 
                               |               | >0.95 (N>250, m<12)  | Less sensitive to sample size. Range of values is 0 (poor fit) to 1 (perfect fit). Higher values indicate better fit. No absolute threshold level for acceptability. |
| Root mean square residual      | RMSR         | Set by researcher, difficult to compare | An average of the residuals between individual observed and estimated covariance and variance terms. Lower values represent better fit (badness-of-fit measures) |
| Standardised root mean residual| SRMR         | <0.08 (m>12) Biased (m<12) | A standardised value of root mean square residual (RMSR). No statistical threshold level for acceptability. |
Table 3.14 (Cont.) – Absolute Fit Indices

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Acceptable level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root mean square error of approximation</td>
<td>RMSEA</td>
<td>Between 0.03 and 0.08</td>
<td>Used to correct the impact of sample size or model complexity on $\chi^2$. Lower values indicate better fit (badness-of-fit measures). Values over 0.10 indicate poor fit.</td>
</tr>
<tr>
<td>Normed Chi-square</td>
<td>Normed $\chi^2$</td>
<td>3:1 or less</td>
<td>A simple ratio of $\chi^2$ to the degrees of freedom for a model.</td>
</tr>
<tr>
<td>Expected cross validation index</td>
<td>ECVI</td>
<td>Not applicable</td>
<td>An approximation of the GOF the estimated model would achieve in another sample of the same size. More useful in comparing the performance of one model to another.</td>
</tr>
<tr>
<td>Actual cross-validation index</td>
<td>CVI</td>
<td>Not applicable</td>
<td>Using the computed covariance matrix derived from a model in one sample to predict the observed covariance matrix taken from a validation sample.</td>
</tr>
<tr>
<td>Gamma Hat</td>
<td></td>
<td>Between 0.9 and 1.0</td>
<td>Used to correct the impact of sample size or model complexity on $\chi^2$.</td>
</tr>
</tbody>
</table>

Source: Hair et al. (2006)

3.8.1.2 Incremental Fit Measures

Incremental fit indices (sometimes referred to as comparative fit indices) differ from absolute fit indices in that ‘they assess how well a specified model fits relative to some alternative baseline model’ (Hair et al. 2006, p. 749). The most common baseline model is referred to as a null model assuming that all observed variables are uncorrelated. Normed fit index (NIF), comparative fit index (CFI), the Tucker Lewis index (TLI), and the relative non-centrality index (RNI) represent the most widely applied incremental fit statistics (Hu & Bentler 1999). A summary of these fit indices and their characteristics is displayed in Table 3.15 below.
Table 3.15 – Incremental Fit Indices

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Acceptable level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normed fit index</td>
<td>NFI</td>
<td>&gt;0.90 (N&gt;250, m&gt;30)</td>
<td>A ratio of the difference in the $\chi^2$ value for the fitted model and a null model divided by the $\chi^2$ value for the null model. Range of values is 0 (poor fit) to 1 (perfect fit).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;0.95 (N&gt;250, m&lt;12)</td>
<td></td>
</tr>
<tr>
<td>Comparative fit index</td>
<td>CFI</td>
<td>&gt;0.90 (N&gt;250, m&gt;30)</td>
<td>An improved version of NFI. Relatively insensitive to model complexity. Values range between 0 (poor fit) and 1 (perfect fit). Higher values indicate better fit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;0.95 (N&gt;250, m&lt;12)</td>
<td></td>
</tr>
<tr>
<td>Tucker Lewis index</td>
<td>TLI</td>
<td>&gt;0.90 (N&gt;250, m&gt;30)</td>
<td>Values can fall below 0 and above 1. Higher values suggest a better fit. Conceptually similar with CFI and so provide very similar values.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;0.95 (N&gt;250, m&lt;12)</td>
<td></td>
</tr>
<tr>
<td>Relative non-centrality index</td>
<td>RNI</td>
<td>&gt;0.90 (N&gt;250, m&gt;30)</td>
<td>Values range between 0 (poor fit) and 1 (perfect fit). Higher values represent better fit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;0.95 (N&gt;250, m&lt;12)</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Hair et al. (2006)

### 3.8.1.3 Parsimony Fit Measures

The last type of fit measure is known as parsimonious fit indices which are ‘designed specifically to provide information about which model among a set of competing models is best, considering its fit relative to its complexity’ (Hair et al. 2006, p. 749). The most widely applied parsimony fit indices include the parsimonious goodness-of-fit index (PGFI) and the parsimonious normed fit index (PNFI). Table 3.16 below describes the level of fit of the
model with parsimonious fit measures. Note that the parsimony ratio of any model forms the basis for these measures and is calculated as the ratio of degrees of freedom used by a model to the total degrees of freedom available (Marsh & Balla 1994).

**Table 3.16 – Parsimonious Fit Indices**

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Acceptable level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parsimonious goodness of fit index</td>
<td>PGFI</td>
<td>Not applicable</td>
<td>Adjusts GFI by using the parsimony ratio. Values range between 0 and 1. Used in comparing one model to another.</td>
</tr>
<tr>
<td>Parsimonious normed fit index</td>
<td>PNFI</td>
<td>Not applicable</td>
<td>Adjusts NFI by multiplying it times the parsimony ratio. Higher values represent better fit. Used in comparing one model to another.</td>
</tr>
</tbody>
</table>

*Source: Hair et al. (2006)*

Hair et al. (2006) advocate the use of multiple fit indices of differing types coupled with adjusting the index cutoff values based on model characteristics, including sample size and model complexity, determine the acceptability of fit for a given model. Specifically, in addition to the Chi-square value and the associated degrees of freedom, at least one incremental index and one absolute index need to be reported and at least one of the indices should be a badness-of-fit index. The authors also suggest that an approach reporting the Chi-square value and degrees of freedom, the CFI (Comparative Fit Index), and the RMSEA (Root Mean Square of Approximation) often provides sufficient unique information to evaluate a model. Therefore, this set of fit indices was used to provide evidence of model fit in this study.

The CFI, an incremental fit index which is relatively insensitive to model complexity, and the GFI (Goodness-of-Fit index), an absolute fit measure which is less sensitive to sample size, have a range of values between 0 (no fit) to 1 (perfect fit) with higher values indicating better
fit (Hair et al. 2006). In contrast, the RMSEA, also an absolute fit measure, is known as a
badness-of-fit index in which higher values are indicative of worse fits. RMSEA indicates
how well a model fits a population, not just a sample used for estimation, and explicitly
attempts to correct for both model complexity and sample size by including each in its
computation. Typically, values of RMSEA are below 0.10 for most acceptable models (Hair et
al. 2006).

3.8.2 Unidimensionality and Construct Validity

When unidimensional measures are used, a set of measured variables (indicators) has only one
underlying latent construct (Hair et al. 2006). Gerbing and Anderson (1988) argue that there
are two types of relationships among variables that impact on unidimensionality. The first is
one in which the behaviour of a single measured variable is determined by more than one
construct. In other words, cross-loadings are not fixed at zero. Another form of relationship is
the covariance among error terms of two measured variables, including within-construct error
variance and between-construct error covariance. Hair et al. (2006) suggest that even if the
addition of these paths can improve the model fit, the researcher should not free or
hypothesise either type of path in CFA because doing so would violate the assumptions of
good measurement. The existence of these relationships is evidence of a lack of construct
validity.

According to Hair et al. (2006, p. 776), construct validity is ‘the extent to which a set of
measured items actually reflects the theoretical latent construct those items are designed to
measure’. Construct validity has three major important components: convergent validity,
discriminant validity, and face (or content) validity.

Convergent validity is ‘the extent to which indicators of a specific construct converge or share
a high proportion of variance in common’ (Hair et al. 2006, p. 771). CFA provides a range of
information used in evaluating the relative amount of convergent validity among item
measures such as factor loadings, variance extracted and construct reliability. Specifically,
adequate convergent validity can be achieved if (1) all factor loadings of the measurement
items are statistically significant and strong (0.5 or higher) (Gerbing & Anderson 1988; Hair
et al. 2006); (2) the average percentage of variance extracted among a set of construct items is
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high (0.5 or higher) (Fornell & Larcker 1981; Hair et al. 2006); and (3) the construct reliability value is acceptable (0.7 or higher) (Bacon, Sauer & Young 1995; Fornell & Larcker 1981; Hair et al. 2006).

According to Hair et al. (2006, p. 778), discriminant validity is ‘the extent to which a construct is truly distinct from other constructs’. It also means that individual measured items should represent only one latent construct and thus, the existence of significant cross-loadings show a lack of discriminant validity. Confirmatory factor analysis provides two common ways of assessing discriminant validity. Discriminant validity is adequate when: (1) the correlation between any two constructs is significantly different from unity with the cut-off value is 0.90 (Bagozzi, Philips & Yi 1991) and (2) the variance extracted percentages for any two constructs should be greater than the square of the correlation estimate between these two constructs (Bagozzi & Foxall 1996; Fornell & Larcker 1981; Gerbing & Anderson 1988). In addition to between-construct discriminant validity, Bagozzi and Foxall (1996) also mention within-construct discriminant validity which is the distinction between components of a construct.

The last component of construct validity is face (or content) validity. This refers to the content or meaning of every measurement item which must be established prior to any theoretical testing using CFA (Hair et al. 2006).

3.8.3 Structural Model Testing

After the measurement model is validated, the next step in SEM analysis is to test the validity of the structural model and its corresponding hypothesised relationships (Gerbing & Anderson 1988; Hair et al. 2006). First, the overall fit of the structural model is assessed using the same criteria as the measurement model. Next, the individual parameter estimates that represent each specific hypothesis are examined. If the model shows good fit and if the hypothesised paths are significant and in the direction hypothesised, then the structural model is supported.

3.9 ETHICAL CONSIDERATIONS

Ethical considerations play a critical role in the business research process (Beauchamp & Bowie 2004; Zikmund 2003). Since the object of inquiry in social research is human beings,
extreme care has been taken to avoid any harm to them (Fontana & Frey 1998). Possible forms of harm may include: physical harm, psychological abuse, stress, loss of self-esteem, legal jeopardy (Neuman 2006). In addition, other ethical issues need to be considered such as ensuring that: participation is voluntary, participants give informed consent, privacy is protected, confidentiality and anonymity are preserved, and no deception is involved in the research (Manning 2006).

In this study, all of these requirements were met. First, no risk or harm was involved in participating in the survey. Second, the respondents’ participation was completely voluntary and they were also free to withdraw their consent or discontinue participation at any time during the process without any consequence. Moreover, any information provided by respondents was protected and kept strictly anonymous, confidential, and private. Their names and other identifying information was not collected except some contact details if they wished to get a summary report of the research outcomes. The responses collected were analysed and presented as overall data and, thus, no individual responses were identified. The study was conducted as part of a doctoral program and will not be used for any other purposes.

All of this information including the purpose of the research was provided to potential participants prior to commencing the survey on the Participant Information Sheet. They were also informed of the ethics approval number ECN-07-116 for this research (presented in Appendices 1a, 1b) granted by the Southern Cross University Human Research Ethics Committee (SCU HREC).

3.10 CONCLUSION

This chapter provided a justification of the research methodology and details of the research design process used to empirically examine the theoretical model developed in the previous chapter. It focused on development and refinement of the questionnaire through two stages of questionnaire design and pilot study. Following an outline of the sample selection and the methods used for administration of the questionnaire in the main survey, data analysis techniques and ethical considerations were described. Based on this methodology chapter, the next chapter reports the results of collected data analysis.
CHAPTER FOUR: DATA ANALYSIS

4.1 INTRODUCTION

The previous chapter outlined the research methodology used for testing the theoretical model and research hypotheses developed in Chapter 2 and justified the use of this methodology. The research methodology design involved the operationalisation of eleven constructs and the research design of pilot and main studies. This chapter discusses the results of this process.

The questionnaire was pre-tested on approximately 150 senior executives using factor analysis and Cronbach alpha calculation to assess its validity and reliability. SPSS version 15.0 was employed to conduct these analyses. Based on the findings of this pilot survey, the questionnaire was finalised for the main study.

The next step was to analyse and interpret the data collected from the main survey preceded by data checking and cleaning and sample description using SPSS version 15.0. A two-step approach to SEM was then applied, including an assessment of the measurement model fit and of the construct validity prior to a testing of the structural model using AMOS version 6.0.

Four measurement models for the main constructs (technical KM infrastructure capability, social KM infrastructure capability, KM process capability, and competitive advantage) and the overall measurement model were determined via CFA, the oldest and best-known statistical procedure for investigating links between sets of observed and latent variables (Byrne 2001). The normal distribution of the data set was also examined for the purposes of the SEM. The last step was to develop the structural model for analysing the research questions and presenting the theoretical relationships which were tested through nine identified hypotheses. The structure of this chapter is shown in Figure 4.1.
Figure 4.1 – Chapter Outline

4.1 Introduction

4.2 Pilot study

4.3 Main study sample profile

4.4 Normality assessment

4.5 Measurement model development

4.6 Structural equation modeling

4.7 Conclusion
4.2 PILOT STUDY

As mentioned in Chapter 3, a pilot study was conducted to eliminate possible weaknesses and flaws in the draft questionnaire as well as to preliminarily examine the validity and reliability of relevant construct measures in a specific context, leading to the final questionnaire used in the main study. The questionnaire with the invitation letter were directly distributed to 600 potential respondents participating in a national exhibition of construction firms organised in Ho Chi Minh City, Vietnam. A total of 170 responses were returned, with an acceptable response rate of 28.3%. However, 22 out of the responses had missing data and were not included in the analysis. Accordingly, the data collected from 148 respondents were used to refine the construct measurement scales by assessing their validity and reliability. Item-total correlations and coefficient (Cronbach) alpha were calculated. Principal component analysis (PCA) was also conducted on the measurement items of each construct, followed by a varimax rotation when more than one factor was derived.

As mentioned in Chapter 3, items with low item-total correlations (less than 0.3) (Nunnally 1978) and low factor loadings (less than 0.4) (Gerbing & Anderson 1988; Hair et al. 2006) were deleted. Values of coefficient alpha above 0.7 are considered to be satisfactory and this minimum acceptable limit may be reduced to 0.6 in the early stages of research (Hair et al. 2006; Nunnally 1978).

Based on these criteria, the results of this pilot study (as depicted in Table 4.1) showed that all construct measurement scales had acceptable coefficient (Cronbach) alpha levels (above 0.6) and item-total correlations (above 0.3). The PCA for all composite variables except organisational culture and people (T-shaped skills) extracted only one underlying component with an eigenvalue greater than 1, explaining from 46.15% to 61.23% of the total variance in the original sets of variables and so unidimensionality was assumed. Moreover, all relevant items were found to display component loadings greater than the minimum level of 0.4. Consequently, the final measurement scales of seven constructs were then used in the main study. The measurement instruments advocated by Gold, Malhotra and Segars (2001) and Smith (2006) were used to assess six variables – information technology, organisational structure, acquisition process, conversion process, application process, and protection process.
The remaining variable, competitive advantage was assessed using a measure adapted from Chuang (2004).

In terms of organisational culture, two components accounting for 70.80% of the total variance were extracted with eigenvalues greater than 1. Four items (CI1, CI2, CI3, CI6) were found to display large loadings (from 0.58 to 0.82) on component one while the other two items (CI4, CI5) had heavy loadings (0.92 and 0.90, respectively) on component two. According to Manning and Munro (2006), if a component has less than four items loading onto it, it is often considered likely to be unreliable. The two items CI4 and CI5 were also deleted in Chuang’s (2004) study. In addition, a scree test suggested a one-component solution might be most appropriate for this dataset. Therefore, the six items were considered not to measure a single underlying construct and component two might represent something different to cultural KM infrastructure. From this pattern of results it was decided not to interpret component two and to recalculate the composite variable using only four items CI1, CI2, CI3, and CI6. This new variable was found to have a good level of reliability (0.78), and an eigenvalue greater than 1, explaining 60.62% of the total variance and was therefore used as the measure of organisational culture in the main study.

Similarly, the construct of people (T-shaped skills) was also found to load onto two components with eigenvalues greater than 1, accounting for 67.51% of the total variance. Three items PI3, PI4, and PI5 had large loadings (from 0.74 to 0.85) on component one while two items PI1 and PI2 had large loadings (0.81 and 0.84, respectively) on component two. A scree test suggested a one-component solution might be most appropriate for this dataset. However, the pattern of results displayed significant variations from the studies of Chuang (2004), Lee and Choi (2003), and Migdadi (2005). Therefore, it was difficult to decide which items to delete to improve the validity and reliability of the measures. As a result, it was decided to retain all five items for re-test in the main study.
Table 4.1 – Results of the Pilot Study

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach alpha</th>
<th>Item-total correlation</th>
<th>PCA</th>
<th>Items deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Component Loading</td>
<td>Variance extracted</td>
</tr>
<tr>
<td>Information Technology</td>
<td>0.69</td>
<td>TI1 0.37</td>
<td>0.61</td>
<td>53.40%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TI2 0.54</td>
<td>0.80</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TI3 0.64</td>
<td>0.86</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TI4 0.38</td>
<td>0.62</td>
<td>none</td>
</tr>
<tr>
<td>Organisational Structure</td>
<td>0.80</td>
<td>SI1 0.54</td>
<td>0.68</td>
<td>46.15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SI2 0.58</td>
<td>0.71</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SI3 0.43</td>
<td>0.56</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SI4 0.50</td>
<td>0.63</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SI5 0.56</td>
<td>0.71</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SI6 0.59</td>
<td>0.74</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SI7 0.56</td>
<td>0.71</td>
<td>none</td>
</tr>
<tr>
<td>Organisational Culture</td>
<td>0.78</td>
<td>CI1 0.65</td>
<td>0.83</td>
<td>60.62%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CI2 0.62</td>
<td>0.80</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CI3 0.55</td>
<td>0.75</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CI6 0.54</td>
<td>0.73</td>
<td>none</td>
</tr>
<tr>
<td>People (T-shaped Skills)</td>
<td>0.69</td>
<td>PI1 0.47</td>
<td>0.81</td>
<td>67.51%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PI2 0.36</td>
<td>0.84</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PI3 0.55</td>
<td>0.75</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PI4 0.42</td>
<td>0.85</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PI5 0.48</td>
<td>0.74</td>
<td>none</td>
</tr>
<tr>
<td>Acquisition Process</td>
<td>0.81</td>
<td>ACP1 0.62</td>
<td>0.76</td>
<td>51.72%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACP2 0.63</td>
<td>0.77</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACP3 0.60</td>
<td>0.74</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACP4 0.51</td>
<td>0.66</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACP5 0.56</td>
<td>0.70</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACP6 0.53</td>
<td>0.68</td>
<td>none</td>
</tr>
<tr>
<td>Conversion Process</td>
<td>0.84</td>
<td>CP1 0.60</td>
<td>0.73</td>
<td>55.78%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CP2 0.68</td>
<td>0.79</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CP3 0.59</td>
<td>0.72</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CP4 0.62</td>
<td>0.75</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CP5 0.63</td>
<td>0.75</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CP6 0.61</td>
<td>0.74</td>
<td>none</td>
</tr>
</tbody>
</table>
Table 4.1 (Cont.) – Results of the Pilot Study

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach alpha</th>
<th>Item-total correlation</th>
<th>PCA</th>
<th>Items deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Component Loading</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Variance extracted</td>
<td></td>
</tr>
<tr>
<td>Application Process</td>
<td>0.86</td>
<td>APP1 0.62 APP2 0.72 APP3 0.63 APP4 0.68 APP5 0.57 APP6 0.59 APP7 0.62</td>
<td>Component Loading APP1 0.73 APP2 0.81 APP3 0.74 APP4 0.76 APP5 0.69 APP6 0.71 APP7 0.73</td>
<td>55.08% none</td>
</tr>
<tr>
<td>Protection Process</td>
<td>0.89</td>
<td>PP1 0.70 PP2 0.76 PP3 0.72 PP4 0.66 PP5 0.70 PP6 0.62 PP7 0.71</td>
<td>Component Loading PP1 0.79 PP2 0.84 PP3 0.80 PP4 0.76 PP5 0.79 PP6 0.72 PP7 0.79</td>
<td>61.23% none</td>
</tr>
<tr>
<td>Competitive Advantage</td>
<td>0.71</td>
<td>CA1 0.41 CA2 0.53 CA3 0.59 CA4 0.46</td>
<td>Component Loading CA1 0.65 CA2 0.76 CA3 0.81 CA4 0.71</td>
<td>53.93% none</td>
</tr>
</tbody>
</table>

As a result of the above preliminary analysis, the Table 4.2 below presents the final instrument used in the main study. Apart from assessing the validity and reliability of the construct measurement scales, the results of this pilot study also indicated that the definitions of special terms in the questionnaire should be explained more clearly in detail with specific examples for easy understanding.
Table 4.2 – Final Construct Measurement Scales

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measurement Scale</th>
</tr>
</thead>
</table>
| **Information Technology** | *My organisation uses technology that allows …*  
TI1: … employees to collaborate with other persons outside the organisation  
TI2: … people in multiple locations to learn as a group from a single source or at a single point in time  
TI3: … people in multiple locations to learn as a group from a multiple source or at multiple points in time  
TI4: … it to map the location (e.g. an individual, specific system, or database) of specific types of knowledge |
| **Organisational Structure** | *My organisation’s (‘s) …*  
SI1: … structure facilitates the discovery of new knowledge  
SI2: … structure facilitates the creation of new knowledge  
SI3: … bases our performance on knowledge creation  
SI4: … has a standardised reward system for sharing knowledge  
SI5: … designs processes to facilitate knowledge exchange across functional boundaries  
SI6: … managers frequently examine knowledge for errors/mistakes  
SI7: … structure facilitates the transfer of new knowledge across structural boundaries |
| **Organisational Culture** | *In my organisation …*  
CI1: … employees understand the importance of knowledge to corporate success  
CI2: … high levels of participation are expected in capturing and transferring knowledge  
CI3: … on-the-job training and learning are valued  
CI6: … senior management clearly supports the role of knowledge in our firm’s success |
| **People (T-shaped Skills)** | *My organisation’s members …*  
P11: … can understand not only their own tasks but also others’ tasks  
P12: … can make suggestions about others’ tasks  
P13: … can communicate well not only with their department members but also with other department members  
P14: … are specialists in their own field of expertise  
P15: … can perform their own task effectively without regard to environmental changes |
| **Acquisition Process** | *My organisation …*  
ACP1: … has processes for acquiring knowledge about our customers  
ACP2: … has processes for generating new knowledge from existing knowledge  
ACP3: … has processes for acquiring knowledge about our suppliers  
ACP4: … has processes for distributing knowledge throughout the organisation  
ACP5: … has processes for acquiring knowledge about new products/services within our industry  
ACP6: … has processes for exchanging knowledge between individuals |
### Table 4.2 (Cont.) – Final Construct Measurement Scales

