Knowledge Management (KM) Using Enterprise Resource Planning (ERP) System

A thesis submitted in partial fulfilment of the requirement for the degree of Doctor of Project Management

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DECLARATION

I hereby certify that except where due acknowledgement has been made; the work is that of myself alone. The work has not been submitted previously, in whole or in part, to qualify for any other academic award. The content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; and any editorial work, paid or unpaid, carried out by a third party is acknowledged.

Signed by:

[Signature]

Eric CHAN
July 2009
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Finally, I wish to thank my family. My wife Ella gave me freedom to spend long hours away home for this research and she took care of the family neatly. I must also say sorry to my sons, Edward and Edwin. They were patient enough to chatting with me only online or over the phone when we were miles apart.
ABSTRACT
The Chinese saying, “知識就是力量” (zhì shí jiù shì lì liang) means ‘knowledge is power’. This slogan was originally attributed to Francis Bacon\(^1\) in “scientia potestia est”. The phrase implies that knowledge will certainly increase abilities and competitive advantage, and it can be gained through good management of knowledge. It is particularly valid in today’s business world because Knowledge Management (KM) is an essential component for winning organizations. The more knowledge that an organization can utilize, the more competitive it is likely to be.

The construction industry has successfully adopted the project management (PM) approach for many decades, but it has long been criticized as being not advance enough to use information communication technology (ICT) and slow to adopt KM. Researchers suggested that using an effective and efficient ICT systems improves KM, and that an enterprise resource planning (ERP) system can be one of the tools that can help KM. It has also been suggested that an ERP is a powerful tool to assist the integration of business processes. This has particular use in the construction industry.

The principle objective of this research was to explore the drivers and inhibitors that determined successful adoption and use of an ERP system at its actual implementation stage. Secondly, it aimed to identify successful factors of a partnering strategy and its integration into the ERP system. The third objective was to investigate the appropriate leadership style that influenced the ERP system and the partnering strategy, and to identify the impact of culture on the leadership style. The research was conducted within a Hong Kong construction organization.

This research was undertaken using both quantitative and qualitative methodologies. Phase 1 of this research is the literature review to outline the theoretical concepts and basis underpinning the surveys, interviews and studies during the research process. It includes a discussion of the context of construction industry, KM development, use of

\(^{1}\) Francis Bacon was a well-known English philosopher, statesman, scientist, lawyer, jurist, and author. He did not propose an actual philosophy, but developed a method. "Knowledge is power" is his famous aphorism which was included in his essays “Meditationes Sacrae” published in 1597.
an ERP system in KM, as well as partnering, leadership and cultural theories related to KM/PM issues.

At Phase 2, three pilot exploratory surveys were undertaken to probe the research problems in terms of the case studied organization’s capability maturity in adopting the ERP, acceptance level of partnering strategy in the business model, as well as the importance of leadership and cultural issues in implementation of business strategy. Sixty-nine participants effectively responded to these three surveys.

Phase 3 uses a descriptive technique, Soft System Methodology (SSM), to identify gaps in the observed maturity level which exists in the organization. Two groups of 16 participants were interviewed who expressed their views, in addition each participant was asked for ideas on improvement to the ERP system, partnering strategy and leadership style in respect of KM issues. This includes collection and reformatting of the raw research data into a rich picture for further improvement actions.

Phase 4 comprises an action research study to observe how identified improvement can be instigated. Three types of intervention actions and series of activities have been taken:

- Enhancement features of the ERP system which included improving data inputting method; eliminating the ERP transition bottlenecks; using the “Crystal Report” function; revising the organization’s “Delegation and Limits of Authority”; publishing “League Table”; adopting the RRP; integrating the 3D model into the ERP system; and updating the “Lesson Learning Portal”;
- A partnering strategy by using preferred subcontractor scheme; and
- A safety leadership and innovation campaign.

Although ultimate success of such actions is beyond the scope of this research, some evidence of improvement was demonstrated by the studied organization winning a HK$5 billion project, partly due to the implementation of the KM and partnering strategy resulting from these improvement actions.

This research makes a contribution in two spheres: PM and the construction industry. The first implication for PM theory is to illustrate how knowledge has been efficiently managed within a construction organization by using ICT/ERP. It can be represented by the ladder of ICT > ERP > KM > PM. The second implication is to pave the way for
the use of partnering strategies in PM practice. It can be represented by the ladder of National Culture > Organizational Culture > Leadership > Partnering Strategy > PM.

Little research has been carried out in the construction industry on this topic; the contribution of this research is to provide evidence of success of adopting KM in a construction company by using an ERP system and how this was achieved. This research illustrates how synergy effects of effectively integrating an ERP with a partnering strategy can improve project cost and time performance. Finally, it highlights the impact of cultural elements of the traditionally collectivistic construction industry, which senior management should take into account when formulating business strategies.

However, there are inherent limitations in this research. Firstly, data gathered for the study was collected only from one leading Hong Kong construction organization during March 2006 to February 2008. Thus, the results may not necessarily be generalized. Secondly, other organizations may use different ICT and KM backbone tools. Therefore, this result cannot be automatically applied to the practices of those organizations. Thirdly, it was not feasible to survey and interview all employees of the studied organization. Lastly, an assessment of the ultimate performance of the intervention actions is beyond the time limit of this research. A further cycle of action of course is much desirable.

This research shows how further rounds of improvement actions can be taken and spread over other regional offices of the studied organization.
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<td>Capability Maturity Model</td>
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<tr>
<td>COP</td>
<td>Communities of Practice</td>
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<tr>
<td>CPM</td>
<td>Construction Project Management</td>
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<td>CRM</td>
<td>Customer Relationship Management</td>
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<tr>
<td>CSD</td>
<td>Combined Services Drawings</td>
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<tr>
<td>D&amp;B</td>
<td>Design and Build</td>
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<tr>
<td>DPM</td>
<td>Doctor of Project Management</td>
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<tr>
<td>EDMS</td>
<td>Electronic Document Management System</td>
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<tr>
<td>EIU</td>
<td>Economist Intelligence Unit</td>
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<tr>
<td>EI</td>
<td>Emotional Intelligence</td>
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<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
</tr>
<tr>
<td>ETS</td>
<td>Electronic Tendering System</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GLOBE</td>
<td>Global Leadership and Organizational Behavior Effectiveness</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Meaning</td>
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<tr>
<td>HK</td>
<td>Hong Kong</td>
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<tr>
<td>HKICM</td>
<td>Hong Kong Institute of Construction Managers</td>
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<tr>
<td>HKIS</td>
<td>Hong Kong Institute of Surveyors</td>
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<tr>
<td>HKSAR</td>
<td>Hong Kong Special Administrative Region</td>
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<tr>
<td>HKSFBC</td>
<td>Hong Kong Standard Form of Building Contracts 2005 Edition</td>
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<td>HR</td>
<td>Human Resources</td>
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<tr>
<td>IC</td>
<td>Inventory Control Packages</td>
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<td>ICoPM</td>
<td>International Conference on Project Management 2008</td>
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<td>ICT</td>
<td>Information Communication Technology</td>
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<td>IJV</td>
<td>International Joint Venture</td>
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<td>IMS</td>
<td>Information Management System</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>Joint Venture</td>
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<td>K-Adv</td>
<td>Knowledge Advantage</td>
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<td>Knowledge Discovery and Data Mining</td>
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<td>KM</td>
<td>Knowledge Management</td>
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<td>KMAP</td>
<td>Knowledge Management Activity Planning</td>
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<td>Key Performance Indicators</td>
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<td>M&amp;E</td>
<td>Mechanical and Electrical</td>
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<td>Master of Business Administration</td>
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<td>MCIOB</td>
<td>Member of Chartered Institute of Building</td>
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<td>MHKIS</td>
<td>Member of Hong Kong Institute of Surveyors</td>
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<td>Multifactor Leadership Questionnaire</td>
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<td>MRP</td>
<td>Material Requirements Planning</td>
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<td>Manufacturing Resources Planning</td>
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<td>NMA</td>
<td>National Museum of Australia</td>
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<td>OL</td>
<td>Organizational Learning</td>
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<td>PC</td>
<td>Personal Computer</td>
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<tr>
<td>Abbreviation</td>
<td>Meaning</td>
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<tr>
<td>PDMS</td>
<td>Project Data Base System</td>
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<td>PM</td>
<td>Project Management</td>
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<td>Project Management Body of Knowledge</td>
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<td>PML</td>
<td>Project Management Leadership</td>
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<td>PP&amp;E</td>
<td>Project Procurement and Ethic</td>
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<tr>
<td>PRC</td>
<td>People Republic of China</td>
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<td>PS</td>
<td>Preferred Subcontractors</td>
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<td>PSWS</td>
<td>Project-Specific Web Sites</td>
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<td>WPMS</td>
<td>Web-Based Project Management Systems</td>
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<td>QS</td>
<td>Quantity Surveyors</td>
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<td>R&amp;D</td>
<td>Research and Development</td>
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<td>RICS</td>
<td>Royal Institution of Chartered Surveyors</td>
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<td>ROT</td>
<td>Return on Investment</td>
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<td>RRP</td>
<td>Resources Requirement Planning</td>
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<td>SCM</td>
<td>Supply Chain Management</td>
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<td>SSM</td>
<td>Soft Systems Methodology</td>
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<td>TOPS</td>
<td>Total Project Systems</td>
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<tr>
<td>U.S./USA</td>
<td>United States of America</td>
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<td>UK</td>
<td>United Kingdom</td>
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Chapter 1  Introduction