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measurement Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conversion Process</strong></td>
<td><strong>My organisation …</strong></td>
</tr>
<tr>
<td>CP1:</td>
<td>… has processes for filtering knowledge</td>
</tr>
<tr>
<td>CP2:</td>
<td>… has processes for transferring organisational knowledge to individuals</td>
</tr>
<tr>
<td>CP3:</td>
<td>… has processes for absorbing knowledge from individuals into the organisation</td>
</tr>
<tr>
<td>CP4:</td>
<td>… has processes for integrating different sources and types of knowledge</td>
</tr>
<tr>
<td>CP5:</td>
<td>… has processes for organisation (store/file) knowledge</td>
</tr>
<tr>
<td>CP6:</td>
<td>… has processes for replacing outdated knowledge</td>
</tr>
<tr>
<td><strong>Application Process</strong></td>
<td><strong>My organisation …</strong></td>
</tr>
<tr>
<td>APP1:</td>
<td>… has processes for using knowledge in development of new products and services</td>
</tr>
<tr>
<td>APP2:</td>
<td>… has processes for using knowledge to solve new problems</td>
</tr>
<tr>
<td>APP3:</td>
<td>… matches sources of knowledge to problems and challenges</td>
</tr>
<tr>
<td>APP4:</td>
<td>… uses knowledge to improve efficiency</td>
</tr>
<tr>
<td>APP5:</td>
<td>… uses knowledge to adjust strategic direction</td>
</tr>
<tr>
<td>APP6:</td>
<td>… is able to locate and apply knowledge to changing competitive conditions</td>
</tr>
<tr>
<td>APP7:</td>
<td>… takes advantage of new knowledge</td>
</tr>
<tr>
<td><strong>Protection Process</strong></td>
<td><strong>My organisation …</strong></td>
</tr>
<tr>
<td>PP1:</td>
<td>… has processes to protect knowledge from inappropriate use inside the organisation</td>
</tr>
<tr>
<td>PP2:</td>
<td>… has processes to protect knowledge from inappropriate use outside the organisation</td>
</tr>
<tr>
<td>PP3:</td>
<td>… has processes to protect knowledge from theft from within the organisation</td>
</tr>
<tr>
<td>PP4:</td>
<td>… has processes to protect knowledge from theft from outside the organisation</td>
</tr>
<tr>
<td>PP5:</td>
<td>… has extensive polices and procedures for protecting trade secrets</td>
</tr>
<tr>
<td>PP6:</td>
<td>… values and protects knowledge embedded in individuals</td>
</tr>
<tr>
<td>PP7:</td>
<td>… clearly communicates (create awareness of) the importance of protecting knowledge</td>
</tr>
<tr>
<td><strong>Competitive Advantage</strong></td>
<td><strong>My organisation …</strong></td>
</tr>
<tr>
<td>CA1:</td>
<td>My organisation often uses knowledge-based innovation</td>
</tr>
<tr>
<td>CA2:</td>
<td>My organisation’s market position can create strong barriers to entry for other firms</td>
</tr>
<tr>
<td>CA3:</td>
<td>My organisation uses KM to widen the array (line/range) of products without increasing costs</td>
</tr>
<tr>
<td>CA4:</td>
<td>The knowledge management capability in my organisation would be difficult and expensive for rivals to duplicate</td>
</tr>
</tbody>
</table>
4.3 MAIN STUDY SAMPLE PROFILE

The initial mailing of 1000 questionnaires led to 254 returned responses plus 84 questionnaires received after the first reminder and 48 after the second. The overall response rate was 38.6%. According to Hair et al. (2006), any of the imputation methods can be applied when missing data are under 10%, however, cases with missing data for dependent variables typically are deleted to avoid any artificial increase in relationships with independent variables. In addition, Kline (2005) suggests that cases with incomplete data should be excluded from the data if they have missing values on items involved in particular computations (pairwise method). Given that all variables of the study had multi-item measurement scales, 24 returned questionnaires which had significant numbers of incomplete items involved in variable computation and inferential statistics of the study were excluded from all analyses. However, another 17 cases with missing data in the descriptive section were retained. This inclusion had no effect on the hypothesis testing of the research. As a result, the final sample included 362 usable responses. This sample size was adequate as it satisfied the minimum ratio of 5:1 for the number of usable questionnaires to the number of parameters in the study (Hair et al. 2006; Kline 1998).

The following sections provide descriptive statistics of the sample relating to the respondents and their respective companies.

4.3.1 Respondent Profile

The respondents were classified according to gender, age, level of education, job function/position and years in their current company.

As shown in Table 4.3 and Table 4.4, approximately two-thirds of the respondents were male which reflects the male dominance in senior management positions of Vietnamese companies. A majority (90.1%) were under 50 years old, with 31–40 years old being the largest group (41.7%) followed by those younger than 30 years (29.8%). Only 8.3 % were between 51–60 and a very small percentage (0.8%) was aged over 60 years. This pattern may imply a tendency of encouraging new blood in the management teams of Vietnamese enterprises.
Table 4.3 – Gender of Respondents

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>245</td>
<td>67.7</td>
</tr>
<tr>
<td>Female</td>
<td>114</td>
<td>31.5</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td>0.8</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.4 – Age of Respondents

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 30 years</td>
<td>108</td>
<td>29.8</td>
<td>29.8</td>
</tr>
<tr>
<td>31-40 years</td>
<td>151</td>
<td>41.7</td>
<td>71.5</td>
</tr>
<tr>
<td>41-50 years</td>
<td>67</td>
<td>18.5</td>
<td>90.1</td>
</tr>
<tr>
<td>51-60 years</td>
<td>30</td>
<td>8.3</td>
<td>98.3</td>
</tr>
<tr>
<td>Over 60 years</td>
<td>3</td>
<td>0.8</td>
<td>99.2</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td>0.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.5 shows that the highest level of education achieved by most respondents was a bachelor’s degree, accounting for 59.7% of the sample, followed by master’s degree (18.8%) and diploma (11.3%). The remaining respondents obtained either a high school or doctoral degree (4.7% and 3.9%, respectively).

Table 4.5 – Highest Level of Education of Respondents

<table>
<thead>
<tr>
<th>Highest level of education</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school</td>
<td>17</td>
<td>4.7</td>
<td>4.7</td>
</tr>
<tr>
<td>Diploma</td>
<td>41</td>
<td>11.3</td>
<td>16.0</td>
</tr>
<tr>
<td>Bachelor</td>
<td>216</td>
<td>59.7</td>
<td>75.7</td>
</tr>
<tr>
<td>Master</td>
<td>68</td>
<td>18.8</td>
<td>94.5</td>
</tr>
<tr>
<td>Doctorate</td>
<td>14</td>
<td>3.9</td>
<td>98.3</td>
</tr>
<tr>
<td>Missing</td>
<td>6</td>
<td>1.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
The respondents’ job functions/positions are summarised in Table 4.6. Given that the survey targeted senior management as key informants, most respondents (74%) were divisional/departmental managers. The group which included business, sales and marketing was the largest, accounting for 27.9% of the total, followed by accounting and finance (13.8%), research and development (8.6%), and production and operation (7.7%). Top management made up approximately a quarter of the sample. Only a small proportion of respondents worked in the fields of human resources, project management, and information technology.

Table 4.6 – Job Function/Position of Respondents

<table>
<thead>
<tr>
<th>Job function/position</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management (CEO, MD, etc.)</td>
<td>88</td>
<td>24.3</td>
<td>24.3</td>
</tr>
<tr>
<td>Accounting &amp; Finance</td>
<td>50</td>
<td>13.8</td>
<td>38.1</td>
</tr>
<tr>
<td>Business, Sales, Marketing</td>
<td>101</td>
<td>27.9</td>
<td>66.0</td>
</tr>
<tr>
<td>Production &amp; Operation</td>
<td>28</td>
<td>7.7</td>
<td>73.8</td>
</tr>
<tr>
<td>Research &amp; Development</td>
<td>31</td>
<td>8.6</td>
<td>82.3</td>
</tr>
<tr>
<td>Information Technology</td>
<td>11</td>
<td>3.0</td>
<td>85.4</td>
</tr>
<tr>
<td>Human Resource</td>
<td>20</td>
<td>5.5</td>
<td>90.9</td>
</tr>
<tr>
<td>Project Management</td>
<td>12</td>
<td>3.3</td>
<td>94.2</td>
</tr>
<tr>
<td>Others</td>
<td>15</td>
<td>4.1</td>
<td>98.3</td>
</tr>
<tr>
<td>Missing</td>
<td>6</td>
<td>1.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 4.7, a majority of respondents had been working in their current companies for a medium period of time (30.7% from 3–5 years and 26.5% from 6–10 years). Over 17% of surveyed people had worked in their companies for longer periods (from 11–20 years). Only a few were either new (less than 1 year) or faithful employees (more than 20 years) at their current workplace.
Table 4.7 – Years in Current Company of Respondents

<table>
<thead>
<tr>
<th>Years in current company</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year</td>
<td>23</td>
<td>6.4</td>
<td>6.4</td>
</tr>
<tr>
<td>1–2 years</td>
<td>44</td>
<td>12.2</td>
<td>18.5</td>
</tr>
<tr>
<td>3–5 years</td>
<td>111</td>
<td>30.7</td>
<td>49.2</td>
</tr>
<tr>
<td>6–10 years</td>
<td>96</td>
<td>26.5</td>
<td>75.7</td>
</tr>
<tr>
<td>11–20 years</td>
<td>62</td>
<td>17.1</td>
<td>92.8</td>
</tr>
<tr>
<td>More than 20 years</td>
<td>16</td>
<td>4.4</td>
<td>97.2</td>
</tr>
<tr>
<td>Missing</td>
<td>10</td>
<td>2.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

In short, the typical respondent was a male aged under 50 years who obtained a bachelor’s degree and had been working at his current company for between 3 and 10 years in top management and in the field of business, sales, and marketing.

4.3.2 Company Profile

The respondents’ company profile was analysed according to size (number of employees), type of business, and basic categories of industry.

It is shown in Table 4.8 that more than 80% of respondents worked for SMEs (firms with less than 300 employees), among which the largest group (36.5%) employed 50–199 people, followed by organisations with 20–49 employees. This result reflected the expected pattern as the majority of Vietnamese companies were of small or medium size.

Table 4.8 – Number of Employees of Company

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20 people</td>
<td>43</td>
<td>11.9</td>
<td>11.9</td>
</tr>
<tr>
<td>20–49 people</td>
<td>65</td>
<td>18.0</td>
<td>29.8</td>
</tr>
<tr>
<td>50–199 people</td>
<td>132</td>
<td>36.5</td>
<td>66.3</td>
</tr>
<tr>
<td>200–299 people</td>
<td>57</td>
<td>15.7</td>
<td>82.0</td>
</tr>
<tr>
<td>300–499 people</td>
<td>18</td>
<td>5.0</td>
<td>87.0</td>
</tr>
<tr>
<td>500 people and over</td>
<td>37</td>
<td>10.2</td>
<td>97.2</td>
</tr>
<tr>
<td>Missing</td>
<td>10</td>
<td>2.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
As shown in Table 4.9, the largest proportion (one-third) of the surveyed organisations were private limited companies, closely followed by joint-stock and state-owned enterprises. Only a small percentage was joint-venture companies or fully owned by foreigners (6% for each category). A majority of the larger companies were state-owned, while smaller organisations were mostly private limited and joint-stock companies. In general, joint-venture and 100% foreign-owned enterprises had a medium number of employees.

The distribution of respondents into two basic types of industries (Table 4.10) shows that the number of surveyed enterprises in the service sector was twice those in manufacturing. This figure may reflect Vietnam’s service orientation. Moreover, as a result of the cross-tabulation analysis of industry classification by business type, it was shown that more than one-third of manufacturing firms were owned by the state while the service industry was largely represented by private limited and joint-stock companies.

In summary, a typical organisation in this study was small to medium-sized, employed a limited number of employees and operated in the service industry. The majority of the state-owned enterprises was large and operated in the manufacturing sector, while the service industry employed a larger number of smaller-sized private limited and joint-stock companies.
Table 4.9 – Cross-tabulation of Employee Number by Business Type

<table>
<thead>
<tr>
<th>Number of employees (Business size)</th>
<th>State-owned enterprises</th>
<th>Pte Ltd.</th>
<th>Joint stock</th>
<th>Joint venture</th>
<th>100% foreign owned</th>
<th>Others</th>
<th>Missing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>Count</td>
<td>3</td>
<td>26</td>
<td>9</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>% within Business size</td>
<td>7.0%</td>
<td>60.5%</td>
<td>20.9%</td>
<td>0%</td>
<td>7.0%</td>
<td>2.3%</td>
<td>2.3%</td>
</tr>
<tr>
<td>20-49</td>
<td>Count</td>
<td>2</td>
<td>36</td>
<td>11</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>% within Business size</td>
<td>3.1%</td>
<td>55.4%</td>
<td>16.9%</td>
<td>3.1%</td>
<td>10.8%</td>
<td>1.5%</td>
<td>9.2%</td>
</tr>
<tr>
<td>50-199</td>
<td>Count</td>
<td>21</td>
<td>38</td>
<td>48</td>
<td>11</td>
<td>7</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>% within Business size</td>
<td>15.9%</td>
<td>28.8%</td>
<td>36.4%</td>
<td>8.3%</td>
<td>5.3%</td>
<td>0.8%</td>
<td>4.5%</td>
</tr>
<tr>
<td>200-299</td>
<td>Count</td>
<td>23</td>
<td>8</td>
<td>16</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>% within Business size</td>
<td>40.4%</td>
<td>14.0%</td>
<td>28.1%</td>
<td>10.5%</td>
<td>1.8%</td>
<td>1.8%</td>
<td>3.5%</td>
</tr>
<tr>
<td>300-499</td>
<td>Count</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>% within Business size</td>
<td>55.6%</td>
<td>11.1%</td>
<td>11.1%</td>
<td>0%</td>
<td>11.1%</td>
<td>5.6%</td>
<td>5.6%</td>
</tr>
<tr>
<td>500 &amp; over</td>
<td>Count</td>
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<td>3</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>% within Business size</td>
<td>37.8%</td>
<td>8.1%</td>
<td>18.9%</td>
<td>8.1%</td>
<td>5.4%</td>
<td>10.8%</td>
<td>10.8%</td>
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<tr>
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<td>0</td>
<td>1</td>
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</tr>
<tr>
<td></td>
<td>% within Business size</td>
<td>10.0%</td>
<td>10.0%</td>
<td>0%</td>
<td>0%</td>
<td>10.0%</td>
<td>0%</td>
<td>70.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
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<td>114</td>
<td>93</td>
<td>22</td>
<td>23</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>% within Business size</td>
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<td>31.5%</td>
<td>25.7%</td>
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<td>6.4%</td>
<td>2.5%</td>
<td>7.5%</td>
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</table>
### Table 4.10 – Cross-tabulation of Industry Classification by Business Type

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<th>Joint venture</th>
<th>100% foreign owned</th>
<th>Others</th>
<th>Missing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>74</td>
<td>114</td>
<td>93</td>
<td>22</td>
<td>23</td>
<td>9</td>
<td>27</td>
<td>362</td>
</tr>
<tr>
<td>% within Industry</td>
<td>20.4%</td>
<td>31.5%</td>
<td>25.7%</td>
<td>6.1%</td>
<td>6.4%</td>
<td>2.5%</td>
<td>7.5%</td>
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</tr>
<tr>
<td>Manufacturing</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td>10</td>
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<td>5.8%</td>
<td>2.9%</td>
<td>1.0%</td>
<td>100.0%</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>67</td>
<td>12</td>
<td>17</td>
<td>5</td>
<td>20</td>
<td>239</td>
</tr>
<tr>
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<td>7.1%</td>
<td>2.1%</td>
<td>8.4%</td>
<td>100.0%</td>
</tr>
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<td>Missing</td>
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<td></td>
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<td>5</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>% within Industry</td>
<td>5.3%</td>
<td>26.3%</td>
<td>31.6%</td>
<td>0%</td>
<td>0%</td>
<td>5.3%</td>
<td>31.6%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
4.4 NORMALITY ASSESSMENT

As stated by Kline (1998), the univariate normality of distribution of all interval variables needs to be investigated to choose an appropriate estimation method in SEM. If the absolute values of skew and kurtosis are greater than 2 and 7 respectively, the data set is considered to have an extreme non-normality (Kline 1998). If this is the case, a number of alternative estimation techniques in SEM should be employed such as weighted least square (WLS), generalised least squares (GLS), and asymptotically distribution free (ADF). On the other hand, if the distribution of scores on variables does not deviate significantly from normality, the maximum likelihood estimation (MLE), which is the most widely used approach in SEM, can be applied (Hair et al. 2006).

Accordingly, values of skew and kurtosis were calculated for the distribution of scores for the nine first-order latent variables in this study (as presented in Table 4.11). All of these values did not exceed the absolute values of 2 for skewness and 7 for kurtosis indices and, therefore, the data set was considered to have moderately normal distribution and the maximum likelihood estimation was used.
### Table 4.11 – Skewness and Kurtosis Statistics

<table>
<thead>
<tr>
<th>Items</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td>Statistic</td>
<td>Statistic</td>
<td>Std. Error</td>
</tr>
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<td>5.29</td>
<td>1.33</td>
<td>-0.73</td>
</tr>
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<td>1.27</td>
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</tr>
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</tr>
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</tr>
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<td>1.13</td>
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<td>1.32</td>
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<td>1.25</td>
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<td>1.17</td>
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<td>-0.73</td>
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</table>
Table 4.11 (Cont.) – Skewness and Kurtosis Statistics

<table>
<thead>
<tr>
<th>Items</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Kurtosis</th>
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<td>Statistic</td>
<td>Std. Error</td>
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<tr>
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<td>356</td>
<td>5.57</td>
<td>1.36</td>
<td>-1.20</td>
<td>0.13</td>
</tr>
<tr>
<td>PP5</td>
<td>355</td>
<td>5.53</td>
<td>1.39</td>
<td>-1.02</td>
<td>0.13</td>
</tr>
<tr>
<td>PP6</td>
<td>353</td>
<td>5.54</td>
<td>1.26</td>
<td>-1.12</td>
<td>0.13</td>
</tr>
<tr>
<td>PP7</td>
<td>356</td>
<td>5.58</td>
<td>1.28</td>
<td>-0.94</td>
<td>0.13</td>
</tr>
<tr>
<td>CA1</td>
<td>353</td>
<td>5.30</td>
<td>1.33</td>
<td>-0.70</td>
<td>0.13</td>
</tr>
<tr>
<td>CA2</td>
<td>353</td>
<td>5.18</td>
<td>1.31</td>
<td>-0.78</td>
<td>0.13</td>
</tr>
<tr>
<td>CA3</td>
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<td>5.40</td>
<td>1.29</td>
<td>-0.68</td>
<td>0.13</td>
</tr>
<tr>
<td>CA4</td>
<td>355</td>
<td>5.21</td>
<td>1.41</td>
<td>-0.46</td>
<td>0.13</td>
</tr>
</tbody>
</table>
4.5 MEASUREMENT MODEL DEVELOPMENT

Developing a measurement model is the first of the two major steps in a complete structural equation model analysis that involves specifying the indicators (observed measures) for each construct (latent variable), enabling an assessment of construct validity and reliability (Gerbing & Anderson 1988; Hair et al. 2006). In this study, the measurement scales measuring the nine first-order constructs and the two second-order constructs were adapted from prior research. These scales are well defined in the literature and were pretested in the pilot survey. Therefore, a CFA was then performed in the main study. The purpose was to provide a confirmatory test of the proposed measurement model (Hair et al. 2006) for model fit and construct validity. The following section presents the results of the CFA assessment of the goodness-of-fit and validity of the nine individual first-order latent constructs and the two second-order latent constructs followed by the final overall measurement model. In particular, the fit indices, factor loadings, construct reliability and correlations were examined.

4.5.1 Structural Infrastructure (SI)

Structural infrastructure was posited as a unidimensional construct measured by the seven items SI1 to SI7. A confirmatory factor analysis was conducted to assess the measurement model validity of this construct. The initial results of CFA showed that the model fit indices did not satisfy the fitness conditions such as $\chi^2$/df=8.48, p=0.00 (significant), CFI=0.85 (less than 0.90) and RMSEA=0.14 (above 0.10) (Hair et al. 2006). Therefore, a number of model diagnostics such as path estimates, standardised residuals, and modification indices were used to improve the fit level of the structural infrastructure measurement model (Anderson & Gerbing 1988; Arbuckle 2005; Hair et al. 2006).

All factor loading estimates (also referred to as standardised regression weights) were found to be positive, and ranged from 0.53 to 0.72. Three of the highest standardised residuals (greater than 2.5) are associated with items SI3 and SI4 which were also the variables with the lowest loading estimates ($\lambda=0.53$ and 0.54 respectively). An examination of modification indices suggested that fit could be improved significantly by freeing the corresponding error covariance parameters between the error terms for pairs of measured variables: SI1 with SI2, SI1 with SI4, and SI1 with SI5. The same results were found for the following pairs of
measured variables: SI3 with SI4, SI3 with SI6, and SI3 with SI7. This meant that the error terms for these measured variables represented more than just the measurement errors (Arbuckle 2005).