1.1  Introduction of the Chapter

There is a Chinese Proverb from the “The Art of War – “知己知彼, 百戰百勝 (zhī jǐ zhī bǐ, bǎi zhàn bǎi shèng)” that means if you know yourself as well as your enemy, you will come out of one hundred battles with one hundred victories. This also applies to the business world in that knowledge management usually puts oneself into a winning position. It is however very difficult to ‘know yourself” when there is a lack of a good information and knowledge management system in place with which to support decision making to take effective action that gains competitive advantage. Information systems have matured from processing data to refining that data through filters and heuristics into useful information. Indeed current generations of such systems now incorporate ways of managing the creation, distribution and use of knowledge itself through integrating data, information and explicit knowledge. Additionally, they merge this capacity with resource planning and monitoring systems so that they become an enterprise resource planning system (ERP). Thus, ‘knowing thyself” includes knowledge about deployable physical resources, intelligence and emotional support to achieve identified aims and objectives.

Recent advances in understanding how to best implement information and knowledge management decision support systems stress a dependence upon two necessary ‘soft’ management issues requiring leadership and organizational culture support (2004; Walker, Wilson et al. 2004; Peansupap and Walker 2006). Leadership is required in setting effective delivery strategies and championing the system’s needs, values and benefits as well as ensuring that processes are in place to facilitate system adoption. Organizational cultural support requires facilitating the ways in which information and knowledge about how to best implement the system is deployed to ensure that plans are translated into the desired actions. Flexibility, the ability to cope with necessary changes in plans to meet unexpected or changed circumstances, depends upon effectively assessing and re-assessing data, information and knowledge used to plan and make decisions as well as drawing upon group experiences (knowledge) that offer solutions to identified problems (Hällgren and Wilson 2007). These ‘soft’ management
issues suggest that successfully implemented an ERP system depends upon the capacity of the organization to learn and adapt in a way that it adopts and uses its supporting technology. Having improved advanced technology (hardware or software) is not the only answer to becoming a more effective ERP system user, organizational learning (OL) about what to do, how (and why) to do it is also crucial effecting adoption.

My thesis investigates the way that an enterprise resource planning system (ERP) was adopted by a company managing a construction contracting supply chain. This organization operates within a project management (PM) organizational culture. The research uses an organizational learning (OL) lens through which to make sense of what is observed about the way that the organization focuses upon strategies to implement the ERP both internally and with key identified supply chain partners. It then proceeds to identify suitable interventions that validated and tested through an action learning cycle.

Learning organizations recognize knowledge management (KM) as a core business concern and intellectual assets used to create, exchange and use knowledge help an organization gain competitive advantage over others (Zack 1999), in this case, in the construction industry. Therefore, the place that OL/KM holds in this thesis is central in understanding how the ERP is valued by the case study firm, and how the ERP adoption has proceeded. This is because (OL/KM), as the chosen lens to view the studied phenomena, reveals drivers and barriers for changed PM process adoption as well as how these come into play.

This chapter introduces the research, and provides an overview of the thesis. It begins a description of the research setting starting with a description of the Doctor of Project Management Program (DPM), and a brief summary of the organization under investigation and my personal background. This is followed by a summary of the research topic that outlines the research problem, the research proposition and questions. Then an overview is provided of the background to the research and its rationale, relating to problems of project management in construction industry and the role of knowledge management. This leads into a broad discussion of the research literature general areas that are relevant to the research. The design to perform the
research follows with a discussion on the implications and limitations which this research has for the Project Management (PM) profession. Finally, the structure of the thesis is provided to guide the reader. This chapter then closes with a summary.

1.2 The Research Context

This section first provides a context for emerging PM research and then follows with details about the context for this particular thesis in terms of the nature and aims of the DPM and where I provide a personal context in how I shaped the DPM aims to deliver this thesis.

1.2.1 The PM Research Context

The value of research in any emerging profession revolves around the need for a greater understanding of the circumstances, problems, and solutions that define it as an academic discipline. PM is at that point in its development where a growing body of PM research is making a contribution and this thesis seeks to contribute through a case study research project firmly anchored in PM practice. The re-thinking project management movement identified five directions for future research in a seminal paper (Winter, Smith et al. 2006). These directions are described as:

- Relating to theory about practice moving from a lifecycle model of projects and PM to theories of the complexity of projects and PM;
- Relating to theory for practice moving from projects as instrumental processes to projects as social processes;
- Relating to theory for practice moving from product creation as the prime focus towards value creation as the prime focus;
- Relating to theory for practice moving from a narrow conceptualization of projects towards a broader conceptualization of projects; and
- Relating to theory in practice moving from practitioners as trained technicians towards practitioners as reflective practitioners.

Thus, emerging PM research supports an in-depth case study approach being undertaken that helps practitioners make sense of their lived reality working on projects as well as attempting to discover best practice or developing new PM tools and techniques.
1.2.2 This Thesis Research Context

The following contexts are discussed:

- This Thesis Research Context
- My DPM Journey
- This Organization’s Context

1.2.2.1 This Thesis Research Context

This is a professional doctorate research thesis. Walker describes the main difference between the DPM and a PhD research thesis, in for example a PM topic, as being explained as “a change in emphasis rather than a change in content or rigor. Both are examined by external experts in the relevant field, both entail rigorous research and both require a new contribution to knowledge in the field. The main differences are that (1) the DPM contains one third coursework that is designed to lead the researcher (candidate) into the research topic that will be examined as a substantive thesis and (2) the research topic should be highly PM practice focused so that the contribution to knowledge is more likely to be centered on how observed practice may be explained in academic terms and how it may be improved”\(^2\).

Another expectation that is relevant to the DPM is that the candidate will use the ‘lived experience’ of working within a PM environment to inform the investigation. The candidate will most likely use the organization that she/he works in as the focus for the investigation and this will require a great deal of reflection on the candidate’s part. Candidates are also expected to have considerable experience of working within project environments and so they bring with them valid expert opinion through their reflection upon the research they are undertaking.

\(^2\) Private correspondence May 22\(^{nd}\) 2008
The DPM is a professional doctorate degree in PM specifically designed for candidates to consolidate and better understand their existing skills and knowledge on how to manage projects. This program enables project managers to reflect upon their widespread experience and learn new skills and gain insights into core strategic areas of required expertise in Knowledge Management (KM), Project Management Leadership (PML) and Project Procurement and Ethic (PP&E). The research component is industry applied using a case study and action learning approach on projects that the DPM candidate has an involvement with. Since candidates who undertake the program are employed on their project management activities, the program allows candidates to gather data, analyze it and reflect upon its implications as part of their action learning approach to their project management work.