However, freeing error covariance terms would be inconsistent with the congeneric properties of the measurement model or, in other words, would violate the principles of good measurement (Hair et al. 2006). An overall check of diagnostic measures from CFA suggested items SI1, SI3 and SI4 were prime candidates for being dropped from the model. Given that the remaining questions (which referred to organisational structure, policies, procedures, and processes that facilitate the creation, exchange, examination, and transfer of knowledge across functional boundaries) still satisfied the content validity of structural infrastructure construct, the items SI1, SI3 and SI4 were deleted from the measurement model.

A revised CFA was repeated to examine the improved level of model fit. Figure 4.2 displays the fit indices summary provided by the CFA output. The Chi-square value was 3.63 with 2 degrees of freedom. The $p$-value associated with this result was insignificant at $p=0.16$. Thus, the $\chi^2$ goodness-of-fit statistic indicated that the observed covariance matrix matched the estimated covariance matrix within sampling variance. In addition to the $\chi^2$ result, the value for CFI, an incremental fit index, was 0.99 while the values for absolute fit indices were 0.99 for GFI (goodness-of-fit) and 0.05 for RMSEA (badness-of-fit). These result suggested that the measurement model of structural infrastructure provided a reasonably good fit. Moreover, all factor loadings estimates considerably exceeded 0.50 and the construct reliability was found to be adequate (CR=0.74). Taken together, the evidence supported the unidimensionality and convergent validity of the measurement model and, as a result, four items (SI2, SI5, SI6, and SI7) were retained to measure the structural infrastructure construct.
Figure 4.2 – CFA Results for Structural Infrastructure

\[ \chi^2=3.63; \text{df}=2; \text{CFI}=0.99; \text{GFI}=0.99; \text{RMSEA}=0.05 \]

4.5.2 Cultural Infrastructure (CI)

Cultural infrastructure was posited as a unidimensional construct measured by the four items, namely CI1, CI2, CI3, and CI6. The measurement scale of this construct was analysed using CFA. Figure 4.3 shows the fit indices summary provided by the CFA output. The Chi-square value is 7.00 with 2 degrees of freedom. The \( p \)-value associated with this result is significant at \( p=0.03 \). Thus, the \( \chi^2 \) goodness-of-fit statistic did not indicate that the observed covariance matrix matched the estimated covariance matrix within sampling variance. However, given that the sample size was quite large (\( N=362 \)), a significant \( p \)-value could be expected (Hair et al. 2006).

In addition to the \( \chi^2 \) result, the value for CFI, an incremental fit index, was 0.99 while the values for absolute fit indices were 0.99 for GFI (goodness-of-fit) and 0.08 for RMSEA (badness-of-fit). These fit statistics results suggested that the measurement model of cultural infrastructure provided a reasonably good fit. Moreover, all factor loadings estimates considerably exceeded 0.50 and the construct reliability was found to be good (CR=0.81). Taken together, the evidence supported the unidimensionality and convergent validity of the measurement model and, as a result, all four items were retained to measure the cultural infrastructure construct.
4.5.3 People Infrastructure (PI)

People infrastructure was posited as a unidimensional construct measured by the five items PI1 to PI5. A confirmatory factor analysis was performed to assess the measurement model validity of this construct. The initial results of CFA indicated that the measurement model did not receive significant fit to the data ($\chi^2$/df=11.76, p=0.00; CFI=0.87; RMSEA=0.17). Therefore, a number of model diagnostics such as path estimates, standardised residuals, and modification indices were used to improve the fit level of the structural infrastructure measurement model (Anderson & Gerbing 1988; Arbuckle 2005; Hair et al. 2006).

All standardised regression weights (or factor loading estimates) were found to be significantly above 0.50 except one associated with PI5 ($\lambda=0.45$) and so PI5 was a candidate for deletion. Two of the highest standardised residuals (greater than 2.5) were associated with item PI2 which was the variable with the second-lowest loading estimate next to item PI5 ($\lambda=0.53$). An examination of modification indices suggested that fit could be improved significantly by freeing the corresponding error covariance parameter between the error terms for the measured variables PI2 and PI1. The same result was found for measured variables PI2 and PI4.
Similar to the measures of SI, an overall check of diagnostic measures from CFA suggested items PI2 and PI5 were prime candidates for being dropped from the model. Given that the remaining questions still satisfied the content validity of the people infrastructure construct, which implies the deep and broad understanding by workers of their own and others’ task areas, the candidate items for deletion were dropped from the measurement model.

The re-specified measurement model of people infrastructure construct then had only three indicators (shown in Figure 4.4) which is referred to as a just-identified or saturated model with 0 degrees of freedom (Hair et al. 2006). The construct could not be tested for goodness-of-fit separately and was integrated into the overall measurement model so that the interconnections between constructs could provide the necessary degrees of freedom to identify the overall model. However, all factor loadings were determined and found to be positive, and ranged from 0.55 to 0.91 and the construct was also found to be reliable (CR=0.71). Taken together, the evidence supported the unidimensionality and convergent validity of the measurement model and, as a result, three items (PI1, PI3, and PI4) were retained to measure the people (T-shaped skills) construct.

**Figure 4.4 – CFA Results for People Infrastructure**

\[ \chi^2 = 0.00; \text{df}=0; \text{CFI}=1.00; \text{GFI}=1.00; \text{RMSEA}=0.55 \text{ to } 0.91 \]
4.5.4 Social Knowledge Management Infrastructure Capability (SKMIC)

Social KM infrastructure capability was hypothesised as a second-order latent construct identified by the three first-order latent variables, including structural infrastructure, cultural infrastructure, and people infrastructure. The validity inspection of this measurement model indicated that the level of model fit was satisfied. Figure 4.5a shows the fit indices summary provided by the CFA output. The Chi-square value is 77.08 with 41 degrees of freedom. Although the $p$-value associated with this result was significant at $p=0.00$, given that the sample size was quite large ($N=362$), a significant $p$-value could be expected (Hair et al. 2006). In addition to the $\chi^2$ result, the value for CFI, an incremental fit index, was 0.97 while the values for absolute fit indices were 0.96 for GFI (goodness-of-fit) and 0.05 for RMSEA (badness-of-fit). These results suggest that the measurement model of social KM infrastructure capability provided a reasonably good fit.

Moreover, the factor loading estimates were significant and ideal (above 0.70 at $p=0.00$), ranging from 0.78 to 0.96 and the second-order construct was also found to have a good reliability (CR=0.89). An examination of inter-correlations between the three dimensions of social KM infrastructure capability (Figure 4.5b) showed all estimates to be significantly below the cut-off value of 0.90, ranging from 0.65 to 0.80, implying distinctness in construct content or discriminant validity. The congeneric measurement model with all unidimensional constructs did not contain any cross-loadings either among the measured variables or among the error terms. Taken together, these results supported the measurement model validity and, as such, Hypothesis 2, which states that social KM infrastructure capability is a second-order latent construct composed of organisational structure, organisational culture and people (or T-shaped skills), was confirmed.
Figure 4.5a – CFA Results for Social KM Infrastructure Capability

\[ \chi^2 = 77.08; \text{df}=41; \text{CFI}=0.97; \text{GFI}=0.96; \text{RMSEA}=0.05 \]

Figure 4.5b – Within Construct Discriminant Validity for Social KM Infrastructure Capability

\[ \chi^2 = 77.08; \text{df}=41; \text{CFI}=0.97; \text{GFI}=0.96; \text{RMSEA}=0.05 \]
4.5.5 Technical Knowledge Management Infrastructure Capability (TKMIC)

Technical infrastructure capability or information technology (IT) was posited as a unidimensional construct. Four items, TI1, TI2, TI3, and TI4, were used to measure the construct. The validity assessment of technical KM infrastructure capability was performed using a CFA. Figure 4.6 displays the fit indices summary provided by the CFA output. The results indicated that the model had a significant fit to the data. The Chi-square value was 0.43 with 2 degrees of freedom. The $p$-value associated with this result was insignificant at $p=0.81$. Thus, the $\chi^2$ goodness-of-fit statistic indicated that the observed covariance matrix matched the estimated covariance matrix within sampling variance. In addition to the $\chi^2$ result, the value for CFI, an incremental fit index, was 1.00 while the values for absolute fit indices were 0.99 for GFI (goodness-of-fit) and 0.00 for RMSEA (badness-of-fit). These results suggest that the measurement model of technical KM infrastructure provided a good fit.

Moreover, all standardised regression weights (or factor loading estimates) were found to exceed 0.50 except the value associated with item TI1 which was slightly weak but acceptable ($\lambda=0.49$). The construct reliability was also found to be satisfactory (CR=0.74). Taken together, the evidence supported the unidimensionality and convergent validity of the measurement model and, as a result, all four items were retained to measure the technical KM infrastructure construct.
4.5.6 Acquisition Process (ACP)

Acquisition process was posited as a unidimensional construct measured by six items APC1 to ACP6. A confirmatory factor analysis was conducted to assess the measurement model validity of this construct. The initial results of CFA showed that the model fit indices did not satisfy the condition of goodness-of-fit such as $\chi^2/df=10.34$, $p=0.00$ (significant), CFI=0.88 (less than 0.90) and RMSEA=0.16 (above 0.10). Therefore, a number of model diagnostics such as path estimates, standardised residuals, and modification indices were used to improve the fit level of the acquisition process measurement model (Anderson & Gerbing 1988; Arbuckle 2005; Hair et al. 2006).

All factor loading estimates (or standardised regression weights) were found to be positive, and ranged from 0.58 to 0.76 and all standardised residuals were found to be less than 2.5. An examination of modification indices suggested that fit could be improved significantly by freeing the corresponding error covariance parameters between the error terms by using the following pairs of measured variables: ACP4 with ACP1, ACP4 with ACP3, and ACP4 with

Figure 4.6 – CFA Results for Technical KM Infrastructure Capability
ACP5. The same results were found for the pairs of measured variables ACP6 with ACP3 and ACP6 with ACP5. This meant that the error terms for these measure variables represented more than just the measurement errors (Arbuckle 2005).

However, freeing error covariance terms would be inconsistent with the congeneric properties of the measurement model or, in other words, would violate the principles of good measurement (Hair et al. 2006). An overall check of diagnostic measures from CFA suggested items ACP4 and ACP6 were prime candidates for being dropped from the model. Given that the remaining questions (which refer to the ability to seek and acquire entirely new knowledge or create new knowledge from existing knowledge through collaboration) still satisfied the content validity of acquisition process, the items ACP4 and ACP6 were dropped from the measurement model.

A revised CFA was repeated to examine the improved level of model fit. Figure 4.7 displays the fit indices summary provided by the CFA output. The Chi-square value is 2.56 with 2 degrees of freedom. The p-value associated with this result is insignificant at p=0.28. Thus, the $\chi^2$ goodness-of-fit statistic indicated that the observed covariance matrix matched the estimated covariance matrix within sampling variance. In addition to the $\chi^2$ result, the value for CFI, an incremental fit index, is 0.99 while the values for absolute fit indices were 0.99 for GFI (goodness-of-fit) and 0.03 for RMSEA (badness-of-fit). These results suggested that the measurement model of acquisition process provided a reasonably good fit. Moreover, all factor loadings estimates considerably exceeded 0.50 and the construct reliability was found to be good (CR=0.80). Taken together, the evidence supports the unidimensionality and convergent validity of the measurement model and, as a result, four items (ACP1, ACP2, ACP3, and ACP5) were retained to measure the acquisition process construct.
4.5.7 Conversion Process (CP)

The conversion process was posited as a unidimensional construct measured by the six items CP1 to CP6. The measurement scale for the conversion process was analysed using CFA. The initial results such as $\chi^2$/df=6.85, $p=0.00$ (significant) and RMSEA=0.13 (above 0.10) showed that the model did not receive significant fit. Therefore, a number of model diagnostics such as path estimates, standardised residuals, and modification indices were investigated to improve the fit level of the conversion process measurement model (Anderson & Gerbing 1988; Arbuckle 2005; Hair et al. 2006).

All factor loading estimates (or standardised regression weights) were found to be positive and ranged from 0.63 to 0.72 and all standardised residuals were found to be less than 2.5. An examination of modification indices suggested that fit could be improved significantly by freeing the corresponding error covariance parameters between the error terms for the following pairs of measured variables: CP5 with CP1, CP5 with CP2, CP5 with CP4, and CP5 with CP6.

Similar to the measures of ACP, an overall check of diagnostic measures from CFA suggested item CP5 be a prime candidate for being dropped from the model. Given that the remaining questions (which refer to the ability to organise, structure, integrate, and convert knowledge...
into a useful form) still satisfied the content validity of conversion process, item CP5 was dropped from the measurement model.

A revised CFA was repeated to examine the improved level of model fit. Figure 4.8 displays the fit indices summary provided by the CFA output. The Chi-square value was 16.65 with 5 degrees of freedom. Although the $p$-value associated with this result was significant at $p=0.01$, given that the sample size was quite large ($N=362$), a significant $p$-value could be expected (Hair et al. 2006). In addition to the $\chi^2$ result, the value for CFI, an incremental fit index, was 0.98 while the values for absolute fit indices were 0.99 for GFI (goodness-of-fit) and 0.08 for RMSEA (badness-of-fit). These results suggest that the measurement model of conversion process provided a reasonably good fit.

Moreover, all factor loadings estimates considerably exceed 0.50 and the construct reliability was found to be good (CR=0.80). Taken together, the evidence supports the unidimensionality and convergent validity of the measurement model and, as a result, five items (CP1, CP2, CP3, CP4, and CP6) were retained to measure the conversion process construct.

**Figure 4.8 – CFA Results for Conversion Process**

\[ \chi^2 = 16.65; \text{df}=5; \text{CFI}=0.98; \text{GFI}=0.98; \text{RMSEA}=0.08 \]
4.5.8 Application Process (APP)

The application process was posited as a unidimensional construct measured by seven items APP1 to APP7. A confirmatory factor analysis was performed to assess the measurement model validity of this construct. The initial results of CFA indicated that the measurement model did not satisfy the level of fit ($\chi^2$/df=11.51, p=0.00; CFI=0.86; GFI=0.88; RMSEA=0.17). Therefore, a number of model diagnostics such as path estimates, standardised residuals, and modification indices were used to improve the fit level of application process measurement model (Anderson & Gerbing 1988; Arbuckle 2005; Hair et al. 2006).

All factor loading estimates (or standardised regression weights) were found to be positive and ranged from 0.65 to 0.76 and all standardised residuals were found to be less than 2.5. An examination of modification indices suggested that fit could be improved significantly by freeing the corresponding error covariance parameters between the error terms for the pairs of measured variables APP1 with APP2, APP1 with APP4, and APP1 with APP7. The same results were found for the following pairs of measured variables: APP3 paired with APP2, APP4, APP6, and APP7 respectively and APP5 paired with APP2, APP4, and APP6 respectively.

Similar to the measures of ACP, an overall check of diagnostic measures from CFA suggested items APP1, APP3, and APP5 were prime candidates for being dropped from the model. Given that the remaining questions (which refer to the ability to store, retrieve, use, and contribute knowledge within organisations) still satisfied the content validity of application process the items APP1, APP3, and APP5 were dropped from the measurement model.

A revised CFA was repeated to examine the improved level of model fit. Figure 4.9 displays the fit indices summary provided in the CFA output. The Chi-square value was 3.82 with 2 degrees of freedom. Although the p-value associated with this result was significant at p=0.00, given that the sample size was quite large (N=362), a significant p-value could be expected (Hair et al. 2006). In addition to the $\chi^2$ result, the value for CFI, an incremental fit index, was 0.99 while the values for absolute fit indices were 0.99 for GFI (goodness-of-fit) and 0.05 for
RMSEA (badness-of-fit). These results suggest that the measurement model of application process provided a reasonably good fit.

Moreover, all factor loadings estimates considerably exceeded 0.50 and the construct reliability was found to be good (CR=0.74). Taken together, the evidence supports the unidimensionality and convergent validity of the measurement model and, as a result, four items (APP2, APP4, APP6, and APP7) were retained to measure the application process construct.

**Figure 4.9 – CFA Results for Application Process**

\[
\chi^2=3.82; \text{ df}=2; \text{ CFI}=0.99; \text{ GFI}=0.99; \text{ RMSEA}=0.05
\]

4.5.9 Protection Process (PP)

The protection process was posited as a unidimensional construct, measured by the seven items PP1 to PP7. A confirmatory factor analysis was performed to assess the measurement model validity of this construct. The initial results of CFA indicated that the measurement model did not satisfy the level of fit \((\chi^2/\text{df}=16.57, \ p=0.00; \text{ CFI}=0.85; \text{ GFI}=0.85; \text{ RMSEA}=0.21)\). Therefore, a number of model diagnostics such as path estimates, standardised residuals, and modification indices were used to improve the fit level of protection process measurement model (Anderson & Gerbing 1988; Arbuckle 2005; Hair et al. 2006).
All factor loading estimates (or standardised regression weights) were found to be positive, and ranged from 0.67 to 0.78. Two of the highest standardised residuals (greater than 2.5) are associated with items PP4 and PP6 which are also the variables with the lowest loading estimates (λ=0.67 and 0.72, respectively). An examination of modification indices suggested that fit could be improved significantly by freeing the corresponding error covariance parameters between the error terms for pairs of measured variables PP4 with PP1, PP4 with PP2, PP4 with PP3, and PP4 with PP7. The same results were found for the following pairs of measured variables: PP5 paired with PP1 and PP7 respectively and PP6 paired with PP1, PP2, PP3, and PP7 respectively.

Similar to the measures of ACP, an overall check of diagnostic measures from CFA suggested items PP4, PP5, and PP6 were prime candidates for being dropped from the model. Given that the remaining questions (which refer to the ability to secure knowledge from inappropriate or illegal use or from the theft) still satisfied the content validity of protection process, the three candidate items were dropped from the measurement model.

A revised CFA was repeated to examine the improved level of model fit. Figure 4.9 displays the fit indices summary provided in the CFA output. The Chi-square value was 0.80 with 2 degrees of freedom. The $p$-value associated with this result was insignificant at $p=0.67$. Thus, the $\chi^2$ goodness-of-fit statistic indicated that the observed covariance matrix matched the estimated covariance matrix within sampling variance. In addition to the $\chi^2$ result, the value for CFI, an incremental fit index, was 1.00 while the values for absolute fit indices were 0.99 for GFI (goodness-of-fit) and 0.00 for RMSEA (badness-of-fit). These results suggest that the measurement model of protection process provided a good fit.

Moreover, all factor loadings estimates ideally exceed 0.70 and the construct reliability was found to be good (CR=0.83). Taken together, the evidence supported the unidimensionality and convergent validity of the measurement model and, as a result, four items (PP1, PP2, PP3 and PP7) were retained to measure the protection process construct.
4.5.10 Knowledge Management Process Capability (KMPC)

Knowledge management process capability was hypothesised to be a second-order latent construct identified by the four first-order latent variables (the acquisition process, the conversion process, the application process, and the protection process). The validity inspection of this measurement model indicated that the level of model fit was satisfied. Figure 4.11a displays the fit indices summary provided in the CFA output. The Chi-square value was 291.78 with 115 degrees of freedom. Although the $p$-value associated with this result was significant at $p=0.00$, given that the sample size was quite large ($N=362$), a significant $p$-value could be expected (Hair et al. 2006). In addition to the $\chi^2$ result, the value for CFI, an incremental fit index, was 0.93 while the values for absolute fit indices were 0.92 for GFI (goodness-of-fit) and 0.07 for RMSEA (badness-of-fit). These results suggest that the measurement model of the KM process capability provided a reasonably good fit.

Moreover, the factor loading estimates were significant and ideal (above 0.70 at $p=0.00$), and ranged from 0.73 to 0.89 and the second-order construct was also found to have a good reliability (CR=0.91). An examination of inter-correlations between the four dimensions of KM process capability (Figure 4.11b) showed all estimates were significantly below the cut-off value of 0.90, and ranged from 0.61 to 0.78, implying distinctness in construct content or
discriminant validity. The congeneric measurement model with all unidimensional constructs did not contain any cross-loadings either among the measured variables or among the error terms. Taken together, these results support the measurement model validity and, as such, Hypothesis 3, which states that KM process capability is a second-order latent construct composed of acquisition process, conversion process, application process, and protection process, was confirmed.

Figure 4.11a – CFA Results for KM Process Capability

\[ \chi^2 = 291.78; \text{ df}=115; \text{ CFI}=0.93; \text{ GFI}=0.92; \text{ RMSEA}=0.07 \]
Knowledge management capability was hypothesised as a multi-dimensional construct including social KM infrastructure capability (SKMIC), technical KM infrastructure capability (TKMIC), and KM process capability (KMPC). The validity inspection of this measurement model was performed using a CFA. The results indicated that the initial fit of the measurement model was not particularly good ($\chi^2=1025.05$ with $df=454$, $p=0.00$; CFI=0.89; GFI=0.85; RMSEA=0.06). Therefore, a number of model diagnostics such as path estimates, standardised residuals, and modification indices were used to improve the fit level of the measurement model (Anderson & Gerbing 1988; Arbuckle 2005; Hair et al. 2006).

All factor loading estimates (or standardised regression weights) were found to be substantial and significant, and ranged from 0.57 to 0.92 except the value associated with item TI1 which was below 0.50. Three of the highest standardised residuals (approximately 4.0) were associated with items TI1, CP6 and PP7. An examination of modification indices suggested that fit could be improved significantly by freeing the corresponding error covariance parameters between the error terms for pairs of measured variables TI1 with CI1 and TI1 with PI1. The same results were found for the following pairs of measured variables: CP6 paired
with APP6, PI3, and SI7 respectively and PP7 paired with PP3, APP7, and CI4 respectively. This meant that the error terms for these measure variables represented more than just the measurement errors (Arbuckle 2005).

However, freeing error covariance terms would be inconsistent with the congeneric properties of the measurement model or, in other words, would violate the principles of good measurement (Hair et al. 2006). An overall check of diagnostic measures from CFA suggested items TI1, CP6, and PP7 were prime candidates for being dropped from the model. Given that the content validity of relevant constructs were still satisfied, the three candidate items for deletion were dropped from the measurement model.

As shown in Figure 4.12, the fit of the re-specified model improved considerably. The Chi-square value was 711.87 with 340 degrees of freedom. The p-value associated with this result was significant at p=0.00. In addition to the $\chi^2$ result, the value for CFI, an incremental fit index, was 0.91 while the values for absolute fit indices were 0.88 for GFI (goodness-of-fit) and 0.06 for RMSEA (badness-of-fit). Given the large sample size (number of observations N=362) and the complexity of the model (number of observed variables m=33) these results suggested that the measurement model of KM capability provided a moderately good fit of the data.

All standardised regression weights were found to significantly exceed the recommended value of 0.50, and ranged from 0.57 for item PI1 to 0.91 for APP. The composite reliability for all individual constructs was found to be acceptable (above 0.70). An examination of inter-construct correlations indicated a moderate to high level of association among constructs (from 0.50 to 0.89). All correlation coefficient estimates were found to be significantly below the cut-off value of 0.90 (p=0.00), implying distinctness in construct content or discriminant validity. The congeneric overall measurement model with all unidimensional constructs did not contain any cross-loadings either among the measured variables or among the error terms.

Taken together, the results support the model fit and construct validity of the measurement model. Thus, Hypothesis 1, which states that KM capability is a multi-dimensional construct
composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability, was confirmed.

**Figure 4.12 – CFA Results for KM Capability**

\[ \chi^2 = 711.87; \text{df}=340; \text{CFI}=0.91; \text{GFI}=0.87; \text{RMSEA}=0.06 \]

4.5.12 Competitive Advantage (CA)

Competitive advantage was posited as a unidimensional construct measured by four items from CA1 to CA4. The validity assessment of competitive advantage was performed using a CFA. Figure 4.13 displays the fit indices summary provided in the CFA output. The results indicated that the model received significant fit to the data. The Chi-square value was 4.83 with 2 degrees of freedom. The \( p \)-value associated with this result was insignificant at \( p=0.09 \). Thus, the \( \chi^2 \) goodness-of-fit statistic indicated that the observed covariance matrix matched the estimated covariance matrix within sampling variance. In addition to the \( \chi^2 \) result, the
value for CFI, an incremental fit index, was 0.99 while the values for absolute fit indices were 0.99 for GFI (goodness-of-fit) and 0.06 for RMSEA (badness-of-fit). These results suggest that the measurement model of competitive advantage provided a good fit.

Moreover, all standardised regression weights (or factor loading estimates) were found to exceed 0.50, and ranged from 0.64 to 0.81. The construct reliability was also found to be satisfactory (CR=0.78). Taken together, the evidence supports the unidimensionality and convergent validity of the measurement model and, as a result, all four items were retained to measure the competitive advantage construct.

Figure 4.13 – CFA Results for Competitive Advantage

\[
\chi^2=4.83; \text{df}=2; \text{CFI}=0.99; \text{GFI}=0.99; \text{RMSEA}=0.06
\]

4.5.13 Overall Measurement Model

After evaluating the validity for individual first-order and second-order latent constructs, an overall measurement model was subjected to a CFA for a comprehensive assessment. The validity inspection of the overall measurement model indicated that the level of model fit was satisfied. Figure 4.14 displays the fit indices summary provided in the CFA output. The Chi-square value was 1014.50 with 482 degrees of freedom. The p-value associated with this result was significant at p=0.00. In addition to the \( \chi^2 \) result, the value for CFI, an incremental fit index, was 0.90 while the values for absolute fit indices were 0.86 for GFI (goodness-of-fit)
and 0.06 for RMSEA (badness-of-fit). Given the large sample size (number of observations N=362) and the complex model (number of observed variables m=33) of the study, these results suggest that the overall measurement model provides a moderately good fit of the data.

The parameter estimates for all first-order and second-order constructs are presented in Table 4.12a and 4.12b. All standardised regression weights were found to significantly exceed the recommended value of 0.50, and ranged from 0.57 for item PI1 to 0.92 for APP. The composite reliability for all individual constructs was found to be acceptable (above 0.70).

An examination of inter-construct correlations (as shown in Table 4.13) indicated a moderate to high level of association among constructs. All correlation coefficient estimates were found to be significantly below the cut-off value of 0.90 (p=0.00), implying distinctness in construct content or discriminant validity. The congeneric overall measurement model with all unidimensional constructs did not contain any cross-loadings either among the measured variables or among the error terms. Taken together, these results support the model fit and construct validity of the overall measurement model. The first step of the two-step SEM was, therefore, completed leading to the subsequent assessment of the structural model.
Figure 4.14 – CFA Results for Final Measurement Model

\[ \chi^2 = 1014.50; \text{df}=482; \text{CFI}=0.90; \text{GFI}=0.86; \text{RMSEA}=0.06 \]
Table 4.12a – Standardised Regression Weights ($\lambda$) and Composite Reliability Estimates (CR)

<table>
<thead>
<tr>
<th>First-order Constructs</th>
<th>Items</th>
<th>Culture</th>
<th>Structure</th>
<th>People</th>
<th>TKMICa</th>
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<th>Conversion</th>
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Table 4.12a (Cont.) – Standardised Regression Weights (\( \hat{\beta} \)) and Composite Reliability Estimates (CR)

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<th>First-order Constructs</th>
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<td>9.92</td>
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<td>CP Conversion Process</td>
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<td>9.51</td>
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<tr>
<td>CR Composite Reliability</td>
<td>0.90</td>
<td>0.89</td>
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---

a TKMIC=Technical Knowledge Management Infrastructure Capabilities  
b SKMIC=Social Knowledge Management Infrastructure Capabilities  
c KMPC=Knowledge Management Process Capabilities  
d Composite Reliability (CR) is defined by Joreskog (1971) as:  
\[
CR = \frac{\left( \sum_{i=1}^{p} \lambda_i \right)^2}{\left( \sum_{i=1}^{p} \lambda_i \right)^2 + \sum_{i=1}^{p} (1 - \lambda_i^2)}
\]

Where:  
\(\lambda_i\) is the \(i^{th}\) standardised factor loading on its corresponding factor;  
\((1 - \lambda_i^2)\) is the variance of measurement error of each indicator;  
\(p\) is the number of indicators.
Table 4.13 – Standardised Inter-Construct Correlation Estimates

<table>
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<tr>
<th>Inter-Construct Correlation</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>t-value</th>
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<td><strong>KMPC Measurement Model</strong></td>
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<td>17.78</td>
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<td>ACP &lt;---&gt;  PP</td>
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<td>12.58</td>
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<td><strong>Overall Measurement Model</strong></td>
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<td></td>
</tr>
<tr>
<td>SKMIC &lt;---&gt;  CA</td>
<td>0.81</td>
<td>0.03</td>
<td>23.95</td>
</tr>
<tr>
<td>PKMC &lt;---&gt;  TKMIC</td>
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<td>0.05</td>
<td>11.87</td>
</tr>
<tr>
<td>KMPC &lt;---&gt;  CA</td>
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<td>0.03</td>
<td>36.38</td>
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<td>0.03</td>
<td>35.14</td>
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<tr>
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<td>0.06</td>
<td>8.54</td>
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<td>SKMIC &lt;---&gt;  TKMIC</td>
<td>0.49</td>
<td>0.05</td>
<td>9.09</td>
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4.6 STRUCTURAL EQUATION MODELING

The final overall measurement model which was developed and assessed in the previous section includes four key constructs, namely TKMIC and CA as first-order latent constructs and SKMIC and KMPC as second-order latent constructs. The measurement model fit and construct validity were found to be satisfactory using a variety of assessment criteria such as various fit indices, standardised factor loadings, composite reliability, and inter-construct correlations. Based on these results, the structural model was subsequently specified and assessed to examine the theoretical links among the latent variables.
4.6.1 Overall Structural Model Fit

As the SEM model specifies that the number of structural relationships is equal to the number of possible correlations in the CFA, the model is considered a saturated structural model. As a result, the fit statistics of the saturated theoretical model should be the same as those obtained for the CFA model (Hair et al. 2006). Specifically, the results of SEM showed that the structural model satisfied an acceptable level of model fit. The Chi-square value was significant ($\chi^2/df=2.11$, $p=0.00$) which is to be expected given the large sample size ($N=362$). The value for CFI, an incremental fit index, was 0.90 while the values for absolute fit indices were 0.86 for GFI (goodness-of-fit) and 0.06 for RMSEA (badness-of-fit). Given the large sample size and the complexity of the model, these results supported the overall structural model fit. Thus, the theoretical model presented in Figure 4.15 was used to address the main research questions and test the hypotheses in the study.
4.6.2 Hypothesis Testing

After the overall structural model fit was assessed and confirmed, the next step was to examine the individual parameter estimates to test the causal relationships. Technical and social KM infrastructure capabilities are two exogenous (or independent) latent variables while the other two constructs are endogenous (or dependent) variables in the structural model. The first question deals with the key dimensions of the KM capability of a firm as follows:

Q1. What are the key dimensions of the KM capability of a firm?
The KM capability of a firm is hypothesised to be a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability. The measurement dimensions of KM capability, social KM infrastructure capability and KM process capability are represented by three hypotheses H1 to H3. These hypotheses were tested and the results were presented in the previous sections (4.5.4, 4.5.10 and 4.5.11). The results confirm the model fit and construct validity of the measurement models of social KM infrastructure capability, KM process capability, and KM capability, supporting the three hypotheses, respectively. Specifically, hypothesis 1 states that KM capability is a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability. According to hypothesis 2, social KM infrastructure capability is a second-order latent construct composed of organisational structure, organisational culture and people (or T-shaped skills). Finally, hypothesis 3 states that KM process capability is a second-order latent construct composed of acquisition process, conversion process, application process, and protection process. Thus, the first research question relating to the key dimensions of KM capability was addressed.

To answer the remaining research questions, five hypotheses H4 to H9 were developed to deal with the interrelationships among variables. Structural equation modeling was applied to test these hypotheses through the path coefficients and t-values (Table 4.14).

**Table 4.14 – Parameter Estimates of Structural Model**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Correlation/Standardised Regression Weight</th>
<th>Std. Error</th>
<th>t-value</th>
<th>p-value</th>
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<td>SKMIC &lt;--- TKMIC</td>
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<td>0.05</td>
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<td>H5</td>
<td>KMPC &lt;--- TKMIC</td>
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<td>0.13</td>
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<td>H7</td>
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<td>CA &lt;--- SKMIC</td>
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<td>CA &lt;--- KMPC</td>
<td>0.97</td>
<td>0.27</td>
<td>3.71</td>
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</table>
Q2. How do the key dimensions of the KM capability of a firm relate to each other?

**H4. Technical and social KM infrastructure capabilities are positively correlated.**

This hypothesis suggests that technical KM infrastructure capability is correlated to social KM infrastructure capability and, thus, improvement in each of them will lead to significant improvement in the other. The results of SEM showed that the correlation coefficient between the two exogenous constructs, technical KM infrastructure capability and social KM infrastructure capability was positive and significant (TKMIC↔SKMIC correlation estimate=0.49; \( t=9.09; p=0.00 \)), providing strong evidence for the connection between the two aspects of infrastructure capabilities. Thus, the research hypothesis H4 is supported by the data.

**H5. Technical KM infrastructure capability is positively related to KM process capability.**

This hypothesis suggests that technical KM infrastructure capability is a driver of KM process capability and, therefore, improvement in the former will lead to significant improvement in the latter. The results of SEM showed that the standardised regression weight of the structural path between technical KM infrastructure capability and KM process capability was positive and significant (path coefficient \( \lambda=0.18; \ t=3.25; \ p=0.00 \)) and so the research hypothesis H5 is supported by the data.

**H6. Social KM infrastructure capability is positively related to KM process capability.**

This hypothesis suggests that social KM infrastructure capability is a driver of KM process capability and consequently, improvement in the former will lead to significant improvement in the latter. The results of SEM showed that the standardised regression weight of the structural path between social KM infrastructure capability and KM process capability was positive and significant (path coefficient=0.80; \( t=6.56; \ p=0.00 \)) and so the research hypothesis H6 is supported by the data.
In addition, the squared multiple correlations ($R^2$) indicated that technical KM infrastructure capability and social KM infrastructure capability accounted for 82% of the variance in KM process capability.

**Q3.** How do the key dimensions of the KM capability of a firm affect its CA?

**H7. Technical KM infrastructure capability has an indirect positive impact on CA.**

This hypothesis suggests that technical KM infrastructure capability per se does not generate sustainable CA directly and significantly. The results of SEM showed that the standardised regression weight of the structural path between technical KM infrastructure capability and CA was insignificantly negative (path coefficient $\lambda = -0.07$; $t = -1.06$; $p = 0.29$). However, technical KM infrastructure capability was found to have an indirect effect on CA with $\lambda = 0.18$. The size of this indirect effect is nontrivial relative to the strength of the direct effect and, thus, it should include at least one significant relationship (Hair et al. 2006). As a result, the indirect impact of technical KM infrastructure capability on CA was confirmed to be significantly positive and, thus, the research hypothesis H7 is supported by the data.

**H8. Social KM infrastructure capability has a positive impact on CA.**

This hypothesis suggests that social KM infrastructure capability is a significant predictor for organisational CA. The results of SEM showed that the standardised regression weight of the structural path between social KM infrastructure capability and CA was insignificantly negative (path coefficient $\lambda = -0.02$; $t = -0.11$; $p = 0.92$) and so the research hypothesis H8 is not supported by the data. However, social KM infrastructure capability was found to have an indirect effect on CA with $\lambda = 0.78$. The size of this indirect effect is nontrivial relative to the strength of the direct effect and, thus, it should include at least one significant relationship (Hair et al. 2006). As a result, the indirect impact of social KM infrastructure capability on CA is found to be significantly positive.

**H9. KM process capability has a positive impact on CA.**
This hypothesis suggests that KM process capability provides a significant contribution to firms’ CA. The results of SEM showed that the standardised regression weight of the structural path between KM process capability and CA was significantly positive (path coefficient $\lambda=0.97$; $t=3.71$; $p=0.00$) and so the research hypothesis H9 is supported by the data. Combined with the results of hypotheses H7 and H8, it can be concluded that KM process capability takes a mediating role between infrastructure capabilities, from both technical and social perspectives, and the CA of the firm.

In addition, the structural model demonstrated good explanatory power for CA with 83% of its variance explained by three predictors (the squared multiple correlation $R^2=0.83$). While technical and social KM infrastructure capabilities display insignificant direct effects on CA, the variance of this outcome variable is mainly accounted for by KM process capability.

### 4.7 CONCLUSION

This chapter reported the results of the instrument pre-test followed by the descriptive and inferential analyses of the results from the main study. The two-step approach to SEM was applied using AMOS statistic software version 6.0. The construct validity and measurement model fit were first assessed through CFA to make sure the overall measurement model satisfied the first step of SEM. The structural model was then specified and found to meet the model fit conditions and, therefore, was used to address the research questions and test the theoretical relationships through a set of hypotheses. A summary of the results of the identified hypothesis testing is displayed in Table 4.15.

**Table 4.15 – Summary of Hypotheses Testing Results**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Statement</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>KM capability is a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability.</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>Social KM infrastructure capability is a second-order latent construct composed of organisational structure, organisational culture and people (or T-shaped skills).</td>
<td>Supported</td>
</tr>
</tbody>
</table>
Table 4.15 (Cont.) – Summary of Hypotheses Testing Results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Statement</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H3</td>
<td>KM process capability is a second-order latent construct composed of acquisition process, conversion process, application process and protection process.</td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
<td>Technical and social KM infrastructure capabilities are positively correlated.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5</td>
<td>Technical KM infrastructure capability is positively related to KM process capability.</td>
<td>Supported</td>
</tr>
<tr>
<td>H6</td>
<td>Social KM infrastructure capability is positively related to KM process capability.</td>
<td>Supported</td>
</tr>
<tr>
<td>H7</td>
<td>Technical KM infrastructure capability has an indirect positive impact on CA.</td>
<td>Supported</td>
</tr>
<tr>
<td>H8</td>
<td>Social KM infrastructure capability has a positive impact on CA.</td>
<td>Rejected</td>
</tr>
<tr>
<td>H9</td>
<td>KM process capability has a positive impact on CA.</td>
<td>Supported</td>
</tr>
</tbody>
</table>

The next chapter will provide further discussion on the main findings, research questions, theory bases and practical implications. Two case studies of successful KM are provided to further illustrate some of the findings and implications. Limitations of the study and recommendations for future research are also presented.
CHAPTER FIVE: CONCLUSIONS AND IMPLICATIONS

5.1 INTRODUCTION

The purpose of this study is to develop a theoretical model of KM capability-based CA of the firm and to empirically examine the model in Vietnam, a developing country. The following is a summary of the five chapters presented in the thesis.

Chapter 1 provides an overview of the research and puts forward the three research questions:

Q1 – What are the key dimensions of the KM capability of a firm?
Q2 – How do the key dimensions of the KM capability of a firm relate to each other?
Q3 – How do the key dimensions of the KM capability of a firm affect its CA?

To deal with these research questions, Chapter 2 identifies gaps in current knowledge through a review of existing literature in CA and KM. The intermediate discipline of KM capability-based CA is then discussed. Based on the social capital theory, the resource-based view of the firm blended with a knowledge-based perspective and the dynamic capability approach, a theoretical model and nine hypotheses are developed to answer the three research questions proposed in Chapter 1.

The next chapter outlines the research methodology used to test the theoretical model and the research hypotheses, and justifies the choice of this methodology. The operationalisation of eleven constructs and the research design of the pilot and main studies used to investigate Vietnamese enterprises is outlined. This chapter also discusses the data analysis techniques and ethical considerations of the study.

Chapter 4 reports the results of the pilot study, and presents the descriptive and inferential analyses for the main study. The two-step approach to SEM is applied using AMOS statistic software version 6.0 to evaluate the theoretical model and test the hypotheses proposed in Chapter 2.
This final chapter provides the final conclusions and implications of the study. It starts with a discussion of the three research questions and main findings drawn for each hypothesis. Next, the theoretical contribution and practical implications are discussed, indicating how this research has successfully contributed to the current body of knowledge and to the practice of organisational KM capability and CA. Two case studies are provided to reinforce some of the main findings and implications. Finally, the study’s limitations are recognised, which is a basis for suggesting opportunities for future research. The structure of Chapter 5 is presented in Figure 5.1.

**Figure 5.1 – Chapter Outline**

```
5.1 Introduction
   5.2 Discussion on research questions
      5.3 Theoretical contributions
         5.4 Practical implications
            5.5 Limitations of the study
               5.6 Recommendations for future research
                  5.7 Conclusion
```
5.2 DISCUSSION OF RESEARCH QUESTIONS

The results of the SEM analyses indicate that the proposed measurement model and structural model satisfy the necessary fit conditions. Based on these results, the nine research hypotheses were tested to address the three research questions. This section provides further discussion of the main findings from the data analysis and a comparison with previous studies and a discussion of the theoretical base related to the research questions.

5.2.1 Question 1: What are the key dimensions of the KM capability of a firm?

The first objective of this study was to provide a comprehensive measurement model of the KM capability construct and to test the model that originated in Western developed countries to identify whether it could be applied in the context of an Asian emerging economy.

To address this question, the literature in KM was examined and the measurement model was tested. Gold, Malhotra and Segars (2001) and Smith (2006) provide a model of KM capability with two key dimensions, namely KM infrastructure and process capabilities. KM infrastructure capabilities or KM enablers (or influencing factors) are the overall organisational activities or mechanisms that can stimulate knowledge creation, protect knowledge, and facilitate the sharing of knowledge in an organisation (Lee & Choi 2003; Migdadi 2005). To leverage infrastructure, KM process capabilities must also be present to store, transform, and transport knowledge throughout the organisation (Gold, Malhotra & Segars 2001). Chuang (2004), Lee and Choi (2003), and Migdadi (2005) classify KM infrastructure elements into technical and social perspectives. Adapted from these key previous studies, this study hypothesised that:

**H1**: KM capability is a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability.

The results of a CFA found that the first hypothesis was supported by the data. Specifically, the measurement model of KM capability achieved good fit indices. The validity and reliability of the three constructs (social KM infrastructure capability, technical KM infrastructure capability, and KM process capability) constituting KM capability were also satisfied. An examination of the correlations between the capabilities supports the relatedness
of these dimensions, consistent with the findings in previous studies such as Grant (1991) and Smith (2006), which argue that knowledge capabilities are integrated, linked, and networked resources. These results imply that individual capabilities should not be viewed in isolation but rather should be combined to measure the overall KM capability of an organisation.

Two of the three capabilities constituting KM capability, namely social KM infrastructure capability and KM process capability, were second-order latent constructs and their measures were tested by Hypotheses 2 and 3, respectively.

**H2**: Social KM infrastructure capability is a second-order latent construct composed of organisational structure, organisational culture, and people (or T-shaped skills).

The measurement model of social KM infrastructure capability that was adapted from Chuang (2004), Gold, Malhotra and Segars (2001), Lee and Choi (2003), and Smith (2006) includes three major components, namely organisational structure, organisational culture, and people. The primary dimensions of each component discussed in the literature are rooted in social capital theory, where individual interactions are the source of new knowledge, such as (1) the dimensions of collective behaviour and flexibility for organisational structure; (2) the value of knowledge, the importance of employee interactions, and the management support of knowledge related activities for organisational culture; and (3) the dimensions of T-shaped skills for human resources.

The results of the testing using the measurement model support the existence of these dimensions, emphasising that (1) a flexible organisational design should facilitate the creation, exchange, and transfer of knowledge across structural boundaries; (2) a supportive culture should value and appreciate the importance of knowledge, on-the-job training and learning, and encourage people to create and share knowledge within the organisation; and (3) members of a knowledge-based organisation should understand and be experts in their own tasks and understand others’ tasks through their interactions with them.

An examination of the correlations among the components of social KM infrastructure capability also supports a view of their interrelationships that is consistent with extensive discussion in the literature of their interwoven nature (Lee & Lee 2007; Nonaka & Takeuchi
1995; Zheng 2005). For example, Nonaka and Takeuchi (1995) develop a new organisational structure that is intricately tied to the knowledge culture of the organisation. Organisations that are adaptive, consistent in their values, engaging to employees, and embracing common missions in their cultures are more likely to have a decentralised structure that facilitates a knowledge-friendly environment (Zheng, Yang & McLean 2010).