The philosophy of the program is that it be global in nature and cross-disciplinary in content to optimize exposure to diverse PM perspectives. It extends candidates’ professional PM expertise well beyond the level expected for PM professional accreditation. The focus is on depth of understanding of emerging PM strategic issues and to lead the advance of the PM profession. Consequently, this leads to in-depth reflective learning and case study research work being the means to prepare candidates for their final dissertation developed around their propositions for improving PM professional practice.

1.2.2.2 My DPM Journey

Figure 1-1 illustrates the structure of the DPM programme and the way it is studied. Taking the KM course as a starting point example, candidates study provided core KM

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3 The Project Management Institute PMI (2004) A Guide to the Project Management Body of Knowledge, Sylva, NC, USA, Project Management Institute has a membership level of certified professional project manager (PPM). Individuals who hold PMI’s PMP credential demonstrate a proficient level of project management leadership skills, and as a result are able to command salaries that exceed those of their non-credentialed counterparts (from the PMI website [http://www.pmi.org/CareerDevelopment/Pages/Obtaining-Credential.aspx#pmp accessed May 23rd 2008]).
reading materials, they review additional KM literature and through their interaction with peers they gain a foundation for a sound understanding of that topic. Candidates then undertake a ‘KM reflective learning’ module by sourcing additional relevant readings and they also reflect upon this based upon their personal experience. In providing this iterative approach, the context for explicit KM coursework learning information is established and this enables the candidate to codify tacit knowledge into explicit knowledge about this topic area. This occurs for each of the four core coursework areas so that it builds upon the candidate’s knowledge and provides the opportunity for them to expand and polish their research focus through the ‘Research Preparation’ DPM modules.

![DPM Programme Structure](image)

**Figure 1-1 – DPM Programme Structure**

The objective of the learning process is to build understanding of the four crucial cores study areas illustrated in Figure 1-1 and their application. The following outlines my DPM journey which helped me to generate the ideas underpinning my research.

I learn the importance of managing organizational knowledge, learning and strategically managing information and information technologies from the PM KM subject. Effective use of information communication technology (ICT) can support the creation of an information/knowledge repository to archive, retrieve, communicate and transfer information and knowledge. A successful project KM system can encourage
and enhance innovation diffusion within and across projects into an organization to the ultimately benefit of saving the project and organization wasting time and money. The use of ICT tools, e.g. the organization’s ERP provided a viable KM initiative for me to study.

The PM Ethics and Procurement subject exposed me to a wide range of options of how to acquire facilities in my construction context by thinking about how to best generate value to stakeholders. I was encouraged to consider value generation across project development phases from project inception to operational management of completed facilities. Ethical theory and its application to procurement provide an ethical framework within which project procurement can be accomplished. This helped me to develop the research focus of adopting a partnering approach to supply chain management strategy.

PM Leadership is about ‘influencing others to accomplish a task’. This subject concentrated upon the nature and practice of leadership, managing change, strategic planning, strategic human source management, encouraging productive diversity, and managing for organizational learning. All these aspects were relevant in the formulation of my thesis ideas. My organization’s decision to effectively implement both an ERP and a partnering strategy to supply chain management with its key sub-contractors is highly relevant to the leadership content of my thesis.

I undertook a purpose-designed PM Practice 2 subject on organizational and national culture that had relevance to my topic focus. Good management practice includes provision of an ideal working environment and systematic policy so that employees are eager to work and share ideas with each other. I felt that these practices need to consider the organizational culture as well as the national culture of employees. I reviewed articles, books, and literature about different organization structures, management styles and business models relevant to this topic to better understand how a successful project delivery model for adopting the ERP might be affected by cultural influences.

The framework illustrated in Figure 1-1 allowed me to develop through a series of pilot study research elements a research plan that will be outlined later in Section 1.6 and is elaborated upon in Chapter 4 (Methodology).
1.2.2.3 My Personal Background and Experience that Supports the Research

I have been working in the construction industry since 1982. My training, wide-exposure and ongoing professional developments in the industry have undoubtedly provided me with a solid foundation to meet the research challenges of understanding a practitioner’s perspective of the research problem. I am a qualified Quantity Surveyor and Builder. I also hold the MRICS\(^4\), MCIOB\(^5\), AAIQS\(^6\) and MHKIS\(^7\) and a Master of Business Administration Degree (MBA).

My career with developers and builders provides me with experience of a variety of construction projects, having a total value of works of up to HK$35 billion. During the course of my employment, I observed many instances of inadequate project management practices within the Hong Kong construction industry that shaped my desire to find a research topic that can improve some of those practices. While working on these construction projects, I came to the view that success or failure of a business

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\(^4\) The Royal Institution of Chartered Surveyors (RICS), has been established for 136 years which representing property professionalism and has 120,000 members across 120 countries worldwide. This institution is one of the most respected and high profile global “standards and membership” organizations for professionals involved in land, property, construction and environmental issues. (For details of this institute, refer Appendix A)

\(^5\) The Chartered Institute of Building's (CIOB) is the international voice of the building professional which representing an unequalled body of knowledge concerning the management of the total building process. (For details of this institute, refer Appendix A)

\(^6\) The Australian Institute of Quantity Surveyors (AIQS) is the regulatory body of the profession. Membership of the Institute is restricted to those with appropriate educational qualifications and who have demonstrated the required level of professional competence after a statutory work experience period. (For details of this institute, refer Appendix A)

\(^7\) The Hong Kong Institute of Surveyors (HKIS) was established in 1984 which is the only professional organization representing the surveying profession in Hong Kong. The Institute has an established presence in the international arenas and overseas connections, and has entered into reciprocal agreements with other professional surveying and valuation institutes in the United Kingdom, Australia and Singapore. (For details of this institute, refer Appendix A)
lies in a series and sequence of decisions where leveraging information and knowledge is critical in reducing waste (in its broadest meaning) and generally improving business performance. While innovative knowledge enables an organization to lead its industry and competitors and to significantly differentiate itself from its competitors, advanced knowledge enables an organization to be competitively viable (Zack 1999). Competitive advantage, in my experience, appears to depend upon an organization’s method and approach to: gathering; organizing; evaluating; disseminating; and acting upon assessment of accumulated data, opinions, information and research. I therefore had a curiosity and motivation to follow my interest in how waste could be minimized and how better decision making be facilitated through improved management of information and knowledge.

1.2.3 This Organization’s Context

This section provides only a brief overview of the organization to help clarifying, in general terms, the characteristics of the firm.

The case study organization (pseudonym = G-Force) is one of the leading construction companies in Asia. Its activities span the entire spectrum of building, civil engineering, foundation work, electrical and mechanical works, and construction services. This organization employs approximately 2,000 full-time staff, more than 50% of whom have a diploma or higher academic qualification, including 450 professional engineers and builders. G-Force has been building a wide range of construction projects in Asia for more than 45 years and is the market’s leading construction contractor in Hong Kong.

G-Force’s ethos reinforces an attitude that it is unwise to compete with others by purely cutting costs and compromising quality, rather, it stresses the need to be more effective in being innovative and to derive a differentiation competitive advantage based upon service quality and effectiveness.

More details about the background of the G-Force refer to Appendix B.
1.3 The Research Problem Development

This section presents the research problem, questions that flow from that and the scope and objectives that shaped the development of the research problem.

1.3.1 The Research Problem

The proposition that this thesis tests is that project management practice will be advanced by the using an effective ICT system for KM with significant major supply chain partners that are sufficiently mature in their adoption of IT and IS systems. The integration of an ERP system with the supply chain will effectively support the knowledge work of the project manager and project team members in construction management. This proposition is tested by action research that follows exploratory surveys and a descriptive study of G-Force. This organization has been using an ERP as its information management backbone since 2002 and also intends to adopt a partnering approach with its key supply chain partners.

1.3.2 Research Questions

To test the proposition, the following research questions are generated:

1. What are the principal drivers and inhibitors influencing the successful implementation of ERP in the case study organization?
2. To what extent do the 3 identified areas of technology/process (the ERP), leadership and culture, shape the way that the ERP is being adopted in the case study organization?
3. What suggested improvements are viable for this organization in improving the way that the ERP is being adopted within Hong Kong?

This research will explore the present practice of the ERP within the case study organization that already used an ERP as part of its information and KM set of knowledge-based tools. The research will also identify key factors and processes that influence integration of its existing ERP system with several of its key supply chain partners.
1.3.3 Research Scope and Objectives

The research project involved a change management process being undertaken, using an action learning approach, based upon surveys and interview findings. This involves the researcher observing and participating in the undertaken actions to improve the organization’s level of maturity in using the ERP.

The primary objective of the three research pilot surveys within the study construction organization, G-Force, was to explore problems related to its adoption of the ERP. It focused on employees within the organization who are currently working with the ERP system and explored factors influencing ERP adoption performance within the organization. These problems represented clusters of interrelated variables identified by a rigorous review of the literature. These surveys not only helped to identify problems that the employees have perceived, but also allowed a better understand of the nature and extent of the need for a supportive environment within the organization that could facilitate its ERP migration to be linked to the ERP used by its principal supply chain partners. Once identified, exploration of these problems can be used as the basis for conducting interviews with targeted teams in the second phase of the research study which sought to gain a richer appreciation and understanding of the nature of the workplace environment that drives and/or inhibits ERP performance within the study organization. The focus of attention throughout the study was mapping interrelationships between ERP performance improvement and leadership of the transformed work processes. The map then led to a series of actions that could be taken to improve ERP performance within G-Force.

The second objective was to identify factors influencing a strategy for integrating the existing ERP within G-Force’s key supply chain partners. These factors also represented clusters of interrelated variables identified by the literature review. Once identified, these factors were then be used as the basis for conducting interviews with individual’s perception for the partnering strategy in the next phase of the current research study to gain a richer appreciation and understanding of the nature of the workplace environment that drives and/or inhibits partnering strategy within the study organization.
The third objective was to gain in-depth insights about the impact of leadership style upon the adoption of the ERP system and the strategy to integrate it with key supply chain partners. Part of this objective was to explore the cultural impact of leadership style on this ERP adoption and how it contributed to identifying improved ERP leadership practices.

1.4 Research Rationale and Limitations

The ‘Construct for Excellence’ report (CIRC 2001) of the Hong Kong SAR construction industry, suggested that: the construction industry has long been criticized as being among the most dangerous of all industries; although it is highly labour-intensive it has inadequate management and this leads to poor quality and serious cost/time overruns; low level of both interest and investment in upgrading technology; continually increasing building costs are comparatively higher than other neighboring countries. Construction was classified in the report as a high-risk-low-margin business. My thesis topic addressed many of the shortcomings identified in that report and this encouraged me that my topic focus could make a valid contribution.

Using an effective and efficient ICT system can improve communication within the study organization and streamline its working process both internally and through external partner supply chain links. G-Force is a major construction company in Hong Kong and its ERP adoption and plans for supply chain integration of ERP facilities represents a unique configuration of innovation initiatives. Thus, according to Yin (1994), a single case study is appropriate when a rare phenomenon is being investigated. This focus provides a realistic rational for my study.

Construction is traditionally undertaken on a project basis. The literature review discussed in Chapter 3 proves many examples what an ERP is and how it can be used as a KM initiative. The Chapter also provides examples of studies that indicate that certain styles of leadership under varying cultural settings can provide the drivers or inhibitors that affect successful adoption of this type of technology. Also that chapter provides outlines of procurement approaches, particularly advances in supply chain management with leading key partner organizations and how this can offer competitive advantage.
There is, however, a dearth of field case studies that indicates what is actually going on within organizations that adopts an ERP. The research study described in this thesis will contribute to an advance in general management and PM research, and practice, by providing an account of G-Force’s attempts to improve its ERP adoption and its implementation and integration of ERP with its key supply chain partners.

The thesis provides a KM initiative and the expected outcomes from this research can be summarized as follows:

- A better understanding of the principal drivers and inhibitors influence the successful implementation of an ERP within a large construction organization that may guide how it is can be applied more generally in the construction industry; and
- A better understanding of effective practices for linking an ERP across a supply chain.

During the period that I have been undertaking the DPM, the firm that I worked for has been adopting an ERP and this gave me the opportunity to observe and participate in the way that it was adopted and to be privy to the rich sources of experience of living with the process of adopting the ERP. This allowed me address some of the research directions that (Winter, Smith et al. 2006) proposed. For example in research direction 1, I was able to study and better understand the complexity of the nature of the ERP adoption program that was occurring within Hong Kong. I was also able to address themes in research direction 2 by studying the adopted ‘project’ as a social process. The focus on how this project might create value to the organization and its supply chain addresses themes of research direction 3 and because this ‘project’ was part of a business transformation it fitted in with research direction 4 neatly. Finally, my interaction with participants that I worked and collaborated with helped me gain insights from their views, thoughts and insights. This allowed research direction 5 to be addressed as this helped my colleagues and I became reflective practitioners.

This research has limitations that need to be acknowledged. First, data gathered for the study was collected only from one leading Hong Kong construction organization.
during May 2006 to February 2008. This organization was chosen because it could source respondents that used an ERP as an IT tool for information and knowledge management. Thus, the results may not necessarily be generalized and so this naturally limits this research work in applying more widely in the construction industry. Further, only one organization was chosen because this research focused upon an in-depth case study and was the one that the researcher was employed by. While this provided the opportunity for action research in where all respondents were known to, and had a good trusting relationship with, the researcher did present the potential for bias. Extensive feedback and checking with respondents the results and implications for the research as it proceeded was one way in which bias was limited. The research design (explained in section 1.6 and Chapter 4) included measures to address concerns about bias.

Quantitative and qualitative data for Phase 2 of this study were gathered from May 2006 to January 2007 and qualitative data for Phase 3 and 4 were collected from November 2006 to February 2008. Thus, the study was limited to studying the organization only at that time using the current ERP. IT advances at a rapid rate and so as a new wave of IT initiatives entered the organization, this introduced different types of change. New technical problems and other issues may emerge that could also affect the ERP adoption. While the underlying results of the study may be valid and useful for the foreseeable future, it cannot be certain that radical IT applications may not radically change this assumption. The focus, however, of this study was to unearth underlying leadership, cultural and relationship issues that affected the ERP adoption and so these underlying factors might remain more constant than the more rapid changes brought about by technology advances and/or business process changes.

Further, the location of the study was Hong Kong, which might also influence what was considered as a contemporary IT application worthy of study. Hong Kong, however, is a technologically sophisticated society that can be considered as representative of this classification of national-industrial IT maturity level. Further, the predominant national cultural background of employees is Chinese and so a Confucian-based culture could be said to dominate social action. Thus, results from this study could be considered as reasonably representing a developed economy with a Confucian culture.
Finally, it was not feasible to interview all employees and supply chain partners of the studied organizations and so the choice of respondents depended upon their availability and willingness to participate in the study and surveys. Every effort was made to ensure that representative groups and individuals were chosen to overcome potential bias.

1.5 Relevant Research Literature

The research draws upon a great deal of theory from general management and project management literatures. While much of this is relevant and it can be argued that this literature should be explored, thesis scope and relevance to the chosen topic forces a degree of culling what could be discussed to only critical relevant literature.

The following Table 1-1 summarizes the literature areas and how they are relevant to this thesis. Chapter 2 discusses literature that has a contextual bearing on this thesis. In that chapter the construction industry is discussed drawing upon history of its development taken from that body of literature, particularly how it applies in Hong Kong. That is followed by a discussion of the pertaining to the context of this research being of a PM nature, and involving supply chain partners to integrate an ERP facility.