For each of the three components, the standardised regression weights suggest that culture is the most significant perspective, followed by human resources while organisational structure is of moderate importance. This empirical finding makes sense because peoples’ interactions and understanding, as well as a change of organisational structure, are all dependent on the knowledge culture of the organisation. The implication is that while three contextual factors (i.e. culture, structure, and T-shaped skills) are interrelated in the way they impact on the social KM infrastructure capability cultural issues should receive the most attention as the most significant enabler of effective knowledge development and sharing and of the successful implementation of KM efforts.

**H3**: KM process capability is a second-order latent construct composed of acquisition process, conversion process, application process, and protection process.

The measurement model of KM process capability was adapted from Gold, Malhotra and Segars (2001) and Smith (2006). It includes four major components (i.e. knowledge acquisition, conversion, application, and protection processes). The acquisition process consists of multiple sub-processes for seeking and obtaining entirely new knowledge or creating new knowledge out of existing knowledge through collaboration. The conversion process deals with making existing knowledge useful while the application process is related to how knowledge is actually used and applied. Finally, the protection process aims to keep knowledge secure from inappropriate or illegal use or theft.

The results of the analysis using the measurement model support the existence of these components, emphasising the importance of each process, in particular: (1) the acquisition process: generating new knowledge from existing knowledge and acquiring knowledge about customers, suppliers, and new products/services within the industry; (2) the conversion
process: filtering knowledge, transferring organisational knowledge to individuals, absorbing knowledge from individuals into organisation, and integrating different sources and types of knowledge; (3) the application process: taking advantage of new knowledge and using knowledge to solve new problems, improve efficiency, and adapt to changing competitive conditions; and (4) the protection process: preventing knowledge from inappropriate use or theft by using a variety of policies, rules, procedures, incentives and technology.

An examination of the correlations among the components of KM process capability also supports a view of their interrelationships that is consistent with findings in previous studies (e.g. Gold, Malhotra and Segars (2001) and Smith (2006)). In addition, it can be argued that the output of one process can be the input of other processes and, therefore, they support each other. For example, new knowledge obtained from an acquisition process needs to be made useful through a conversion process before being exploited. To secure this new knowledge from inappropriate or illegal use or theft, a protection process should be applied.

For each of the four components, the standardised regression weights suggested that the application process is the most important process while the acquisition process has the least influence. This result accords with Gold’s (2001) findings that provide strong support for the knowledge-based theory of the firm, positing that the major source of competitiveness rests in the ability to apply integrated knowledge resources and not in the ability to generate new knowledge per se (Grant 1996a). The empirical findings also imply that while the four main processes come together to determine the KM process capability, the application process should be highlighted and strengthened to exploit different types and sources of knowledge to achieve organisational objectives.

The results of the testing of the first three hypotheses regarding the measurement model of KM capability of a firm are depicted in Figure 5.2.
Figure 5.2 – KM Capability as a Multi-dimensional Construct

(Measurement errors and item loadings are omitted for clarity)

5.2.2 Questions 2: How do the key dimensions of the KM capability of a firm relate to each other?

Based on the answer to Question 1 which confirmed that KM capability is a multi-dimensional construct composed of the social KM infrastructure capability, the technical KM infrastructure capability, and the KM process capability, Question 2 investigates the relationships between these distinct but related capabilities. To deal with this question, the literature on the theory of social capital and KM resources and capabilities was examined and the structural model was tested. First, the connection between social and technical KM infrastructure capabilities was examined by Hypothesis 4.

**H4**: Technical and social KM infrastructure capabilities are positively correlated.

An examination of the correlation coefficient between the two exogenous constructs in the structural model supports this hypothesis and this result is consistent with the literature that
extensively discusses the interrelationships among the infrastructural factors such as structure, culture, people, and IT encompassing both the social and technical systems of an organisation (Lee & Lee 2007; Zheng 2005). For example, Gold (2001) argues that if organisational culture does not support the application of technology, no matter what technology base is established, the adoption rate can remain very low. IT infrastructure, on the other hand, is also able to assist in negating some cultural issues especially in international markets (Soley & Pandya 2003), thereby encouraging people to participate in creating, sharing, and applying knowledge within and among organisations.

Technology can also overcome space and time barriers for group interactions, enabling knowledge workers to share their expertise and improve collaboration and communication among employees at all levels and all locations, regardless of structural boundaries and even across organisations (Weill & Broadbent 1998). Specifically, in this study, technology allows employees in multiple locations to learn as a group from a single or multiple sources at a single or multiple points in time. However, in shaping IT infrastructure capability for CA, the human skills which creatively and effectively combine, integrate, coordinate, and utilise IT infrastructure components are the more important factor, not the IT infrastructure itself (Kim 2001). This result, which supports Hypothesis 4, strengthens the evidence found related to the importance of such correlations between the technical and social perspectives of KM infrastructure capabilities.

Regarding the relationships between KM infrastructure elements and knowledge-oriented processes, the following hypotheses were formulated:

**H5**: Technical KM infrastructure capability is positively related to KM process capability.

**H6**: Social KM infrastructure capability is positively related to KM process capability.

Although little research has been carried out into the relative importance of the various KM infrastructure capabilities in relation to KM process capabilities (Khalifa & Liu 2003), a central proposition was examined concerning the role of infrastructure elements as enablers for process capabilities (e.g. Appleyard (1996), Gold, Malhotra and Segars (2001), Hansen
According to the theory of social capital, infrastructure elements enable maximisation of social capital by providing a mechanism for the social interaction of individuals as the basis for KM (Gold, Malhotra & Segars 2001). Knowledge, or intellectual capital, is created through the process of exchange and combination that occurs within the social network of an organisation. Closely tied to the theory of social capital, the KBV of the firm also highlights the effective means of coordinating individuals’ activities within the firm and integrating their knowledge (Grant 1996a; Lopez 2005). This is where the role of organisational infrastructure elements comes into play to effectively manage the firm’s knowledge (Gold 2001).

The assessment of the structural model supported the two hypotheses and an examination of the standardised regression weights indicated that while technical KM infrastructure capability was moderately and positively influential, improvements in social KM infrastructure capability led to strong and positive improvements in KM process capability. The indications further suggest that most of the differences (more than 80%) in KM process capability across firms can be explained by the social infrastructural imperatives of culture, structure and human resources with culture having the most influence. This implication is consistent with the findings of Smith (2006) and Zheng, Yang and McLean (2010), suggesting that how well knowledge is managed is largely associated with how well cultural values are translated into value to the organisation. This may be due to the fact that culture determines the basic beliefs, values, and norms regarding the why and how of knowledge generation, sharing, and utilisation in an organization (Zheng, Yang & McLean 2010).

The testing results of the relationships between the three components of KM capability are depicted in Figure 5.3.

5.2.3 Question 3: How do the key dimensions of the KM capability of a firm affect its CA?

After examining the main components constituting the overall KM capability of an organisation and their interrelationships, the last research question attempted to determine the impact of each component on the firm’s CA. To answer this question, the RBV of the firm,
blended with a knowledge-based perspective, and the dynamic capability approach were utilised to provide the context for defining and understanding the key KM capabilities necessary for organisational CA.

Technical KM infrastructure capability per se is purported in the literature to have no significant, direct effect on a firm’s CA. Instead, firms need to use technologies to leverage and enhance KM processes, thereby improving organisational performance (Khalifa & Liu 2003; Tanriverdi 2005). Meanwhile, the three critical dimensions of social KM infrastructure capability (structure, culture, and people) typically evolve over a long period of time through the accumulation of organisational operations (Gold, Malhotra & Segars 2001) and become a unique, hard to acquire and difficult to replicate organisational KM capability which provides a sustained CA (Chuang 2004). Therefore, the study hypothesised that:

**H7**: Technical KM infrastructure capability has an indirect positive impact on CA.

**H8**: Social KM infrastructure capability has a positive impact on CA.

To explain the relationship between KM process capability and CA, the dynamic capability view of KM was employed. The implication of the dynamic capability concept is that in the current turbulent and dynamic environments, firms are not only competing on their ability to exploit but also on their ability to renew and develop their existing resources and capabilities which enable them to react to changing market conditions and remain competitive (Lopez 2005; Teece, Pisano & Shuen 1997; Winter 2003). In the context of KM, knowledge-oriented processes that change, renew, and exploit knowledge-based resources can represent the knowledge-related dynamic capabilities of the firm which are central to creating and sustaining a CA in today’s dynamic markets. This connection was illustrated by Hypothesis 9:

**H9**: KM process capability has a positive impact on CA.

The results of structural model assessment supported Hypotheses 7 and 9 and rejected Hypothesis 8. In other words, both social and technical KM infrastructure capabilities were found to have no significant, direct contribution to a firm’s CA, however, their indirect positive effects were confirmed by the data. KM process capability was found to have a
strong, positive impact on organisational competitiveness. Combined with the findings from Hypotheses 5 and 6, these findings have several implications.

First, the result for Hypothesis 7 provides strong support for the theory of technology assimilation which states that technologies must be infused and diffused into business processes to enhance organisational performance (Cooper & Zmud 1990; Fichman & Kemerer 1997). In the context of KM, where knowledge-oriented processes play a decisive role, IT should become the enabler of these processes to exhibit and improve their effect on firm performance and CA. In other words, IT does not affect a firm’s CA directly but instead, its effect is mediated through KM process capabilities and, thus, the role of technological capability should be viewed in the context of process capability. A firm that improves its IT assets will realise improvements in process capability for achieving a CA.

Second, the rejection of Hypothesis 8 indicated that the social KM infrastructure capability was not a significant predictor of organisational CA. This finding is contrary to the results of previous studies (e.g. Chuang (2004); Nguyen, Neck and Nguyen (2009)) and did not support the RBV of the firm with a knowledge-based perspective. This finding suggests that when social infrastructure elements are investigated in isolation (as in prior research) without the presence of KM processes, they may significantly contribute to a firm’s CA. However, it becomes apparent that such effects are negligible once KM process capability is included in the model as a mediator and all theoretical hypotheses are examined simultaneously. This is because social KM infrastructure capabilities, along with technical KM infrastructure capabilities, become the key drivers of KM processes.

The indirect impacts of infrastructure capabilities on CA can also be explained by the current dynamic and challenging landscape with its constant and unpredictable changes, where the possibility of organisational infrastructure resources being imitated by competitors and/or modified by engaging in global business activities is increased (Porter 1985; Powell & Dent-Micalef 1997). These factors, once sources of CA, have become a competitive necessity due to their being no longer rare and imperfectly imitable (Barney 1986).
The findings further imply that most of the differences in CA (above 80%) across firms can be explained by the KM process capabilities of acquisition, conversion, application, and protection while KM infrastructure capabilities enable them to enhance the organisation’s outcome. This implication is in accordance with the argument of Walters, Halliday and Glaser (2002) who state that in the New Economy, the generation of competitive positioning is a dynamic process and, thus, other organisational resources such as IT, structure, culture and people should be utilised and leveraged to harness this dynamism.

The results of the structural links between the three components of KM capability and CA are displayed in Figure 5.3.

**Figure 5.3 – Theoretical Model of KM Capability based CA**

\[ R^2 = 0.82 \]

\[ R^2 = \text{Squared Multiple Correlation} \]

*Measurement errors, residual terms and item loadings are omitted*
In summary, this study developed a more comprehensive measurement model of KM capability (Research Question 1) and confirmed that a model grounded in industrialised, advanced countries could be revised to be applicable in the context of a developing economy like Vietnam’s. The interrelationships between the three major components of technical KM infrastructure capability, social KM infrastructure capability, and KM process capability were investigated (Research Question 2). Specifically, KM infrastructure capabilities, from technical and social perspectives, were found to be strongly and positively related to KM process capability with social elements having a dominant influence. The study also examined the impact of each component of KM capability on a firm’s CA (Research Question 3) and found that both social and technical KM infrastructure capabilities indirectly affect CA through KM process capability which is the key driver of organisational competitiveness.

Table 5.1 summarises the final results of the nine hypotheses which were proposed to address the three research questions of this study.
Table 5.1 – Summary of Research Results

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Research Hypothesis</th>
<th>Result</th>
</tr>
</thead>
</table>
| **Q1. What are the key dimensions of the KM capability of a firm?** | **H1:** KM capability is a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability.  
**H2:** Social KM infrastructure capability is a second-order latent construct composed of organisational structure, organisational culture, and people (or T-shaped skills).  
**H3:** KM process capability is a second-order latent construct composed of acquisition process, conversion process, application process, and protection process. | **Supported**  
**Supported**  
**Supported** |
| **Q2. How do the key dimensions of the KM capability of a firm relate to each other?** | **H4:** Technical and social KM infrastructure capabilities are positively correlated.  
**H5:** Technical KM infrastructure capability is positively related to KM process capability.  
**H6:** Social KM infrastructure capability is positively related to KM process capability. | **Supported**  
**Supported**  
**Supported** |
| **Q3. How do the key dimensions of the KM capability of a firm affect its CA?** | **H7:** Technical KM infrastructure capability has an indirect positive impact on CA.  
**H8:** Social KM infrastructure capability has a positive impact on CA.  
**H9:** KM process capability has a positive impact on CA. | **Supported**  
**Rejected**  
**Supported** |
5.3 THEORETICAL CONTRIBUTIONS

This study attempts to expand extant literature in strategic and knowledge management by making several significant contributions.

First, the study provides a critical review of the existing literature on KM and CA, leading to a detailed overview of relevant studies from which the research gaps were identified and a holistic theoretical model of KM capability-based CA of the firm was developed. This model represents one of the first endeavours to combine the social capital theory, the RBV blended with a knowledge-based perspective, and the dynamic capability approach of KM to investigate a variety of integrated and complementary KM capability components and their impacts on organisational competitiveness.

Specifically, the study confirms that social KM infrastructure capability, technical KM infrastructure capability, and KM process capability are three distinct but related components which constitute the overall KM capability of the firm. Two of the three components are second-order latent constructs. Social KM infrastructure capability is composed of organisational structure, organisational culture, and human resources among which cultural attributes are the most critical dimension. KM process capability has four dimensions, namely knowledge acquisition, conversion, application, and protection processes with application process being the most important. A notable difference from previous studies of KM capabilities (e.g. Gold (2001), Smith (2006)) is the separation of KM infrastructure capability into social and technical aspects. Based on the hypotheses that social KM capability has a positive effect on CA while technical KM infrastructure capability is indirectly influential, the separation makes possible an estimate of the impact of each group on the outcome variable.

Moreover, the model does not view different KM infrastructure elements in isolation (as in prior research) as such an approach is not consistent with the interwoven nature of the organisational factors of structure, culture, people, and information technology. Instead this research emphasises the strong, positive correlations between them. In addition, the model stresses the importance of KM processes as dynamic capabilities in association with an organisation’s CA, a viewpoint which was ignored or only discussed in conceptual terms in previous studies (e.g. Chuang (2004), Nielsen (2006)). Therefore, the interrelationships
between KM capabilities were also explored to highlight their valuable integrated contribution to the organisational outcome.

There is a lack of empirical evidence in the literature on KM and CA, especially in the context of developing countries. This study filled this gap by conducting a questionnaire survey of a cross-section of enterprises in Vietnam to test the theoretical links in the proposed model. The empirical findings supported the theoretical model developed in this study and confirmed that while social and technical infrastructure capabilities are strongly correlated, they are both enablers of process capability with social elements having a dominant influence while the effect of the technological aspect is trivial. These infrastructure capabilities, however, do not directly affect organisational CA. Their impacts are fully mediated through KM process capability and, thus depend on their strength in supporting this process capability. It is the critical role of KM processes as dynamic capabilities in firm competitiveness that makes the key contribution of the research model. The empirical results also confirm that the dynamic capability-based approach of KM is workable in an emerging less developed economy.

Another significant contribution of the study relates to methodological issues. An instrument for measuring KM capability and CA consisting of nine first-order latent constructs was derived from the literature and customised for the research at hand. As most conceptual models of KM capabilities have been developed and empirically tested in developed or newly industrialised countries such as the USA (Gold, Malhotra & Segars 2001; Zheng 2005), Australia (Migdadi 2005), Canada (Manovas 2004), Taiwan (Chuang 2004), Hong Kong (Khalifa, Lam & Lee 2001; Khalifa & Liu 2003), and Korea (Choi & Lee 2002, 2003; Lee & Choi 2003; Lee & Lee 2007), this study makes a contribution to the literature by testing and modifying the measurement model in Vietnam, a developing country. The findings confirm that the instrument which was adapted from studies grounded in developed countries is valid and reliable in an emerging, less developed economy though some items were deleted to improve the level of model fit. This instrument can be used in future research and can also be retested or adapted in other contexts such as other developing countries where the cultural attributes may be different from those found in the countries in which the original model was developed.
Finally, the application of the two-step approach in SEM to test the measurement and structural models is of considerable significance. Most previous studies investigating the association between different KM capabilities and CA used a number of analysis techniques such as multiple regression and factor analysis which enabled the examination of only a single relationship between the dependent and independent variables at a time. This is where the SEM, which employs these multivariate techniques in a more sophisticated manner, is particularly useful.

First of all, SEM enables the researcher to assess measurement properties and test the key theoretical relationships with one technique. It is also able to reveal unobserved concepts in these relationships and correct for measurement error in the estimation process. More notably, SEM can examine a series of dependence relationships simultaneously in which a hypothesised dependent variable becomes an independent variable in a subsequent dependence relationship (e.g. TKMIC → KMPC; SKMIC → KMPC; and KMPC → CA in this study). This technique also makes it possible to combine dependence and correlation relationships among exogenous and endogenous constructs in a single SEM model (e.g. correlation between TKMIC and SKMIC in this study), thereby making it possible to create a model to explain the entire set of relationships. All of these properties of the SEM method were utilised for assessing the research model proposed in the study and, thus, improving the accuracy of its findings in comparison with findings from prior research.

5.4 PRACTICAL IMPLICATIONS

Achieving a CA is always one of the strategic objectives of every business. To remain sustainable and competitive in the turbulent, dynamic environments of today, firms are required to acquire strong dynamic capabilities by implementing a variety of KM activities. Therefore, the most important concern of senior management must be how to develop and effectively exploit such capabilities to improve the firm’s organisational competitiveness. This study attempts to provide a variety of practical recommendations for guiding business executives, especially those who are operating in Vietnam, to be successful in using KM projects to attain strategic business objectives.
Firstly, the study suggests that practising managers should understand and develop a holistic approach of implementing an overall KM capability which is composed of the three perspectives of social, technical infrastructure and processes. These correlated and complementary capabilities should not be considered in isolation but rather should be integrated and combined to leverage, exploit and sustain a CA.

Secondly, management should, on the one hand, coordinate and synchronise infrastructure capabilities from both social and technical aspects to facilitate KM process capability. On the other hand, they need to keep in mind that cultural attributes are of the most importance to social infrastructure capability and also exert the most influence on other capabilities and, as such, this factor should receive more attention.

The first case study (as presented in Appendix 5) is an example to illustrate these implications. Specifically, although a relatively successful case of developing KM infrastructure and processes, Vietnam Bank for Agriculture and Rural Development (Agribank) recognises that to improve and strengthen the KM performance and competitiveness they need to place more effort into encouraging people to share their knowledge as this is one of their main weaknesses. Although the bank is equipped with advanced information technologies that provide a formal knowledge sharing facility such as intranet, websites, online forums, electronic document storage, the potential and benefits of these functions are not fully exploited. This may be due to the fact that the employees tend to seek knowledge-oriented help via their social networks (i.e. peers, subordinates, superiors) when they cannot solve a work problem by themselves. However, people are unwilling to share their knowledge with colleagues if they believe that knowledge is their power and doing so will affect their hierarchical position in the organisation.

These issues at Agribank can be explained based on the distinctive Vietnamese business and organisational culture. Vietnam has been found to highly score on power distance and collectivism, the two out of five cultural value dimensions developed by Hofstede (1980) that underlie the organisational behaviour. It is argued that collectivism fosters cooperation and team work that facilitates disclosure of knowledge as well as opens the access to and creates motivation to exchange knowledge (Chen, Chen & Meindl 1998; Nahapiet and Ghoshal 1998;
Wagner 1995). As a result, members in collectivist organisations and cultures (e.g. Vietnam) tend to seek knowledge-oriented help via their social networks as people are willing to share and exchange their knowledge with other members. In contrast, power distance is argued to have a negative impact on knowledge sharing and exchange activities (Wang, Su & Yang 2011). In high power distance organisations and cultures such as Vietnam employees respect formal positions and rarely bypass them in the hierarchy (Deresky 2011). This explains why people might be unwilling to share their knowledge with colleagues if they believe that knowledge is their power and doing so will affect their hierarchical position in the organisation.

To solve the aforementioned problem, Agribank should redesign its organisational structure and move towards a flatter and more flexible form that facilitates the sharing and transfer of knowledge across structural boundaries (within and across branches). A standardised reward system is also needed to encourage employees to actively involve in a friendly knowledge sharing environment by interacting with each other, discussing their work with and asking the opinion of people within and in other groups, divisions, and exchanging their own experience in specific situations.

In a broader context of Vietnam, there are a number of significant implications for KM strategies. First, managers must build up an organisational design which enables the creation of new knowledge, knowledge exchange and transfer across functional boundaries. At the same time, knowledge needs to be frequently examined for errors and mistakes. Second, senior management should clearly support the role of knowledge in corporate success, make sure that their employees understand this issue and more importantly, encourage them to participate in on-the-job training and learning, as well as in capturing and transferring knowledge. Regarding human skills, business managers must emphasise employees’ understanding of their own and others’ tasks, develop their expertise, and enable them to communicate well with all other organisational members. Combining all of these individual capabilities with more attention to cultural issues will assist firms to develop a strong social KM infrastructure capability.
Along with social capability, practising managers also need to take advantage of technological capability to support KM processes. In particular, organisations should use technology to map the location of specific types of knowledge, thereby facilitating the application and sharing of knowledge. Technology also needs to be applied to facilitate people in multiple locations to learn as a group from a single or multiple resources and at a single or multiple points in time. By doing so, social and technical infrastructure elements can complement each other and come together to enhance knowledge-oriented processes.