Chapter 3 provides a wider discussion on the literatures chosen to be reviewed that supports the research design and analysis of findings. Table 1-1 illustrates the rationale for selecting specific literatures that are discussed in Chapter 3 which are relevant to this thesis.
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<thead>
<tr>
<th>Literature Source Categories</th>
<th>Relevance to this Thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information communication technology (ICT): Trends in ICT used in the construction industry: ICT and technology as a knowledge-enabler that drives business process change.</td>
<td>The research is centred on an ERP and so the development of ICT as a tool chosen by G-Force is relevant.</td>
</tr>
<tr>
<td>KM: KM concepts and processes; KM as a strategic tool for business process change; KM in the construction industry; Measuring KM maturity levels.</td>
<td>Adoption of the ERP was contingent upon not only mechanically rolling out the technology but its adaptation to and role in transforming the organization’s business processes.</td>
</tr>
<tr>
<td>ERP: ERP concepts and evolution; ERP in practices as a change agent; ERP’s role in business transformation.</td>
<td>The focus of the thesis is how the ERP was adopted and so its characteristics and history needs to be clearly stated to supply the context to this study.</td>
</tr>
<tr>
<td>Leadership: Leadership’s link with influence through trust, commitment and power in group decision making processes; Transformational leadership versus management and transactional management; Leadership’s influence on stakeholders to drive innovation and change.</td>
<td>The ERP presented a radical change in the way that G-Force conducted its business. Clearly leadership strategy and a supportive leadership environment need to be in place to facilitate drivers and inhibit barriers to adoption of the ERP and attempt to integrate it with key supply chain partners.</td>
</tr>
<tr>
<td>The influence of culture (organizational and national); culture and the process of change.</td>
<td>Clearly change involves challenging ‘the way that things are done’ and the leader/follower relationship is influenced by the group’s cultural norms.</td>
</tr>
<tr>
<td>Procurement choices: The nature of traditional and evolving procurement choices; Relationship procurement forms and choices; supply chain management.</td>
<td>The thesis is centred on ERP and its influence in the management of the whole supply chain that G-Force is a part of.</td>
</tr>
</tbody>
</table>

It is recognized that this thesis assumes many theoretical concepts such as business strategy and other management areas of theory that could have been included but would have extended the thesis beyond its scope. Where possible authorities are cited to support assumptions and some of these are not elaborated upon beyond the context of their citation and their relevance to the discussion.
1.6 The Research Design

The research project was designed to address the research questions listed in Section 1.3.2. It was conducted in four phases: Phase 1 involved the review of the literature that underpinned this thesis. It included a discussion of the context of this thesis as being a PM example of an ERP system adoption within the construction industry. Other underpinning concepts included KM, ERP, leadership and cultural theories as well as relationship based procurement examples. Phase 2 was an exploratory research through undertaking three pilot surveys to explore the research problem in terms of G-Force’s capability maturity in adopting the ERP. Phase 3 used a descriptive technique to identify gaps in the observed maturity level and that which was desired by the organization. Phase 4 comprised an action research exercise to observe how identified improvement could be instigated.

The framework of research design is illustrated in Figure 1-2. More details of the research design will be discussed in Chapter 4.
Figure 1-2 – Framework of Research Design

1.7 Structure of the Thesis

This thesis comprises eight chapters and its structure is shown in Figure 1-3 below:
Chapter 1 introduces an overall view of this research and also describes the DPM programme, my DPM journey and personal background. It addresses the research background, the research propositions, research questions, research scope and objectives, research design, expectation and limitations of this research, and structure of the thesis.

Chapter 2 provides a broad view of the macro environment of construction industry which includes the economies contribution and productivity. It also briefly describes different contextual aspects namely project management, construction project management and information management system which link to knowledge management improving the management practice of the industry.
Chapter 3 reviews the literature related to construction industry, knowledge management, ERP system, partnering strategy in the construction organization, leadership style and cultural impacts. Firstly, it provides an overview of the construction industry including the economies contribution, productivity, nature, risk and communication modes. It then reviews those management aspects generally practise in the construction industry: project management, construction management, and information management system concept which lead to the importance of knowledge management in the construction industry. The review also explains knowledge and knowledge management theories and how ICT and system can benefit knowledge management in the construction industry. Literatures about the partnering supply chain management is then reviewed, the main emphasis is on the relevance of partnering in Hong Kong. There is also a section focused on different leadership theories in related to management. The final section is on dimensions of various national cultures and critical organizational-cultural factors influencing the leadership style.

Chapter 4 discusses the research methodology. This is presented as the philosophical assumptions underpinning this research; the research’s study approach; research strategy; and the research design. The chapter not only describes three main research phases: exploratory survey, descriptive study and action research; but also introduces the use of Capability Maturity Model (CMM) and Soft System Methodology (SSM) as the tool in exploratory and descriptive phases.

Chapter 5 presents the findings of three surveys for ERP systems, partnering strategy, and leadership within a large Hong Kong construction organization. It begins with the brief of the background of organization and the ERP system. Each survey is generally analyzed in the following manners: respondents’ profile, perceptions and expectations with discussion of factors affecting ERP systems, partnering strategy, and leadership style. It leads to the identification of gaps by using CMM and form the basis of the descriptive study.

Chapter 6 describes the conclusions of those three surveys for ERP systems, partnering strategy, and leadership within a large Hong Kong construction organization. By using
SSM to map the surveys, it leads to a list of proposed actions for the forthcoming action learning phases of the research project.

Chapter 7 presents the observation of actions taken to improve the implementation of ERP systems, partnering strategy and its integration. Effects of proper leadership style and the cultural impact are also discussed.

Chapter 8 summarizes research findings that related to the research questions. The chapter then discusses the research contribution and recommendation made by this work and presents limitation of this research and practice. It concludes with suggestions for some future research that needs to be explored.

Chapter 9 details the references and bibliography cited in this thesis.

The thesis ended with various appendices including the questionnaire tools for those three exploratory surveys.

1.8 Chapter Summary

This chapter provides an introduction to this research study. The main argument for this research is that current knowledge management in the construction industry is not adequate. Use of ICT tool – ERP system is one of the solutions.

The chapter begins by an introduction of the DPM programme and how the thought of the research is generated. The chapter then argues that inadequacy of research on the ERP system and KM with partners, due consideration on leadership style and cultural impact is also discussed. Next, the chapter identifies a series of research questions and highlights the scope of this research that focuses on a selected large Hong Kong construction organization that has implemented the ERP system and intends to integrate partnering strategy into the system. The chapter then describes the approaches that will be used in this research project. The chapter follows with the briefs of the research design which is developed for this thesis. Finally an outline of the thesis structure is given.
Chapter 2  Context of Study – The Construction Industry

2.1  Introduction of the Chapter

計 (shǐ jì) means laying plans, which is the first chapter of ‘Sun Zi Art of War’ and it emphasizes the importance of 計 (jì) i.e. calculation, plan and assessment in any military affairs. The first quote in this chapter is ‘國之大事，死生之地，存亡之道，不可不察也’ (guó zhì dà shì, sǐ shēng zhī dì, cún wáng zhī dào, bù kě bù chá yě) it means war is of immense importance because it determines the survival of the nation and its people. Thus, initial intelligence gathering and assessment in war is of utmost importance. Good planning is therefore ‘夫未戰而廟算勝者，得算多也，未戰而廟算不者，得算少也，多算勝，少算不勝’ (fū wèi zhàn ér miào suàn shèng zhě, dé suàn duō yě, wèi zhàn ér miào suàn bù zhě, dé suàn shǎo yě, duō suàn shèng, shǎo suàn bù shèng). The general always wins a battle when he makes many calculations, detail planning, and assessments in his temple where the battle is fought. However, the opposing general will lose a battle if he makes few calculations beforehand. Thus, many calculations leads to victory, and few calculations to defeat; also the more the environment is considered the higher are the chances of winning.

This traditional Chinese cultural perspective makes it clear that knowing the environment and planning in advance are crucial in military affairs that are equally applicable in the business world. Good planning, detailed assessment of the society, economy, environment and industry etc determine project and project management success.