In addition, to consider and develop infrastructure capabilities as positive enablers of process capability, the study further suggests that practising managers must place more effort into pursuing various KM processes. The four related processes of knowledge acquisition, conversion, application, and protection, on the one hand, should be integrated and coordinated to leverage KM infrastructure. On the other hand, managers should be aware of the more critical role of the capacity to effectively apply integrated knowledge resources to the creation and delivery of products and services to customers, assisting firms to improve their efficiency and reduce costs, thereby leading to a CA.

While the organisation’s vital strategic objectives are firm performance and CA, senior management should understand that infrastructure capabilities per se do not directly improve these outcomes, especially in the presence of process capability. However, infrastructure elements can, through KM processes, provide a fully mediated support. Therefore, to attain a CA, management should start with the development of infrastructure capabilities from both social and technical perspectives, which in turn will provide the platform necessary for increasing the effectiveness and efficiency of process capability, the key driver in improving organisational competitiveness. Both case studies presented in Appendix 5 provided typical examples of how successful organisations manage their knowledge infrastructure and processes to achieve and sustain CA in a transitional economy.

As mentioned above, among infrastructure capabilities, more attention should be paid to social aspects, especially cultural issues because they have a considerably stronger influence on knowledge processes than the technical aspects do. Similarly, while combining all knowledge processes, more effort needs to be placed on applying and utilising knowledge-based
resources. Although being aware of the relative importance of each factor is necessary to establish prioritisation in implementing KM projects and activities, practising managers should understand that an over emphasis on any factor, especially those of less importance (e.g. information technology, and acquisition processes) as well as a complete neglect of any factor, especially those of major influence (e.g. organisation culture, application process) can lead to inefficiency and other negative consequences.

5.5 LIMITATIONS OF THE STUDY

Although this research presents strong evidence regarding the impact of KM capabilities on organisational CA, the results should be interpreted in light of the study’s limitations.

First, the study may suffer from potential response bias associated with the single informant and the single technique of data collection used. However, in Vietnam, where the centralisation of power is still common, using multiple informants may be redundant and is unlikely to result in advantages such as greater accuracy of data. Moreover, the complex theoretical model proposed in this study has made a single method survey difficult to implement. Therefore, future studies might use the structured methods of triangulation to gain deeper insights into research issues of interest.

Second, this study used responses of senior management covering a variety of job functions, assuming that their judgements regarding KM capabilities and CA are objective. However, an over-reporting or under-reporting of certain phenomena may occur as a result of the respondent’s job satisfaction or personal and role characteristics (Bagozzi, Philips & Yi 1991).

Third, as is the case in any research, problems with sampling method occur and a completely random sample is difficult to achieve. The sampling frame used in this study, the Business Directory issued by the Vietnamese Chamber of Commerce and Industry, though considered the best commercial database available on the Vietnamese market, still possesses weaknesses. First, the database was not updated at the time of the research and thus, on the one hand, may contain old information such as names, addresses, and even businesses no longer existent, and on the other hand, may also miss information about newly established businesses. These issues may have produced some non-response bias. In addition, the database is only
categorised by industry and location and not by size, so the fact that nearly 80% of responding enterprises were SMEs is not necessarily an accurate indication of the proportion of Vietnamese enterprises that are SMEs.

Fourth, the measurement scales of several constructs such as technical KM infrastructure capability, the T-shape skills of people, and knowledge protection processes were reduced to three items to increase the level of model fit and this may have limited the accuracy of the measures of these constructs. Although having three indicators per construct is acceptable, particularly when other constructs have more than three, it is suggested that statistics under re-specification of the CFA model on a shortened scale require cross-validation studies to re-evaluate the measurement model and examine its generalisability. However, due to the complexity of the model and limitations of the study’s resources, only a single sample was obtained and so model re-estimation was not attempted. Further research could address this problem.

Next, practical implications suggested in the study were based on theoretical and empirical findings requiring a holistic and comprehensive approach. It is difficult and sometimes impossible for management to undertake the whole task at one time due to limited resources of businesses, especially in a developing country like Vietnam. Though the relative importance of individual capabilities was discussed, future research is necessary to explore the model further to determine if there is an optimal level of capabilities.

Case study two (as presented in Appendix 5) indicates this limitation. Although Vietnam Airlines’ management strongly believes that their infrastructure and processes of managing knowledge have provided them with a CA in the marketplace both nationally and internationally, they have experienced limited resources as a common problem in such a high-tech and knowledge-intensive industry. While KM is characterised as innovative and resource-consuming, the corporation is attempting to manage their knowledge in a better cost-effective manner, thereby adding more value in the organisation and providing it with a SCA. For example, in terms of the incentive system to encourage knowledge creation, sharing, and application they tend to focus on non-financial rewards such as a sense of accomplishment, a sense of involvement in the organisation, or a sense of contribution to the organisation. In
addition, they believe that learning from success and failure of past projects will improve R&D and a central focus of the integration of knowledge derived from R&D will successfully exploit innovative ideas and expand the creative potential of the entire corporation.

Another limitation of the study is the empirical evidence rejected the hypothesis that social KM infrastructure capability has a direct positive impact on organisational CA which is contrary to previous findings in the literature. Although justification for this result has been provided, the theoretical relationship should be retested in future research in various contexts where cultural properties and other conditions of structure and human resource may be different. In addition, it should be acknowledged that there are other elements of KM capability that were not investigated in this study such as business strategy and leadership. In future research, these factors might be taken into consideration to provide a more comprehensive picture of the interrelationships among these factors, their relative importance on KM process capabilities and their contribution to organisational competitiveness.

Finally, in a broader view, it is stated that Vietnamese cultural, economic and political context shapes entrepreneurial business activities and strongly impacts a firm’s ability to achieve CA and business success (Ha & Swierczek 2003; Nguyen & Alam 2007b; Nguyen, Alam & Perry 2007a). Within the scope of this study, focus is only directed to examining the internal environment of organisations – that is, their organisational culture, organisational structure, T-shaped skills of people, and information technology as KM infrastructure capabilities of a firm. This is considered a limitation of the study that may be dealt with in future research.

5.6 FUTURE RESEARCH

The abovementioned limitations of the study offer a number of opportunities for future research to extend the current body of knowledge in the literature of KM and CA.

First, future research could investigate each of the individual knowledge capabilities included in the model by combining both quantitative and qualitative research methods to develop a deeper insight into each factor and provide richer and more accurate data in a specific context. For example, while organisational culture is confirmed as the most important dimension of social KM infrastructure capability in this study, future research could use case study
methodology to explain in detail how and why organisational culture affects KM process capability and business competitiveness.

Second, according to Hair et al. (2006), it is advisable to use more than three indicators to measure constructs. In this study, the measurement scales of technical KM infrastructure capability, T-shape skills of people, and knowledge protection process were reduced to three items to increase the level of model fit. Therefore, the shortened scale of the measures due to the CFA model re-specification requires cross-validation studies to re-evaluate the measurement model and examine its generalisability. Cross-validation studies might be conducted in similar or different cultures.

Third, this study opens opportunities for future research due to the complexity and limited resources of businesses in today’s dynamic landscape. It would be appropriate if the model was further explored to determine if there is an optimal level of capabilities so that management can employ available resources and an optimal combination of different factors to develop a proactive approach for designing long-term strategies.

Next, as mentioned earlier, one hypothesis was rejected in the current theoretical model. This finding needs more testing in similar or different contexts to reconfirm the empirical result and the theory of a dynamic capability-based approach, especially in emerging, less developed countries. Other factors constituting social KM infrastructure capability can also be included in the model, such as business strategy and leadership to examine the relative importance of each factor as well as their impacts on the organisational CA.

Finally, the characteristics of the Vietnamese business environment that determine organisational infrastructure elements (i.e. culture, structure, people and information technology) can also be investigated to provide an important part of the overall picture of the internal and external business environments. Many previous studies conclude that the potential for entrepreneurial activities and business success can be enhanced by cultural factors in general and organisational culture in particular (Baughn et al. 2006; Deshpande, Farley & Bowman 2004). In the context of Vietnam, cultural issues are even more critical and complex because the country has been strongly affected by Chinese Confucian culture
(Nguyen, Neck & Nguyen 2008) and also had long exposure to Western values during French colonisation from the 1880s to the 1950s and the US intervention until 1975 (Mcleod & Dieu 2001). While cultural factors can hinder or encourage KM activities and firm competitiveness, Vietnamese enterprises need to incorporate Confucian philosophy, socialist market philosophy and careful adaption of new Western management approaches and innovative ideas in accordance with their values and beliefs (Mcleod & Dieu 2001).

In addition, Deshpande, Farley and Bowman (2004, p. 22) state that ‘Vietnamese firms emerging from central planning to some form of market socialism tend to be bureaucratic’. In other words, they tend to focus on loyalty, commitment, regulations and formal organisational structure rather than future orientation (Nguyen, Neck & Nguyen 2009). Due to the strong influence of Confucian culture, Vietnamese managers might accept hierarchical and formal management structures, placing less emphasis on individual actions and achievement, and be less willing to accept change (Berrell, Wright & Hoa 1999).

It is clear that Vietnamese culture is a determinant of both external and internal business environments which influences entrepreneurial activities in general and the success of KM projects in particular. Therefore, future research might investigate further external environments with a focus on cultural properties to explain why and how they can assist to enhance KM processes, business innovation and competitiveness.

5.7 CONCLUSION

Given the increasingly critical role of KM in connection with firm competitiveness in today’s dynamic market place, this study has contributed to the current body of knowledge in KM and CA by combining social capital theory and the RBV blended with knowledge and dynamic capability approaches to develop an integrative theoretical model of KM capability-based CA of the firm. While there is a shortage of studies in this area in the context of emerging less developed countries, the study also adds to the literature empirical evidence within the specificities of Vietnam through a questionnaire survey with 1,000 senior managers in Hanoi and Ho Chi Minh City.
The empirical results of SEM analysis of data collected from 362 usable responses confirmed that the model is workable in the context of Vietnam, an emerging less developed country. In Vietnam, as well as in developed countries the KM capability of a firm is a multi-dimensional construct composed of social KM infrastructure capability, technical KM infrastructure capability, and KM process capability. Social KM capability is identified by three dimensions, including culture, structure and people (or T-shaped skills). KM process capability is identified by four dimensions, namely acquisition, conversion, application and protection processes.

Social and technical KM infrastructure capabilities are strongly correlated. They are both enablers for KM process capabilities with social elements having dominant influence. KM processes as dynamic capabilities, in turn, take the key role in contributing to organisational competitiveness. As a result, the indirect effects of social and technical infrastructure capabilities on organisational CA are fully mediated through KM process capability. In addition to theoretical contributions, the study also provides a variety of practical recommendations for business executives, especially those who are operating in Vietnam, on how to be successful in applying KM projects to achieve business strategic objectives.

Future research can further investigate KM capabilities to develop a deeper insight into particular factors of interest, especially cultural issues, or can explore other factors to provide a more comprehensive picture of the association between organisational KM and CA. Cross-validation studies might also be conducted in different cultures to improve the generalisability of the findings and to determine if there is an optimum level of capabilities in each context.
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APPENDICES

Appendix 1a: Ethics Approval (Version 1)
Appendix 1b: Ethics Approval (Version 2)
Appendix 2a: Cover Letter (English version)
Appendix 2b: Cover Letter (Vietnamese version)
Appendix 3a: Final Questionnaire (English version)
Appendix 3b: Final Questionnaire (Vietnamese version)
Appendix 4a: Reminder Letter (English version)
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Appendix 5: Case studies of successful KM capability-based CA
APPENDIX 1A

ETHICS APPROVAL (VERSION 1)

HUMAN RESEARCH ETHICS COMMITTEE (HREC)
NOTIFICATION

To: Professor Phil Neck/Nguyen Thi Nguyet Que
Graduate College of Management, Tweed Heads Campus
pneck@scu.edu.au, t.nguyen.15@scu.edu.au
cc. sue.white@scu.edu.au

From: Secretary, Human Research Ethics Committee
Graduate Research College, R. Block

Date: 3.8.07

Project: Knowledge management capability based competitive advantage: an empirical study of Australian small and medium sized enterprises.

Status: Approved subject to the standard conditions of approval.
Approval Number ECN-07-116

HUMAN RESEARCH ETHICS COMMITTEE (HREC)

The Southern Cross University Human Research Ethics Committee has established, in accordance with the National Statement on Ethical Conduct in Human Research – Section 5/Processes of Research Governance and Ethical Review, a procedure for expedited review by a delegated authority.

This expedited ethics application was considered by the HREC sub-committee at the Tweed Heads Campus. It has now been approved.

This expedited approval will be ratified by the full HREC at the September meeting. If the full HREC has any further queries, the researchers are expected to answer these satisfactorily.

Please also note that the National Statement on Ethical Conduct in Human Research (National Statement or NS) has been reviewed and the following conditions adhere to the new National Statement.

Standard Conditions in accordance with the National Statement on Ethical Conduct in Human Research (National Statement) (NS).
1. Monitoring

**NS 5.5.1 – 5.5.10**

Responsibility for ensuring that research is reliably monitored lies with the institution under which the research is conducted. Mechanisms for monitoring can include:
(a) reports from researchers;
(b) reports from independent agencies (such as a data and safety monitoring board);
(c) review of adverse event reports;
(d) random inspections of research sites, data, or consent documentation; and
(e) interviews with research participants or other forms of feedback from them.

The following should be noted:

(a) All ethics approvals are valid for **12 months** unless specified otherwise. If research is continuing after 12 months, then the ethics approval MUST be renewed. Complete the Annual Report/Renewal form and send to the Secretary of the HREC.

(b) **NS 5.5.5**

Generally, the researcher/s **provide a report every 12 months** on the progress to date or outcome in the case of completed research specifically including:
- The maintenance and security of the records.
- Compliance with the approved proposal
- Compliance with any conditions of approval.
- Any changes of protocol to the research.

Note: Compliance to the reporting is **mandatory** to the approval of this research.

(c) Specifically, that the researchers report immediately and notify the HREC, in writing, for approval of **any change in protocol**. **NS 5.5.3**

(d) That a report is sent to HREC when the **project has been completed**.

(e) That the researchers report immediately **any circumstance** that might affect ethical acceptance of the research protocol. **NS 5.5.3**

(f) That the researchers report immediately **any serious adverse events/effects** on participants. **NS 5.5.3**

2. Research conducted overseas

**NS 4.8.1 – 4.8.21**

That, if research is conducted in a country other than Australia, **all research protocols for that country are followed ethically and with appropriate cultural sensitivity**.

3. Complaints

**NS 5.6.1 – 5.6.7**

Institutions may receive complaints about researchers or the conduct of research, or
about the conduct of a Human Research Ethics Committee (HREC) or other review body.

Complaints may be made by participants, researchers, staff of institutions, or others. All complaints should be handled promptly and sensitively.

*Complaints, in the first instance, should be addressed in writing to the following:*

Ms Sue Kelly  
Ethics Complaints Officer and Secretary  
HREC  
Southern Cross University  
PO Box 157  
Lismore, NSW, 2480  
Telephone (02) 6626-9139 or fax (02) 6626-9145  
Email: sue.kelly@scu.edu.au

*All complaints are investigated fully and according to due process under the National Statement on Ethical Conduct in Human Research and this University. Any complaint you make will be treated in confidence and you will be informed of the outcome.*

*All participants in research conducted by Southern Cross University should be advised of the above procedure and be given a copy of the contact details for the Complaints Officer. They should also be aware of the ethics approval number issued by the Human Research Ethics Committee.*

Sue Kelly  
Secretary & Ethics Complaints Officer  
HREC  
Ph: (02) 6626 9139  
sue.kelly@scu.edu.au

Associate Professor Baden Offord  
Chair, HREC  
Ph: (02) 66203162  
baden.offord@scu.edu.au
APPENDIX 1B

ETHICS APPROVAL (VERSION 2)

HUMAN RESEARCH ETHICS COMMITTEE (HREC)
NOTIFICATION

To: Prof Phil Neck/T. Nguyen
Faculty of Business
Graduate College of Management
philip.neck@scu.edu.au, t.nguyen.15@scu.edu.au

From: Secretary, Human Research Ethics Committee
Graduate Research College, R. Block

Date: 16/11/07

Project: Knowledge management capability based competitive advantage: an empirical study of Vietnamese enterprises.

Status: Change of protocol approved subject to the standard conditions of approval.
Approval Number ECN-07-116

The Southern Cross University Human Research Ethics Committee has established, in accordance with the National Statement on Ethical Conduct in Human Research – Section 5/Processes of Research Governance and Ethical Review, a procedure for expedited review by a delegated authority.

This change of protocol was considered by the Tweed Heads Human Research Ethics Subcommittee (HRESC). The change which includes the survey being conducted in Vietnam by the student, who is Vietnamese, has now been approved subject to the usual standard conditions of approval.

However, the title of the research project does not reflect that research is being conducted in Vietnam. Perhaps this could be changed to reflect this aspect?

This change will be ratified by the full HREC at the December meeting. If the full HREC has any further queries, the researchers are expected to answer these satisfactorily.

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Please also note that the National Statement on Ethical Conduct in Human Research (National Statement or NS) has been reviewed and the following conditions adhere to the new National Statement.

**Standard Conditions** in accordance with the National Statement on Ethical Conduct in Human Research (National Statement) (NS).

1. **Monitoring**

   **NS 5.5.1 – 5.5.10**

   Responsibility for ensuring that research is reliably monitored lies with the institution under which the research is conducted. Mechanisms for monitoring can include:
   
   (a) reports from researchers;
   
   (b) reports from independent agencies (such as a data and safety monitoring board);
   
   (c) review of adverse event reports;
   
   (d) random inspections of research sites, data, or consent documentation; and
   
   (e) interviews with research participants or other forms of feedback from them.

   The following should be noted:

   (c) All ethics approvals are valid for **12 months** unless specified otherwise. If research is continuing after 12 months, then the ethics approval MUST be renewed.

   (d) **NS 5.5.5**

   Generally, the researcher/s **provide a report every 12 months** on the progress to date or outcome in the case of completed research specifically including:

   - The maintenance and security of the records.
   - Compliance with the approved proposal
   - Compliance with any conditions of approval.
   - Any changes of protocol to the research.

   Note: Compliance to the reporting is **mandatory** to the approval of this research.

   (c) Specifically, that the researchers **report immediately** and notify the HREC, in writing, for approval of **any change in protocol. NS 5.5.3**

   (d) That a report is sent to HREC when the **project has been completed**.

   (e) That the researchers **report immediately any circumstance** that might affect ethical acceptance of the research protocol. **NS 5.5.3**

   (g) That the researchers **report immediately any serious adverse events/effects** on participants. **NS 5.5.3**

2. **Research conducted overseas**

   **NS 4.8.1 – 4.8.21**

   If research is conducted in a country other than Australia, **all research protocols for that**
country are followed ethically and with appropriate cultural sensitivity.

5. **Complaints**

*NS 5.6.1 – 5.6.7*

Institutions may receive complaints about researchers or the conduct of research, or about the conduct of a Human Research Ethics Committee (HREC) or other review body.

Complaints may be made by participants, researchers, staff of institutions, or others. All complaints should be handled promptly and sensitively.

*Complaints, in the first instance, should be addressed in writing to the following:*

The Executive Officer  
Office of the Vice-Chancellor  
Southern Cross University  
PO Box 157  
Lismore, NSW, 2480

*All complaints are investigated fully and according to due process under the National Statement on Ethical Conduct in Human Research and this University. Any complaint you make will be treated in confidence and you will be informed of the outcome.*

*All participants in research conducted by Southern Cross University should be advised of the above procedure and be given a copy of the contact details for the Complaints Officer. They should also be aware of the Ethics Approval Number issued by the Human Research Ethics Committee.*

Sue Kelly  
Secretary & Ethics Complaints Officer  
HREC  
Ph: (02) 6626 9139  
sue.kelly@scu.edu.au

Dr Carmen Cox  
Chair, HREC Sub-Committee  
Graduate College of Management  
Tweed Heads SCU  
carmen.cox@scu.edu.au
Dear Survey Participants,

I am a Doctor of Business Administration candidate at the Graduate College of Management of the Southern Cross University (SCU) in Australia. In this program, all candidates are required to undertake a research project that examines a significant issue relating to a field of business.

The issue I am investigating is the relationship between a firm’s knowledge management capability and competitive advantage in Vietnam. In today’s dynamic turbulent market place, businesses are required to adapt by developing new knowledge to generate new skills and capabilities. As a result, knowledge management has become as a powerful weapon for organisations to remain competitive.

In the trends of integration and globalisation, especially after joining WTO, Vietnam has emerged as a potential market with challenges and opportunities. Though knowledge management might still be a relatively new concept, it is becoming one of the critical issues that Vietnamese enterprises have to face, develop and exploit as a determinant of success. As such, the purpose of this study is to provide practising managers with useful comprehensive insights on knowledge management and assist them in answering the question “how the firms need to be effectively managed for their overall knowledge management capability to achieve, leverage, exploit, and sustain a competitive advantage in the current context of complex and challenging economic landscape?”.

The questionnaire of this survey should be filled out by the senior executives of businesses operating in Vietnam, who are knowledgeable of their organisation’s knowledge infrastructure and process capabilities as well as its competitive advantage. Completion of the survey is
voluntary and you may withdraw at any time without any consequence. Data collected is anonymous, strictly confidential and will be kept in a secure place.
If you are willing to participate, please read the questionnaire carefully and answer all questions to the best of your knowledge. It would be much appreciated if you could return the survey in the postage paid return envelop **before 31 March 2008**. If you would like to receive a summary of the research results when it is available, please send me a request to the address given below.

The ethical aspects of this study have been approved by the SCU Human Research Ethics Committee. The approval number is ECN-07-116. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Ethics Complaints Officer, Ms. Sue Kelly (phone: 02.6620.9139, fax: 02.6626.9145, email: skelly@scu.edu.au). Any complaint you make will be treated in confidence and you will be informed of the outcome.

Should you have any queries about the survey please do not hesitate to contact me through FKS Company Ltd. Thank you very much for your time and efforts and your contribution is highly appreciated.

Kind regards,

**Researcher**
On behalf of Thi N. Q. Nguyen
FKS Company Ltd.
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Kính gửi Quý Ông/Bà,

Tôi là nghiên cứu sinh về Quản trị kinh doanh dưới sự hướng dẫn của Giáo sư Tiến sĩ Phillip Neck tại Trường Đại học Southern Cross, Australia. Tái cử ứng cử viên theo khóa học này đều phải thực hiện một dự án nghiên cứu khảo sát một vấn đề quan trọng liên quan đến doanh nghiệp.

Vấn đề tôi đang nghiên cứu là mối quan hệ giữa năng lực quản lý tri thức và lợi thế cạnh tranh của các doanh nghiệp Việt Nam. Trong thị trường năng động và đầy biến đổi hiện nay, các doanh nghiệp buộc phải thích nghi bằng cách phát triển tri thức mới nhằm tạo ra những kỹ năng và năng lực mới. Kết quả là, quản lý tri thức đã trở thành một vũ khí đặc lược giúp các doanh nghiệp duy trì cạnh tranh.

Trong xu thế hội nhập và toàn cầu hóa đặc biệt sau khi gia nhập WTO, Việt Nam nói lên như một thị trường đầy tiềm năng, cơ hội và thách thức. Mặc dù có thể còn là một khái niệm tương đối mới nhưng quản lý tri thức đang và sẽ là một trong những vấn đề quan trọng mà các doanh nghiệp Việt Nam phải đối đầu, phát triển và khai thác như một yếu tố quyết định thành công của doanh nghiệp. Do đó, mục đích của nghiên cứu này là cung cấp cho các nhà quản lý doanh nghiệp Việt Nam một cái nhìn khái quát, toàn diện về năng lực quản lý tri thức và trả lời câu hỏi ‘Làm thế nào để quản lý tri thức một cách hiệu quả nhằm phát triển, tân dụng, khai thác và duy trì lợi thế cạnh tranh trong bối cảnh kinh tế phục vụ và đẩy thượng thực hiện nay?’.

Đối tượng khảo sát của nghiên cứu này bao gồm các nhà quản lý doanh nghiệp (cấp trưởng phòng trở lên), những người hiểu rõ về các yếu tố cơ sở hạ tầng của tổ chức, các quá trình có định hướng tri thức cũng như lợi thế cạnh tranh của doanh nghiệp. Việc tham gia khảo
sát của ông/bà là hoàn toàn tự nguyện, dữ liệu do ông/bà cung cấp được giàu tén và bảo mật tuyệt đối. Nếu ông/bà đồng ý tham gia khảo sát này, xin vui lòng ghi nhận chút ít thời gian hoàn thành bằng câu hỏi được gửi kèm theo дня và gửi lại cho chúng tôi theo phong bì đã dán tem và ghi sẵn địa chỉ trước ngày **31/3/2008.** Bạn tóm tắt kết quả nghiên cứu sẽ được chuyển tới ông/bà ngay sau khi việc thu thập và phân tích số liệu hoàn tất.

Nghiên cứu này đã được Ủy ban Đạo đức nghiên cứu con người Trường Đại học Southern Cross cấp giấy phép số ECN-07-116. Nếu ông/bà có bất kỳ thắc mắc hay phản hồi gì về khả năng đạo đức của nghiên cứu này, xin vui lòng liên hệ với Bà Sue Kelly (ĐT 02 6620 9139, fax 02 6626 9145, email: skelly@scu.edu.au). Chúng tôi sẽ giải quyết mọi thắc mắc của quý ông/bà trên cơ sở bảo mật và sẽ thông báo với ông/bà kết quả sớm nhất có thể.

Nếu ông/bà có bất kỳ câu hỏi gì về nội dung khảo sát này xin vui lòng liên hệ với công ty Nghiên cứu và Tư vấn FKS. Chúng tôi rất mong nhận được sự tham gia đóng góp của ông/bà.

Xin trân trọng cảm ơn!

**Nghiên cứu sinh**
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Công ty Nghiên cứu & Tư vấn FKS  
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Giáo sư Tiến sĩ Philip Neck  
Trưởng Quản trị Sau đại học  
Tweed Heads NSW 2485 Australia  
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Phone: (617) 5599 3125
APPENDIX 3A

FINAL QUESTIONNAIRE (ENGLISH VERSION)

A SURVEY OF KNOWLEDGE MANAGEMENT CAPABILITY BASED COMPETITIVE ADVANTAGE ON VIETNAMESE ENTERPRISES

This study focuses on the perception of business executives on knowledge management infrastructure capabilities, knowledge management process capabilities and competitive advantage of businesses.

The questionnaire consists of two main sections:
(1) KNOWLEDGE MANAGEMENT CAPABILITY BASED COMPETITIVE ADVANTAGE
(2) PARTICIPANT & BUSINESS BACKGROUND INFORMATION

Please note that your responses are anonymous and confidential and will be used by the researcher only for the purposes of research.
There are no right or wrong answers. Please answer all questions to the best of your knowledge.

DEFINITIONS OF KEY TERMS

- ‘KNOWLEDGE’ in this study is defined as a resource/asset that provides organisations with a competitive advantage, including:
  + **Tangible resources/assets**: Generic, basic knowledge assets that are relatively easy to imitate in a competitive environment. These knowledge assets are usually used to support or enable the storage and acquisition of core/strategic knowledge assets. **Examples**: organisational structure and infrastructure such as information systems, computer hardware, software, database, people, documented policies and procedures, training manuals,…
  + **Intangible resources/assets**: Core, strategic knowledge assets that provide competitive advantage, including the resources held by people and (Examples: intelligence, expertise, judgement, know-how, insight, experience, accumulated learning and knowledge, ability to innovate, ability to learn) and the resources owned the firm (Examples: organizational culture, formal reporting structure, planning processes, controlling and coordinating systems, networks, team-work, patterns of coordination, methodologies, ability to manage change, ability to innovate, ability to learn, perception of high quality standards, perception of high customer service standards, patents, designs, trademarks, copyrights, trade marks, trade secrets, reputation).

- ‘KNOWLEDGE MANAGEMENT’ in this study is defined as the organisational capability which identifies, locates (creates or acquires), transfers, converts, and distributes knowledge into competitive advantage'.
## SECTION 1: KNOWLEDGE MANAGEMENT CAPABILITY AND COMPETITIVE ADVANTAGE

*Please indicate (by circling the appropriate box) the extent to which you agree or disagree with each of the statements from captions ‘Organisational Structure’ through ‘Competitive Advantage’. The following scale is applied for all statements:*

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<tr>
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<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Slightly Disagree</td>
<td>Neither Agree Nor Disagree</td>
<td>Slightly Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
<td></td>
</tr>
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</table>

### 1. Organisational Structure

**My organisation’s …**

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<tr>
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<tbody>
<tr>
<td>SI1</td>
<td>Structure facilitates the discovery of new knowledge</td>
<td>1</td>
<td>2</td>
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<tr>
<td>SI2</td>
<td>Structure facilitates the creation of new knowledge</td>
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</tr>
<tr>
<td>SI6</td>
<td>Managers frequently examine knowledge for errors/mistakes</td>
<td>1</td>
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<td>6</td>
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<tr>
<td>SI7</td>
<td>Structure facilitates the transfer of new knowledge across structural boundaries</td>
<td>1</td>
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</table>

**My organisation …**

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<tbody>
<tr>
<td>SI3</td>
<td>Bases our performance on knowledge creation</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td>SI4</td>
<td>Has a standardised reward system for sharing knowledge</td>
<td>1</td>
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</tr>
<tr>
<td>SI5</td>
<td>Designs processes to facilitate knowledge exchange across functional boundaries</td>
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</table>

### 2. Organisational Culture

**In my organisation …**

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<tr>
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</thead>
<tbody>
<tr>
<td>CI1</td>
<td>Employees understand the importance of knowledge to corporate success</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
<td>6</td>
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<tr>
<td>CI2</td>
<td>High levels of participation are expected in capturing and transferring knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>CI3</td>
<td>On-the-job training and learning are valued</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
<td>6</td>
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<tr>
<td>CI6</td>
<td>Senior management strongly support the role of knowledge management to business success</td>
<td>1</td>
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### 3. T-shaped Skills (People)
### My organisation’s members …

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<tbody>
<tr>
<td>PI1</td>
<td>Can understand not only their own tasks but also others’ tasks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>PI2</td>
<td>Can make suggestions about others’ tasks</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
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<tr>
<td>PI3</td>
<td>Can communicate well not only with their department members but also with other department members</td>
<td>1</td>
<td>2</td>
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<tr>
<td>PI4</td>
<td>Are specialists in their own field of expertise</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td>PI5</td>
<td>Can perform their own task effectively without regard to environmental changes</td>
<td>1</td>
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### 4. Information Technology

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<tbody>
<tr>
<td>TI1</td>
<td>Employees to collaborate with other persons outside the organization</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>TI2</td>
<td>People in multiple locations to learn as a group from a single source or at a single point in time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>TI3</td>
<td>People in multiple locations to learn as a group from a multiple source or at multiple points in time</td>
<td>1</td>
<td>2</td>
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<tr>
<td>TI4</td>
<td>It to map the location (e.g. an individual, specific system, or database) of specific types of knowledge</td>
<td>1</td>
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</table>

### 5. Acquisition Process

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<tbody>
<tr>
<td>ACP1</td>
<td>Has processes for acquiring knowledge about our customers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ACP2</td>
<td>Has processes for generating new knowledge from existing knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tr>
<tr>
<td>ACP3</td>
<td>Has processes for acquiring knowledge about our suppliers</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ACP4</td>
<td>Has processes for distributing knowledge throughout the organization</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ACP5</td>
<td>Has processes for acquiring knowledge about new products/services within our industry</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td>ACP6</td>
<td>Has processes for exchanging knowledge between individuals</td>
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### 6. Conversion Process

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<tbody>
<tr>
<td>CP1</td>
<td>Has processes for filtering knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>CP2</td>
<td>Has processes for transferring organisational knowledge to individuals</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>CP3</td>
<td>Has processes for absorbing knowledge from individuals into the organisation</td>
<td>1</td>
<td>2</td>
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<tr>
<td>CP4</td>
<td>Has processes for integrating different sources and types of knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>CP5</td>
<td>Has processes for organising (store/file) knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
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<tr>
<td>CP6</td>
<td>Has processes for replacing outdated knowledge</td>
<td>1</td>
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## 7. Application Process

<table>
<thead>
<tr>
<th>My organisation …</th>
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<tbody>
<tr>
<td>APP1 Has processes for using knowledge in development of new products/services</td>
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<td>2</td>
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<td>7</td>
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<tr>
<td>APP2 Has processes for using knowledge to solve new problems</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>APP3 Matches sources of knowledge to problems and challenges</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
<td>6</td>
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</tr>
<tr>
<td>APP4 Uses knowledge to improve efficiency</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>APP5 Uses knowledge to adjust strategic direction</td>
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<tr>
<td>APP6 Is able to locate and apply knowledge to changing competitive conditions</td>
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<td>6</td>
<td>7</td>
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<tr>
<td>APP7 Takes advantage of new knowledge</td>
<td>1</td>
<td>2</td>
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## 8. Protection Process

<table>
<thead>
<tr>
<th>My organisation …</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td>PP1 Has processes to protect knowledge from inappropriate use inside the organisation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>PP2 Has processes to protect knowledge from inappropriate use outside the organisation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>PP3 Has processes to protect knowledge from theft from within the organisation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>PP4 Has processes to protect knowledge from theft from outside the organisation</td>
<td>1</td>
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<tr>
<td>PP5 Has extensive polices and procedures for protecting trade secrets</td>
<td>1</td>
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<td>6</td>
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<tr>
<td>PP6 Values and protects knowledge embedded in individuals</td>
<td>1</td>
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<tr>
<td>PP7 Clearly communicates (create awareness of) the importance of protecting knowledge</td>
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## 9. Competitive Advantage (extensively meet customers’ needs)

<table>
<thead>
<tr>
<th>My organisation often uses knowledge-based innovation</th>
<th>1</th>
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<tbody>
<tr>
<td>CA2 My organisation’s market position can create strong barriers to entry for other firms</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<td>7</td>
</tr>
<tr>
<td>CA3 My organisation uses knowledge management to widen the array (line/range) of products without increasing costs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>CA4 The knowledge management capability in my organisation would be difficult and expensive for rivals to duplicate</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
SECTION 2: PARTICIPANT & BUSINESS BACKGROUND INFORMATION

(This information is used for sample descriptives)

10. What is your gender?

□ 1  Male  □  2  Female

11. What is your age?

□ 1  Under 30 years  □  3  41-50 years  □  5  Over 60 years
□ 2  31-40 years  □  4  51-60 years

12. Please indicate the highest level of education you have achieved.

□ 1  High school  □  3  Bachelor’s degree  □  5  Master’s degree
□ 2  Diploma  □  4  Graduate diploma  □  6  Doctorate

13. What is your current position?

□ 1  CEO/President/Chairman  □  5  Finance/Accounting Manager  □  8  Information Technology Manager
□ 2  Managing Director  □  6  Human Resource Manager  □  9  Operations/Production Manager
□ 3  General Manager  □  7  R & D Manager  □  10  Other (please specify):
□ 4  Sales/Marketing Manager

14. How many years have you worked for this firm?

□ 1  Less than 1 year  □  3  3-5 years  □  5  11-20 years
□ 2  1-2 years  □  4  6-10 years  □  6  More than 20 years
15. What is the number of employees in your firm?

<table>
<thead>
<tr>
<th></th>
<th>Employees</th>
<th></th>
<th>Employees</th>
<th></th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Less than 20</td>
<td>3</td>
<td>50-199</td>
<td>5</td>
<td>300-499</td>
</tr>
<tr>
<td>2</td>
<td>20-49</td>
<td>4</td>
<td>200-299</td>
<td>6</td>
<td>500 and over</td>
</tr>
</tbody>
</table>

16. What type of ownership is your business?

<table>
<thead>
<tr>
<th></th>
<th>Ownership</th>
<th></th>
<th>Ownership</th>
<th></th>
<th>Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>State-owned</td>
<td>3</td>
<td>Joint stock</td>
<td>5</td>
<td>100% foreign owned</td>
</tr>
<tr>
<td>2</td>
<td>Limited</td>
<td>4</td>
<td>Joint venture</td>
<td>6</td>
<td>Others</td>
</tr>
</tbody>
</table>

17. What is your firm’s primary industry?

<table>
<thead>
<tr>
<th></th>
<th>Industry</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturing</td>
<td>2</td>
</tr>
</tbody>
</table>

If you would like to receive a copy of the research results, please indicate your mailing or email address below:

__________________________________________________________________________

THANK YOU VERY MUCH FOR YOUR TIME AND EFFORTS TO COMPLETE THIS SURVEY!
APPENDIX 3B

FINAL QUESTIONNAIRE (VIETNAMESE VERSION)

NGHIỀN CỬU VỀ LỘI THẾ CẢNH TRANG DỪA VÀO NĂNG LỰC QUẢN LÝ TRI THỨC CỦA CÁC DOANH NGHIỆP VIỆT NAM

Nghiên cứu này nhằm mang đến nhận thức của các nhà quản lý doanh nghiệp về lợi thế cảnh tranh dựa vào năng lực cơ sở hạ tầng và năng lực quá trình quản lý tri thức của doanh nghiệp.

Bảng câu hỏi gồm hai phần chính:
(1) LỘI THẾ CẢNH TRANG DỪA VÀO NĂNG LỰC QUẢN LÝ TRI THỨC
(2) THÔNG TIN CÁ NHÂN VÀ DOANH NGHIỆP

Nghề nhân viên được đánh giá dựa trên mức độ của nghiệp nhân viên.
Không có câu trả lời đúng hay sai. Rất mong ông/bà trả lời tất cả các câu hỏi để mức độ chính xác cao nhất có thể.

ĐỊNH NGHĨA CÁC THUẬT NGỮ CÓ BÀN

- ‘TRI THỨC’ trong nghiên cứu này được hiểu là ‘một nguồn lực/tài sản cung cấp lợi thế cảnh tranh cho tổ chức’, bao gồm:

  + Nguồn lực/tài sản hữu hình: Tri thức chung, cơ bản, dễ bắt chước trong môi trường cạnh tranh, thường được sử dụng để hỗ trợ cho việc tích lũy, hình thành tri thức cơ sở chuyên môn. Ví dụ: cơ sở hạ tầng như hệ thống thông tin, phần cứng, phần mềm, cơ sở dữ liệu, con người, các chính sách và thứ tự được ghi chép thành văn bản, tài liệu đào tạo,...

  + Nguồn lực/tài sản vô hình: Tri thức cơ sở chuyên môn, cung cấp lợi thế cạnh tranh vững chắc cho tổ chức, bao gồm nguồn lực được sở hữu bởi các thành viên của tổ chức (Ví dụ: sự hiểu biết, thông thạo, cố vấn chính, kinh nghiệm, khả năng tiếp cận kỹ thuật, kinh nghiệm tích lũy, khả năng đổi mới, khả năng học hỏi, nhận thức cao về tiêu chuẩn chất lượng và tiêu chuẩn dịch vụ khách hàng, thiết kế, sáng chế phát minh, quyền sở hữu trí tuệ, bản quyền, nhận hiệu suất, đã, bí mật thương mại, danh tiếng,...)
- ‘QUẢN LÝ TRI THỨC’ trong nghiên cứu này được hiểu là ‘năng lực tổ chức trong việc xác định, định vị, tạo ra tri thức, chuyển giao, chuyển đổi và phân bố tri thức thành lợi thế cạnh tranh’.

PHÀN 1: LỢI THẾ CẢNH TRANH DỪA VÀO NĂNG LỰC QUẢN LÝ TRI THỨC

Xin ông/bà cho biết mức độ đồng ý của mình đối với các phát biểu dưới đây bằng cách khoanh tròn chỉ một con số thích hợp cho từng phát biểu theo thang điểm từ 1 đến 7 với quy ước:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoàn toàn phản đối</td>
<td>Phản đối</td>
<td>Có xu hướng phản đối</td>
<td>Bình thường</td>
<td>Có xu hướng đồng ý</td>
<td>Động ý</td>
<td>Hoàn toàn đồng ý</td>
</tr>
</tbody>
</table>

1. Những phát biểu dưới đây nhận mảnh đến nhận thức của ông/bà về ‘CƠ CẤU TỔ CHỨC’ có liên quan đến tổ chức của ông/bà. ‘CƠ CẤU TỔ CHỨC’ trong nghiên cứu này bao gồm ‘các nguyên tắc, chính sách, thủ tục, cấp bậc báo cáo, hệ thống đồng viên và ranh giới giữa các phòng ban nhằm định hình nhiệm vụ trong tổ chức’.

<table>
<thead>
<tr>
<th>Trong tổ chức của chúng tôi ...</th>
<th>Hoàn toàn phản đối</th>
<th>Hoàn toàn đồng ý</th>
</tr>
</thead>
<tbody>
<tr>
<td>S11</td>
<td>Có cấu tổ chức tạo điều kiện cho việc khám phá tri thức mới</td>
<td>1</td>
</tr>
<tr>
<td>S12</td>
<td>Có cấu tổ chức tạo điều kiện cho việc tạo ra tri thức mới</td>
<td>1</td>
</tr>
<tr>
<td>S13</td>
<td>Kết quả hoạt động kinh doanh dựa vào việc tạo ra tri thức</td>
<td>1</td>
</tr>
<tr>
<td>S14</td>
<td>Có hệ thống khen thưởng được tiêu chuẩn hoá đối với việc chia sẻ tri thức</td>
<td>1</td>
</tr>
<tr>
<td>S15</td>
<td>Các quá trình được thiết kế tạo điều kiện cho việc tạo ra tri thức giữa các bộ phận chức năng</td>
<td>1</td>
</tr>
<tr>
<td>S16</td>
<td>Các nhà quản lý thường xuyên kiểm tra tri thức để phát hiện lỗi và sai số</td>
<td>1</td>
</tr>
<tr>
<td>S17</td>
<td>Có cấu tổ chức tạo điều kiện cho việc chuyển giao tri thức mới giữa các bộ phận chức năng</td>
<td>1</td>
</tr>
</tbody>
</table>

2. Những phát biểu dưới đây nhận mảnh đến nhận thức của ông/bà về ‘VĂN HÓA TỔ CHỨC’ có liên quan đến tổ chức của ông/bà. ‘VĂN HÓA TỔ CHỨC’ trong nghiên cứu này bao gồm ‘các giá trị, niềm tin chúng và thực tiễn con người trong tổ chức, bao gồm sự tương tác qua lại giữa các nhân viên trong tổ chức, tầm nhìn công ty và hỗ trợ của ban quản lý cấp cao’.
### Trong tổ chức của chúng tôi ...

| CI1 | Nhân viên hiểu được tầm quan trọng của tri thức đối với thành công của doanh nghiệp | 1 2 3 4 5 6 7 |
| CI2 | Chứng tỏ kỹ năng nhiều nhân viên tam gia vao việc nắm bắt và chuyển giao tri thức | 1 2 3 4 5 6 7 |
| CI3 | Học hỏi và đào tạo tại nơi làm việc được chủ y cô i trong | 1 2 3 4 5 6 7 |
| CI6 | Ban quản lý cấp cao thức sự ủng hộ vài trò của tri thức đối với thành công của doanh nghiệp | 1 2 3 4 5 6 7 |

3. Những phát biểu dưới đây nhận mạnh đến nhận thức của ông/bà về 'YÊU TÔ CON NGƯỜI' có liên quan đến tổ chức của ông/bà. 'YÊU TÔ CON NGƯỜI' trong nghiên cứu này liên quan đến 'mục dỗ hiểu biết của nhân viên về nhiệm vụ của họ cũng như nhiệm vụ của những người khác trong tổ chức'.