\footnote{In this Chinese context, the \textit{temple} is the sacred place where secret strategic planning takes place.}
A detailed assessment of the economic environment, construction industry and different management aspects is important in understanding the context surrounding this thesis. This is discussed and structured in this chapter as follows:

- A review of the construction industry’s impact includes an overview of the sector’s general significance to the economy, especially in Hong Kong and how construction industry productivity affects economic performance. *This supports the rationale for choosing this industry sector to study.*

- This leads to a review of the general construction industry culture and how good management practice can improve its efficiency and effectiveness. *This helps explain why the thesis topic of studying the introduction and use of an ERP as a productivity gain strategy is relevant and how culture may affect the necessary innovation and change management aspects to this study.*

- A contextual review is then presented of management aspects that can enhance the productivity of the construction industry by improving communication efficiency and effectiveness. This review focuses on project management, construction project management (CPM) and information management practices and systems that enhance the importance of knowledge management (KM) in construction industry a supply chain setting. *This supports the rationale for a study relating to how an ERP may be adopted with supply chain partners.*

### 2.2 The Construction Industry Context

Consistent with the introductory quote to this chapter, background information on the nature of the construction industry should be presented to help identify the specific need for relevant management techniques and skills. The construction industry has distinct characteristics when compared to many other industries. In particular, this section will deal with the nature of the construction industry and the characteristics of the Hong Kong construction industry. The review centres on the primary forces and characteristics that influence information and KM within this industry.
2.2.1 The Economy and the Construction Industry

The significance of an industry to an economy is commonly assessed by its percentage contribution to Gross Domestic Product (GDP).

Table 2-1- Construction’s Share of GDP in Selected Countries 2004-2006

<table>
<thead>
<tr>
<th>Country</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>5.9%</td>
<td>6.0%</td>
<td>6.0%</td>
</tr>
<tr>
<td>USA</td>
<td>4.7%</td>
<td>4.8%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1.7%</td>
<td>1.6%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Singapore</td>
<td>3.6%</td>
<td>3.4%</td>
<td>3.3%</td>
</tr>
<tr>
<td>South Korea</td>
<td>8.3%</td>
<td>8.2%</td>
<td>8.1%</td>
</tr>
<tr>
<td>New Zeland</td>
<td>4.8%</td>
<td>4.8%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Japan</td>
<td>6.6%</td>
<td>6.3%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>3.4%</td>
<td>3.3%</td>
<td>2.7%</td>
</tr>
<tr>
<td>France</td>
<td>5.6%</td>
<td>5.8%</td>
<td>6.2%</td>
</tr>
<tr>
<td>China</td>
<td>5.4%</td>
<td>5.5%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Australia</td>
<td>6.1%</td>
<td>6.2%</td>
<td>6.4%</td>
</tr>
</tbody>
</table>

Table 2-1 illustrates the construction industry’s share of GDP in selected countries as presented by The Economist Intelligence Unit. The 2004 to 2006 figures provide a representative picture for the current context. This suggests that not only is the construction industry an important sector in the national economy, but its share of construction activity remains stable.

The definition of ‘construction’ adopted by the Census and Statistics Department in HK refers to activities undertaken by contractors for the construction of buildings and other structures and facilities. However ‘construction’ should not be so narrowly defined to include only on-site activities. Therefore, a broader view should be adopted and taken

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9 The Economist Intelligence Unit is the world's foremost provider of country, industry and management analysis. It was founded in 1946 and provides a constant flow of analysis and forecasts on more than 200 countries.
more construction-related activities into account. Based on the re-ordering method of Rowlinson and Walker (1995), construction-related activities include architectural, surveying and project engineering services, real estate development, leasing, maintenance management, brokerage and agency, property holding and resale, and ownership of premises. According to Leung and Wong (2005) using the 2002 data, ‘construction’ represents 4% GDP share (as shown in Figure 2-1). When the contributions of these activities are grouped into a single category, construction industry accounted for 22% of GDP (as shown in Figure 2-2). This broadly defined construction industry then became the second largest industry in HK.

Figure 2-1 – Percentage Contribution to GDP by Various Economic Activities 2002 (adapted) (Leung and Wong 2005)

Figure 2-2 – Percentage Contribution to GDP by Reordered Economic Activities 2002 (adapted) (Leung and Wong 2005)

The construction industry makes a significant business contribution to the economies of many nations. The following illustrates some examples as a snapshot:

- Construction demand and output in Singapore have been increasing in the last decade (Building and Construction, 2001). This government promoted creation of physical infrastructure has facilitated the country’s economic development and enhanced its international competitiveness. The Ministry
of Trade and Industry, Economic Survey 2005, reported the industry contributing 3.4 to 4.8% of GDP of Singapore in the last four years.

- The construction industry in Taiwan is very competitive and booming. Continuing high levels of economic growth in eighties and nineties has also made Taiwan an attractive market for foreign construction companies and since the construction sector was opened to foreign firms in 1986, around 30 contractors have established in Taiwan (Fenn and Yan 2002).

- The GDP share of Australian construction industry from 2000/01 to 2004/05 reflects a stable growth from 4.9% to 6.2% within a recent five years time span. The Australian Bureau of Statistics, ABS (2006) reported that the construction industry sector employed 876,000 people in 2005/06 or about 8% to 9% of total employment. This shows the construction industry greatly influences country’s economic growth (GDP) and improves its productivity.

- The Bureau of Economic Analysis (BEA) stated that the USA construction industry contributed a steady 4.6 to 4.8% of GDP between 2001 and 2005, and represented a gradual increase from US$469.5 billion to US$593.5 billion. The Economic Report of the President also recorded that the construction industry employed around 6.7 to 7.2 million employees, or around 5% of the workforce in the same period.

- The HK construction industry has historically contributed significantly to the GDP of the city and is an important part of HK's economy (EIU 2000). In June 2006 the industry employed 52,273 manual labourers on 886 sites. The construction sector has gone through a series of booms and slumps

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10 The Bureau of Economic Analysis (BEA) is an agency in the United States Department of Commerce that provides important statistics on the economy of the United States.
since the early 1980s (EIU 2006). Between 1995-2004, HK$586 billion was spent on construction industry, and the share of GDP was maintained within the stable range of HK$40 to HK$72 billion.

Better management practices in the HK’s construction industry can improve its contribution to the HK economy, for example in eliminating wastage. Waste can be generated through design errors, materials misuse or damage, and many other forms of pathogens and inefficiencies as well as wasted management attention (Love, Edwards et al. 2005; Love, Edwards et al. 2008). However, this requires a change from traditional construction project management (CPM) practices that do not improve construction productivity (CIRC 2001). In response to this, since 2002, the HK government has introduced a requirement for the implementation of non-traditional CPM practices that include post contract project partnering, value management and risk management for projects over HK$200M. The choice of the thesis topic is, therefore, justified.

2.2.2 The Construction Industry Productivity Improvement Context

Many research studies have been undertaken on ways to improve CPM methods and techniques that could increase industry productivity with many countries having research centres devoted to construction innovation for example the CRC in Construction Innovation in Australia 11 and the Centre for Infrastructure & Construction Industry Development in HK12. However, Latham (1994) found that the nature of construction industry practice form a barrier to improving its productivity.

The construction industry has been characterized as being complex, fragmented and unique in a series of UK government reports (Murray and Langford 2003). This claim is made for a variety of reasons. Most construction projects involve many phases –

11 URL is http://www.construction-innovation.info/
12 URL is http://www.hku.hk/cicid/
feasibility, design, construction and maintenance. Also, each phase involves communication and coordination among many project participants – the owner, contractor, designer, consultant, subcontractors, and suppliers. This leads to problems of communication and information exchange because each project is unique in construction type, location, and project participants. Thus, traditional management practice within this construction environment has been criticized for not being conducive to improving construction productivity (Latham 1994; CIRC 2001). Comments made above and below relate not just to the UK but also HK.

Egan (1998) suggested that rather than changing the nature of construction industry, the construction workforce should be wary of attempts to improve construction productivity and process by blindly adopting innovation such as new management techniques, construction techniques or IT. He cautioned against undertaking isolated piecemeal change initiatives and stated that adoption of innovation should be mindful of existing industry constraints to overcome barriers using a more systemic approach to change its prevailing culture.

Latham (1994) implied that price competition is keen due to clients insisting on a dominance of lowest-price criteria to award contracts. Therefore, the industry is extremely price competitive and this limits the ability of firms from controlling the market place. However, this also leads to organizations offering construction services being chosen by price criteria not quality criteria thus limiting their ability to differentiate themselves in the market.

2.2.3 Construction Industry Culture and Impact upon Innovation

Effective diffusion of knowledge has the potential to increase construction industry productivity through innovation. Jones and Saad (2003) argued that the construction industry has considerable barriers to accepting innovation in general, mainly due: to its culture of conservatism; lack of appropriate leadership; poor learning organizational orientation; lack of investment in people; and its timidity in leading the adaptation of new technologies. Latham (1994) highlighted this as being a likely result of low profit levels and clients who insist on a dominance of lowest-price criteria to award contracts on rigid specifications rather than seeking innovative CPM delivery solutions. This
inhibits the construction industry making significant inroads in investing in the adoption and diffusion of innovation with technology push rather than demand pull being the dominance influence on the construction industry considering to adopt new technologies (Maqsood, Finegan et al. 2003).

The construction industry by its very nature has a very complex structure. Public sector/private sector involvement, uses a variety of financing/funding models, deploys numerous procurement methods, and involves numerous actors (organizations and trading partners) and this causes considerable fragmentation. Also, firms often work for their individual benefits aiming at achieving low cost while ignoring its impact on others. This generates adversarial relationships often ending in expensive litigation and giving rise to a win-lose attitude. Coupled with this, a complex human-technology interaction and risk aversion has contributed towards the formation of a culture that resists new adoption and diffusion of innovation, be it a new innovative technology or an innovative process (Latham 1994).

Construction is a very demanding and stressful process (Lingard and Sublet 2002). Construction teams work long hours and are constantly under pressure to meet deadlines. Under such circumstances it is extremely difficult for the people to spend time and creative energy in developing alternative innovative solutions to carry out tasks, even though they are capable of it. The main concern of the organization is ‘to get the work done’ as early as possible to avoid the threat of project time loss. Experimenting with new ideas and seeking innovative alternatives are often considered as increasing uncertainty and may put project success at risk. This risk avoidance culture deters people from adopting innovative ideas. Risk avoidance can be explained as follows.

The construction industry is characterized by activities that are discontinuous, dispersed, diverse and distinct in nature (Tay 1994). Rowlinson and Walker (1995) also pointed out that the construction industry is characterized by its non-standardization, and production processes are to some extent different among projects. Project management in the construction setting is therefore rendered more difficult not only at the national level (Seymour and Low 1990) but also at the project level (Low and Goh 1994) for a wide spectrum of reasons (Sharma 1997). According to Smith and Bohn
(1999), some of these could be overcome and mitigated, being firm-specific (as design, logistic, construction, natural and environmental). However, some are beyond the control of the construction contractors - workload, legal / regulatory and political risks. Mulholland and Christian (1999) observed that most risks are forced onto the contractors who have to complete the project within the time frame, tender price and to cope with all unforeseeable and predictable risks. Cooke-Davies (2002) argued that risk management is a key factor of leading to successful project management. Successful contractors outperform their competitors, control costs, and manage inherent industry risks (Hanson 1999). Hanson (1999) also suggested that key risk areas that affect a company’s profitability are associated with marketing and sales, capital and finances, as well as effectively managing employees and technology. Kangari (1988) stated that risk management is the processes of: risk identification; risk policy definition; risk sharing and allocation; risk analysis and evaluation; response planning; and risk minimization. Therefore, improved access to and use of knowledge is crucial in helping contractors identify and manage risk. By improving risk management, organizations have less need to be sensitive to this ‘risk’ pressure point and therefore can begin to change their culture to becoming more innovative.

2.2.4 R&D in the HK Construction Industry Context

In addition to the above characteristics and nature of construction industry in general which is shared by the HK construction industry, other specific issues are relevant. Two dominant themes are chosen for discussion relating to the HK construction industry’s attitude towards research in developing and applying innovation.

An important feature of the HK construction industry is its emphasis on low technology and labour-intensive activities in project implementation (Ball 1988; Hagerdoorn 1993; Rowlinson and Walker 1995; CIRC 2001). Whilst implementation of these activities require cost control, operative capabilities, and the knowledge of labour markets (opportunity wages, suitable incentive systems, and precise screening mechanisms), the teams in a construction project are usually based on blue-collar workers, mainly craftsmen and unskilled labourers, whose purpose is to accurately carry out any project as instructed rather than seek out innovative alternatives (Hillebrandt and Cannon 1990). This cultural aspect has both industry contextual roots discussed here and
national cultural roots, particularly power distance, which is discussed in more depth in the literature review in Section 3.7.

According to Rowlinson and Walker (1995), despite the increasingly complex building requirements of the local construction industry, the majority of the construction workforce is still using traditional labour skills; and the large numbers of small and medium contractors specialized in buildings are used to traditional styles of management with centralized decision making. Challenging the status quo is not encouraged.

In general, the construction industry is widely perceived as being slow to innovate and has trailed many manufacturing industries in implementing management and technology innovations (Veshosky 1998). This is similar in HK and there is little or no coordination between various research institutions or between their individual departments or research clusters. Much of the research direction comes from individual firms, without government support (Ho 2002). Inquiries with the HK Census and Statistics Department revealed that there are no measures of research and development activity. However, several research programs have been evident in several HK academic institutions (Rowlinson and Walker 1995). Data on individual projects and amounts of expenditure exceed HK$10 million per annum, which amounted to approximately 0.02% of the annual gross output. Compared to the typical R&D expenditure of 1% of the annual turnover in most Japanese large contractors (The Overseas Construction of Japan Inc., 1989), this is very insignificant. This research thesis, therefore, provides a much needed understanding of the mechanics of innovation deployment of the ERP that is lacking within the HK context.

2.3 The PM Context of this Research

This thesis is primarily about how an Enterprise Resource Planning system (ERP) was introduced and managed within a construction project management organization. It was therefore, primarily a change management project involving innovation diffusion. It also was a project that involved engaging the firm’s supply chain in a relationship contracting context to persuade and enable participating supply chain partners to link their ERP facilities to that of the organization under investigation. In Chapter 1 Section
1.4.2, the broad context of the organization was provided including its attitudes and culture. The broader PM context and the need for the ERP by the researched organization are discussed in this section.

2.3.1 Project Types and their Cultural Impact

The Project Management Institute’s Guide to the Project Management Body of Knowledge™ (PMBOK) defines a project as a ‘temporary endeavour undertaking to create unique product or service or result’ (PMI 2004). Temporary means that every project has a definite beginning and a definite end. Unique means that the product or services is different in some distinguishing way from all other products or services. Result implies a beneficial change. There is no shortage of literature on Project Management. A search at the catalogue from the library of Hong Kong University for ‘Project Management’, it yielded over 6,600 books. Project management concerns how good ‘Project Manager’ manages the project. A Project Manager’s primary goals, according to the PMBOK, are to assure that a specified project scope is completed on time, within budget, and to the quality specified (PMI 2004).

Heil, Bennis and Stephens (2000) noted that in the future more companies will be organized in project teams because it is the most efficient way to customize and deliver value in an era where specialization, speed of delivery, and rapid learning are keys to organizational success. Project management is orientated towards planning and control; it is concerned with on-time delivery, within-budget expenditures and appropriate performance standards. Kerzner (2003) summarized typical benefits of project management that are also relevant to the construction industry as follows:

- Accomplishing more work in less time with fewer resources and without any sacrifice in quality,
- An increase in profitability,
- Better control of scope changes,
- More efficient and effective operations,
- Better customer relations,
- Better risk identification and problem solving,
- Applicability to a multitude of projects irrespective of size,
• An increase in quality,
• A reduction in power struggles,
• An improvement in the sharing of information,
• Better company decision-making,
• An increase in business and becoming more competitive, and
• The ability to become a solutions provider rather than a component manufacturer.

There is, however, evidence that some industries, such as construction, are more mature in terms of applying project management tools and techniques than industries that have adopted the approach more recently (Cooke-Davies and Arzymanow 2003). There are differences between project management practices in different industries because of a longer history of delivering large scale endeavours in older industries, different maturity levels and differing corporate cultures. Much has been written about factors affecting project success for examples Munns and Bjeirmi (1996), Hyväri (2006), Cooke-Davies (2002). These all generally concur with Avots (1969) who listed factors affecting project management failure as including:

• Inadequate basis for project,
• Wrong person as project manager,
• Top management support,
• Inadequately defined tasks,
• Lack of project management techniques,
• Management techniques mis-used,
• Project closedown not planned, and
• Lack of commitment to project.