<table>
<thead>
<tr>
<th>Các thành viên trong tổ chức của chúng tôi ...</th>
<th>Hoàn toàn phản đối</th>
<th>Hoàn toàn đồng ý</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI1 Không chỉ hiểu rõ nhiệm vụ của họ mà còn nắm được nhiệm vụ của những người khác</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>PI2 Có thể dựa ra dễ xuất, hiểu về nhiệm vụ của những người khác</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>PI3 Có thể giao tiếp tốt không chỉ với thành viên trong bộ phận của họ mà còn với các bộ phận khác</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>PI4 Là chuyên gia trong lĩnh vực chuyên môn của họ</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>PI5 Có thể hoàn thành nhiệm vụ của họ một cách hiệu quả mà không bị ảnh hưởng bởi những thay đổi của môi trường</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

4. Những phát biểu dưới đây nhận mạnh đến nhận thức của ông/bà về ‘CÔNG NGHỆ THÔNG TIN’ có liên quan đến tổ chức của ông/bà. ‘CÔNG NGHỆ THÔNG TIN’ trong nghiên cứu này liên quan đến ‘các hệ thống của tổ chức cho phép việc nắm bắt, dịch chuyển, tiếp cận và sử dụng tri thức trong tổ chức bao gồm hệ thống thông tin doanh nghiệp, hợp tác và phân phối thông tin giữa các bộ phận/phòng ban, khám phá tri thức, định vị tri thức, sử dụng thông tin/trí thức chiến lược tạo cơ hội cho doanh nghiệp và bảo vệ tài nguyên tri thức'.

<table>
<thead>
<tr>
<th>Tổ chức của chúng tôi sử dụng công nghệ cho phép ...</th>
<th>Hoàn toàn phản đối</th>
<th>Hoàn toàn đồng ý</th>
</tr>
</thead>
<tbody>
<tr>
<td>TI1 Nhân viên công tác với những người khác bên ngoài tổ chức</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>TI2 Những người ở các địa điểm khác nhau tạo thành một nhóm cùng học vào cùng một thời điểm sử dụng một nguồn cung cấp tri thức</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>TI3 Những người ở các địa điểm khác nhau tạo thành một nhóm cùng học vào các thời điểm</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
5. Những phát biểu dưới đây nhận mạnh đến nhận thức của ông/bà về ‘QUÁ TRÌNH TẠO TRI THỨC’ có liên quan đến tổ chức của ông/bà. ‘QUÁ TRÌNH TẠO TRI THỨC’ trong nghiên cứu này được hiểu là ‘khai náng tìm kiếm và có được tri thức hoàn toàn mới hoặc tạo ra tri thức mới từ tri thức đã có thông qua hợp tác’.

<table>
<thead>
<tr>
<th>Tổ chức của chúng tôi…</th>
<th>Hoàn toàn phản đối</th>
<th>Hoàn toàn đồng ý</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACP1</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>ACP2</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>ACP3</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>ACP4</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>ACP5</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>ACP6</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

6. Những phát biểu dưới đây nhận mạnh đến nhận thức của ông/bà về ‘QUÁ TRÌNH CHUYỂN ĐOỊ TRÍ THỨC’ có liên quan đến tổ chức của ông/bà. ‘QUÁ TRÌNH CHUYỂN ĐOỊ TRÍ THỨC’ trong nghiên cứu này được hiểu là ‘khai năng làm cho tri thức hiện có trở nên có ích’.

<table>
<thead>
<tr>
<th>Tổ chức của chúng tôi…</th>
<th>Hoàn toàn phản đối</th>
<th>Hoàn toàn đồng ý</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP1</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>CP2</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>CP3</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>CP4</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>CP5</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>CP6</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

7. Những phát biểu dưới đây nhận mạnh đến nhận thức của ông/bà về ‘QUÁ TRÌNH ÁP DỤNG TRI THỨC’ có liên quan đến tổ chức của ông/bà. ‘QUÁ TRÌNH ÁP DỤNG TRI THỨC’ trong nghiên cứu này liên quan đến việc ‘tri thức sử dụng sử dụng như thế nào’.

<table>
<thead>
<tr>
<th>Tổ chức của chúng tôi…</th>
<th>Hoàn toàn phản đối</th>
<th>Hoàn toàn đồng ý</th>
</tr>
</thead>
<tbody>
<tr>
<td>APP1</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
8. Những phát biểu dưới đây nhân mạnh đến nhận thức của ông/bà về ‘QUÁ TRÌNH BAÔ VŒ TRÌ THỌC’ có liên quan đến tổ chức của ông/bà. ‘QUÁ TRÌNH BAÔ VŒ TRÌ THỌC’ trong nghiên cứu này được hiểu là ‘khả năng bảo vệ tri thức không bị sử dụng bất hợp pháp hoặc không thích đáng hoặc bị đánh cáp’.

<table>
<thead>
<tr>
<th>Tố chức của chúng tôi</th>
<th>Hoàn toàn phản đối</th>
<th>Hoàn toàn đồng ý</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Những phát biểu dưới đây nhân mạnh đến nhận thức của ông/bà về ‘LÔI THÉ CAI NH TRANH’ có liên quan đến tổ chức của ông/bà. ‘LÔI THÉ CAI NH TRANH’ trong nghiên cứu này bao gồm ‘sự sáng tạo/dimei mới, vị thế thị trường, đáp ứng yêu cầu khách hàng một cách rộng rãi và khó sao chép’.

| CA1                   |                  |
| CA2                   |                  |
| CA3                   |                  |
| CA4                   |                  |
PHẦN 2: THÔNG TIN CÁ NHÂN VÀ DOANH NGHIỆP

(Thông tin trong phần này được sử dụng để phân tích những đặc điểm về nhân khẩu của người tham gia khảo sát)

10. Giới tính của người tham gia khảo sát:

□ 1 Nam
□ 2 Nữ

11. Độ tuổi của người tham gia khảo sát:

□ 1 Dưới 30 tuổi
□ 2 31-40 tuổi
□ 3 41-50 tuổi
□ 4 51-60 tuổi
□ 5 Trên 60 tuổi

12. Xin vui lòng cho biết bằng cấp cao nhất mà ông/bà đạt được:

□ 1 Trung học
□ 2 Cao đẳng
□ 3 Cử nhân
□ 4 Thạc sĩ
□ 5 Tiến sĩ

13. Chức năng công việc chính của ông/bà là:

□ 1 Quản lý cấp cao (P/Tổng/GĐ, P/Chủ tịch HĐQT,....)
□ 2 Tài chính Kế toán
□ 3 Kinh doanh/Bán hàng/Tiếp thị
□ 4 Sản xuất
□ 5 Nghiên cứu Phát triển
□ 6 Công nghệ thông tin
□ 7 Nhân sự
□ 8 Dự án
□ 9 Khác _____________

14. Xin vui lòng cho biết thời gian ông/bà đã làm việc tại đây?

□ 1 Dưới 1 năm
□ 2 1-2 năm
□ 3 3-5 năm
□ 4 6-10 năm
□ 5 11-20 năm
□ 6 Trên 20 năm
15. Quy mô doanh nghiệp (số lượng nhân viên) nơi ông/bà làm việc?

- □ 1. Dưới 20 người
- □ 2. 20-49 người
- □ 3. 50-199 người
- □ 4. 200-299 người
- □ 5. 300-499 người
- □ 6. Trên 500 người

16. Doanh nghiệp của ông/bà thuộc một trong những loại hình cơ bản nào sau đây?

- □ 1. Doanh nghiệp Nhà nước
- □ 2. Công ty TNHH
- □ 3. Công ty Cổ phần
- □ 4. DN liên doanh với nước ngoài
- □ 5. DN 100% vốn nước ngoài
- □ 6. Các loại hình khác

17. Doanh nghiệp của ông/bà thuộc một trong hai ngành cơ bản nào sau đây?

- □ 1. Sản xuất
- □ 2. Dịch vụ

_Nếu ông/bà muốn nhận một bản tóm tắt kết quả của nghiên cứu này, xin vui lòng cung cấp địa chỉ e-mail hoặc thu tin:_

XIN CHÀN THÀNH CẢM ƠN ÔNG/BÀ RẤT NHIỀU VỊ ĐÃ DÀNH THỜI GIAN VÀ CÔNG SỨC HOÀN THÀNH BẢNG CẦU HỘI NÀY!
DEAR SURVEY PARTICIPANTS,

Last month an invitation letter seeking your input on a mail survey of knowledge management capability based competitive advantage was mailed to you. I would much appreciate it if you could complete the questionnaire. If you have already responded, thank you very much for your assistance.

Background: I am a Doctor of Business Administration candidate at the Graduate College of Management of the Southern Cross University (SCU) in Australia. In this program, all candidates are required to undertake a research project that examines a significant issue relating to a field of business.

The issue I am investigating is the relationship between a firm’s knowledge management capability and competitive advantage in Vietnam. In today’s dynamic turbulent market place, businesses are required to adapt by developing new knowledge to generate new skills and capabilities. As a result, knowledge management has become as a powerful weapon for organisations to remain competitive.

In the trends of integration and globalisation, especially after joining WTO, Vietnam has emerged as a potential market with challenges and opportunities. Though knowledge management might still be a relatively new concept, it is becoming one of the critical issues that Vietnamese enterprises have to face, develop and exploit as a determinant of success. As such, the purpose of this study is to provide practising managers with useful comprehensive insights on knowledge management and assist them in answering the question “how the firms need to be effectively managed for their overall knowledge management capability to achieve,
leverage, exploit, and sustain a competitive advantage in the current context of complex and challenging economic landscape?”. 

The questionnaire of this survey should be filled out by the senior executives of businesses operating in Vietnam, who are knowledgeable of their organisation’s knowledge infrastructure and process capabilities as well as its competitive advantage. Completion of the survey is voluntary and you may withdraw at any time without any consequence. Data collected is anonymous, strictly confidential and will be kept in a secure place.

If you are willing to participate, please read the questionnaire carefully and answer all questions to the best of your knowledge. It would be much appreciated if you could return the survey in the postage paid return envelop before 28 April 2008. If you would like to receive a summary of the research results when it is available, please send me a request to the address given below.

The ethical aspects of this study have been approved by the SCU Human Research Ethics Committee. The approval number is ECN-07-116. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Ethics Complaints Officer, Ms. Sue Kelly (phone: 02.6620.9139, fax: 02.6626.9145, email: skelly@scu.edu.au). Any complaint you make will be treated in confidence and you will be informed of the outcome.

Should you have any queries about the survey please do not hesitate to contact me through FKS Company Ltd. Thank you very much for your time and efforts and your contribution is highly appreciated.

Kind regards,

Reseacher
On behalf of Thi N. Q. Nguyen
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123 Truong Dinh St., Dist. 3, HCMC
Email: info@fks.com.vn
Phone: (848) 9320285
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Supervisor
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Email: philip.neck@scu.edu.au
Phone: (07) 5599 3125
Kính gửi Quý Ông/Bà,


Giới thiệu chung:

Tôi là nghiên cứu sinh về Quản trị kinh doanh dưới sự hướng dẫn của Giáo sư Tiến sĩ Phillip Neck tại Trường Đại học Southern Cross, Australia. Tất cả ứng viên theo khóa học này đều phải thực hiện một dự án nghiên cứu khảo sát một vấn đề quan trọng liên quan đến doanh nghiệp.

Văn đề tôi đang nghiên cứu là mối quan hệ giữa năng lực quản lý tri thức và lợi thế cạnh tranh của các doanh nghiệp Việt Nam. Trong thị trường năng động và đầy biến động hiện nay, các doanh nghiệp bước phải thích nghi bằng cách phát triển tri thức mới nhằm tạo ra những kỹ năng và năng lực mới. Kết quả là, quản lý tri thức đã trở thành một vũ khí đặc lục giúp các doanh nghiệp duy trì cạnh tranh.

Trong xu thế hội nhập và toàn cầu hóa đặc biệt sau khi gia nhập WTO, Việt Nam nói lên như một thị trường đầy tiềm năng, cơ hội và thách thức. Mục đích cố thể còn là một khía cạnh tiêu hoá mới nhưng quản lý tri thức đang và sẽ là một trong những vấn đề quan trọng mà các doanh nghiệp Việt Nam phải đối đầu, phát triển và khai thác như một yếu tố quyết định thành công của doanh nghiệp. Do đó, mục đích của nghiên cứu này là cung cấp cho các nhà quản lý doanh nghiệp Việt Nam một cái nhìn khái quát, toàn diện về năng
lực quản lý tri thức và trả lời câu hỏi ‘Làm thế nào để quản lý tri thức một cách hiệu quả nhằm phát triển, tận dụng, khai thác và duy trì lợi thế cạnh tranh trong bối cảnh kinh tế phức tạp và đầy thách thức hiện nay?’.


Nghiên cứu này đã được Ủy ban Đạo đức nghiên cứu con người Trường Đại học Southern Cross cấp giấy phép số ECN-07-116. Nếu ông/bà có bất kỳ trách nhiệm hay phản hồi gì về khía cạnh đạo đức của nghiên cứu này, Xin vui lòng liên hệ với bà Sue Kelly (ĐT 02 6620 9139, fax 02 6626 9145, email: skelly@scu.edu.au). Chúng tôi sẽ giải quyết mọi phản nàn theo mức độ của quý ông/bà trên cơ sở bảo mật và sẽ thông báo với ông/bà kết quả sốm nhận có thể.

Nếu ông/bà có bất kỳ câu hỏi gì về nội dung khảo sát này xin vui lòng liên hệ với công ty Nghiên cứu và Tư vấn FKS. Chúng tôi rất nhận được sự tham gia đóng góp của ông/bà.

Xin trân trọng cảm ơn!

**Nghiên cứu sinh**
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APPENDIX 5

TWO CASE STUDIES OF KNOWLEDGE MANAGEMENT CAPABILITY BASED COMPETITIVE ADVANTAGE

Case 1: Vietnam Bank for Agriculture and Rural Development (Agribank)

Established in 1988, Agribank is the leading commercial bank that holds the decisive role and is the main force in the economic development in Vietnam, especially in investment in agriculture, farmers and rural areas. This is the largest bank in terms of capital, assets, personnel/staff, operating network, and customer numbers. As of December 2009, Agribank's leading position has been confirmed with many aspects: total capital of 434,331 billion VND, own capital of 22,176 billion VND, total assets of 470,000 billion VND, total balance of 354,112 billion VND, operating network of 2,300 branches and transaction offices nationwide, and human resources of 35,135 personnel. In addition, Agribank has the largest number of correspondent banks in Vietnam with 1,034 agent banks in 95 countries and territories all over the world.

Agribank always focuses on innovation and investment in banking technology applications to efficiently serve the business management activities and the development of advanced banking services network. With its position as the leading commercial bank of Vietnam, Agribank has endlessly endeavoured and gained encouraging achievements, contributing to the industrialisation, modernisation and economic development of the country.

In-depth interviews were conducted with two key persons - the general director and deputy general director of Bac Ha Noi branch, one of the tier-one branches of the bank located in Hanoi, the capital of Vietnam. The results reveal that the branch’s infrastructure elements are supportive and encouraging of knowledge-related activities. The organisational design is flexible that facilitates the transfer of knowledge across structural boundaries (within and across branches) and the branch’s management frequently monitors knowledge within the organisation to note and correct errors and mistakes. In terms of organisational culture, they value on-the-job training and learning and strongly support the role of KM to business success. The branch also focuses on the T-shaped skills and knowledge of the employees via
intensive training and job rotation and so the employees can understand not only their own
tasks but also others’ tasks and are specialists in their own field of expertise. In regard to
information technology, they use collaboration and distributed learning technologies to allow
their members to work together and collaborate interactively (e.g. e-learning, teleconferencing, video-conferencing, etc.).

With such a supportive infrastructure, the Bac Ha Noi branch of Agribank confirms that they
have had necessary processes in place to manage knowledge within the organisation. To
obtain knowledge, they have processes for acquiring knowledge about their customers
(through direct contacts by phone, mail, email and doing customer satisfaction studies),
knowledge about new products/services within their industry (from market surveys, data
search tools, and industry publications), and exchanging knowledge between individuals
(through work groups, informal events, electronic discussion forums, etc.). To make
knowledge useful, they have processes for absorbing knowledge from individuals into the
organisation and integrating different sources and types of knowledge (using knowledge
maps, electronic databases, etc.). To apply knowledge, they have processes for using
knowledge in development of new products and services and in adjustment of strategic
direction (responding to the acquired knowledge about customers, competitors, technology
and new products/services in the industry). Finally, to protect knowledge from inappropriate
or illegal use or from theft, they communicate clearly and create the awareness of the
importance of protecting knowledge throughout the organisation, especially the knowledge
used to generate or preserve the organisational CA.

The branch’s management believes that their infrastructure and processes of managing
knowledge have provided them with a strong market position that can create barriers to entry
for potential competitors. However, they also recognise that as in most other Vietnamese
organisations, KM is still at an initial stage and mainly focuses on fundamental knowledge at
a lower level (i.e. explicit knowledge). Though this type of knowledge is an indispensable
basis of an organisation’s development, it has not been effectively managed within the branch
particularly and throughout the bank operating network generally. To improve and strengthen
the branch’s KM performance and competitiveness, the management realises that they need to
place more effort into encouraging people to share their knowledge as this is one of their main
problems. The fact is that although the bank is equipped with advanced information
technologies that provide a formal knowledge sharing facility such as intranet, websites,
online forums, electronic document storage, the potential and benefits of these functions are
not fully exploited. Employees tend to seek knowledge-oriented help via their social networks
(i.e. peers, subordinates, superiors) when they cannot solve a work problem by themselves.
However, people are unwilling to share their knowledge with colleagues if they believe that
knowledge is their power and doing so will affect their hierarchical position in the
organisation. To solve the problem, the bank is trying to develop a standardised reward system
for sharing knowledge and encourages employees to be actively involved in a friendly
knowledge sharing environment by interacting with each other, discussing their work with and
asking the opinion of people within and in other groups, divisions, and exchanging their own
experience in specific situations.

Case 2: Vietnam Airlines Corporation

Originally established by the government in 1956, the Vietnam Civil Aviation Department
marked the birth of the civil aviation industry in Vietnam. The 1976-1980 period witnessed
the beginning of the airline’s expansion and efficient operation in Asian destinations and at
the end of this period, Vietnam Civil Aviation became a member of the International Civil
Aviation Organization (ICAO). The year 1993 was a major turning point when Vietnam
Airlines was officially established as the country’s national flag carrier, leading to Vietnam
Airlines Corporation born in 1996 gathering 20 aviation businesses and the airline itself.

Vietnam Airlines introduced the new logo of the Golden Lotus and corporate identity in 2002
that symbolised its dramatic progress towards becoming a world-class airline. The launch
represented a complete repositioning and brand strategy of Vietnam Airlines, coupled with
significant improvements in its infrastructure, operations and fleet. For 15 years of
development with an average annual growth rate of over 10 percent (except 1997 when the
Asian financial crisis broke out), the national flag carrier has marked an obvious advance to
become a major competitor in the Asian aviation market. Today Vietnam Airlines’ network
extends to 20 cities throughout the country and 40 international destinations in the USA,
Europe, Australia and Asia.
In-depth interviews were conducted with three key persons – the chairman of Vietnam Airlines Corporation, the general director and the head of R&D department of the Northern Regional Office. The results reveal that the corporation’s infrastructure elements are supportive and encouraging of knowledge-related activities. The corporation has a *standardised reward system* that encourages the discovery and creation of new knowledge as well as the transfer of knowledge within the headquarter and across subsidiaries and affiliates. The senior management frequently examines knowledge within the corporation to uncover and correct *errors and mistakes*. In terms of *organisational culture*, employees understand the importance of knowledge to corporate success. The management also values on-the-job training and learning and strongly supports the role of KM to corporate success. To develop human resources, Vietnam Airlines focuses on the *T-shaped skills* of the employees through apprenticeship, mentoring, coaching, and on-the-job training programs and therefore, the employees are specialists in their own areas but also able to make suggestions about others’ fields. To support and stimulate knowledge creation, sharing and application, the corporation invests in advanced applications of *information technology* such as collaboration and distributed learning technologies (i.e. corporate portals, corporate intranet, teleconferencing, video-conferencing, websites, internal local area network and wide area network) to allow their members to learn and work with other people within and outside the organisation.

Supported by the infrastructure elements, Vietnam Airlines confirms that they have had necessary processes in place to manage knowledge within the organisation. To *obtain knowledge*, they have processes for acquiring knowledge about their customers, suppliers, and new products/services within their industry (using customer and supplier relationship management software and web access that enables searching for and recording new knowledge). To *make knowledge useful*, they have processes for transferring organisational knowledge to individuals and absorbing knowledge from individuals into the organisation in formal and informal ways such as scheduled meetings, conferences, product and service committees and social events. Knowledge is also stored in the corporate information system and replaced when outdated using best practices. To *apply knowledge*, they have processes for using acquired knowledge to develop breakthrough innovations, new products and services, to solve new problems, improve efficiency and adjust strategic direction. Finally, Vietnam
Airlines also uses technologies such as firewalls, network security, and password access to *protect its knowledge* from inappropriate or illegal use or from theft, as well as extensive policies and procedures to protect its trade secrets.

Vietnam Airlines’ management strongly believes that their infrastructure and processes of managing knowledge have provided them with a CA in the marketplace both nationally and internationally. Specifically, they can take advantage of their KM capabilities to widen the array of products/services without increasing costs. These KM capabilities are difficult and expensive for rivals to duplicate and as such provide strong barriers to entry for potential competitors. However, aviation, in comparison with others, is a high-tech and knowledge-intensive industry which usually faces a severe problem of limited managerial and financial resources. While KM is characterised as innovative and resource-consuming, the corporation is attempting to manage their knowledge in a better cost-effective manner, thereby adding more value in the organisation and providing it with a SCA. For example, in terms of the incentive system to encourage knowledge creation, sharing, and application they tend to focus on non-financial rewards such as a sense of accomplishment, a sense of involvement in the organisation, or a sense of contribution to the organisation. In addition, they believe that learning from success and failure of past projects will improve R&D and a central focus of the integration of knowledge derived from R&D will successfully exploit innovative ideas and expand the creative potential of the entire corporation. They are completely aware that in a dynamic and rapidly changing environment, creativity and innovation are critical success factors and implementing KM program effectively will facilitate innovation performance which, in turn, enables them to achieve CA.