Turner and Cochrane (1993) identified four basic project types using a matrix of goals well defined against methods well defined. They noted that construction projects fall into a traditional category of well defined goals and well defined methods whereas change management projects are often poorly defined in both goals and methods. The more tangible construction projects tend to be successfully delivered using more structured approaches with well developed plans and monitoring for control. The more nebulous change management projects rely upon emergent planning and greater
involvement with stakeholders who can shape delivery patterns more subtly (Walker, Bourne et al. 2008; Walker and Rowlinson 2008). This suggests that the ERP change management project under study in this thesis requires a different cultural approach in its delivery to the organization’s dominant culture of delivering construction projects. Thus, the cultural barriers to be overcome are not confined to the industry or national location but also the dominant organizational culture as well.

Project management can contribute towards project success but is unlikely to be able to prevent failure although it may facilitate the project being able to take corrective actions when the possibility of failure is recognized. Every aspect of project management has two dimensions; a technical dimension and a human dimension and each of these have organizational culture implications.

Effectively exercising project control on construction projects requires accurate current, relevant data and information and the knowledge, skill and expertise to effectively analyze data and information and make sound decisions based on that input. Part of the problem faced by users of project management data and information is ‘information overload’ and various strategies have been developed in an attempt to overcome such problems including increasing the extent of visualization and graphic representation of information. For example, Total Project Systems (TOPS) developed by (Froese, Rankin et al. 1997) provide a model for a totality of services required to support the project implementation. This includes a comprehensive, flexible and fully integrated system that facilitates the management of projects in such a manner that actors within the project teams and external environment are able to utilize the functions available within the tools sets to maximize efficiency within the project team. These systems are now developing into ERP adoption and are increasing being adopted for use in construction organizations as part of a firm’s e-business strategy (Walker, Aranda-Mena et al. 2008). They nurture a cultural belief of ERP information as a means of control rather than a facilitator of innovation through improved KM.

Much of the skill of project management leadership is about ensuring that the projects’ need is adequately articulated into a project vision, often a statement, which facilitates enthusiasm and commitment for its successful realization (Christensen and Walker 2004). People view project management leadership skills as being crucial because
leaders are the conduit that: facilitates formulating the vision; detail a clear understanding and expectations of the vision; and incorporates the project aims and objectives into the vision. Hopefully, this vision guides the teams through the forming, norming, storming and performing stages (Tuckman and Jensen 1977). This vision is often clearly expressed for construction projects in models, rendered drawings and other visible artefacts. For change management projects, such as rolling out an ERP, there is a greater reliance upon communication and visionary persuasion of stakeholders that their interests are aligned. However, when information technology support is embedded in CPM processes it enables faster and more accurate distribution of information. This can be extended in ERP systems to enable working with information to create knowledge. Thus, the way that the ERP support system is used as an innovation enabler or a KM tool becomes critical to the way that the CPM operations are undertaken. This has organizational cultural implications.

2.3.2 CPM Knowledge Integration/ERP Context

Typically, the construction industry includes three main parties: an owner, a designer (called the architect/engineer), and the builder (called the contractor). Traditionally, there are two contracts between these three parties as they work together to plan, design, and construct the project. The first contract is the owner-designer contract, which involves planning, design, and possibly, some aspects of construction. The second contract is the owner-contractor contract, which involves construction. An indirect third-party relationship exists between the designer and the contractor due to these two contracts.

Project management is not new in construction projects. According to Wills, Ashworth and Wills (1994), the management of construction projects merges separated and identifiable professional disciplines including the architect, engineer, and quantity surveyor. CPM therefore requires managerial and technological expert advice relating to both design and construction activities. This places a heavy emphasis on the need for excellent information management technology such as ERP to facilitate integration and distribution of relevant necessary information sources that both design and construction team members need. ERP allows design options to be more accurately cost and time
implications modelled and investigated. Thus an ERP becomes a facilitator of innovation in design solutions as well as CPM processes.

Walker (2002) elaborated on CPM as involving planning, control and coordination of a project from conception to completion (including commission) on behalf of a client. CPM is also concerned with the identification of the client’s objectives in terms of utility, function, quality, time and cost. It also establishes the relationship between resources and their systematic integration, the monitoring and control of all contributors to the project and their output. The evaluation and selection of alternatives, in pursuit of the client’s satisfaction with the project outcome, are also fundamental CPM aspects.

Murdoch and Hughes (1995) stated that CPM has its origins in the United States. There, as in HK, was a need for large buildings to be erected quickly and reliably. This, coupled with increasing technical complexity, led to the involvement of an increasing number of technical people in the design, programming and construction of a building. Management of these people became less of an architectural issue, and more of a management issue. Therefore, organizational-cultural knowledge about how to best manage these diverse disciplines is an important asset. This is particularly true when introducing an innovation such as ERP to such groups. CPM ranges from general management skills, to management skills specifically related to technical knowledge of construction methods and practices.

One of the founding members of the HKICM13 stated that Construction Managers should ‘jump out from the box’. The construction management approach should not just focus on its own issue on its own building or infrastructure areas but it needs to

13 The Hong Kong Institute of Construction Managers, Ltd. (HKICM), formerly known as the Hong Kong Institute of Builders, was established in 1997 to promote professional excellence in the management of both Building and Civil Works. The pre-requisites for attainment of HKICM membership include academic eligibility and appropriate professional experience.
understand and appreciate other disciplines such as design, maintenance, hygiene and incorporate all related information into an integrated management system (Ho 2003). However, there are variations among different project teams in the administration of acceptable standards of ensuring compliance of the contracted completed work requirements. Such variations may be attributable to subjectivity in the interpretation of contract requirements. This is affected by communication, information and knowledge flow. CPM is thus facilitated by KM, and therefore it is essential that teams use ICT such as ERP to provide a good management tool for this outcome. Understanding differences in managing the ERP rollout project and the organizational cultural implications is also an important factor determining success of the ERP acceptance by all parties.

Construction organizations are usually project-based companies. They face challenges in adopting their ERP because construction projects are structured around various disparate knowledge and information bases that are not always easy to codify or standardize. These necessary knowledge bases are embedded in project teams rather than in intranets or KM systems (Dent and Montague 2004). Moreover, knowledge transfer is more effective in continuous teams where changes within a team are less frequent. This is due in part to the emotional transaction cost of building, developing and maintaining trust that leads to cultural norms of sharing knowledge and tolerating experimentation and failures being seen as learning opportunities (Walker, Bourne et al. 2008). This also tends to lead to lessons learned being forgotten. Thus, applying knowledge between projects is still problematical even when it involves the same team members due to CPM’s fragmented team context. There is also scant evidence of the general transfer of lessons and rules by abstracting and de-conceptualizing project knowledge into general good practices. Transfer is more likely to take place where a large level of shared or overlapping content exists. Therefore, there is need to overcome the negative impact of fragmented teams by having a good information management/KM system that transforms data into information to generate and make valuable knowledge available to those that can make the most productive use of it.

It is necessary to define data, information and knowledge before determining how an information management system can usefully transform information into a knowledge base. Popper (1983) distinguished between data, information, and knowledge. Data can
be understood as perceived truth of an observer transmitted by means of energy inputs that reach that observer through his or her senses. Information is extracted and refined by observers from the entirety of received data because of its apparent or potential relevance to them. Information is also what was extracted from data when incoming data can be related in a meaningful way to an observer’s prior expectations. Knowledge can then be thought of as an observer’s beliefs that dispose him or her to act on the receipt of new information and knowledge. It consists of a set of probability distributions which orients an individual’s behaviour and which in turn is modified by information extracted from data. An ERP primarily acts at the data level but filtering and reporting algorithms also allows it to be an information management system. An ERP may also capture an array of complementary format of information that can be combined in a way that it codifies knowledge. It also facilitates a platform for sharing information and knowledge and so becomes a KM tool. Knowledge about how to best use ICT (or an ERP) can promote innovation through the technology itself (Peansupap and Walker 2005).

Boisot and Griffiths (2001) analyzed how knowledge flows within and between organizations; the authors concluded that data is something ‘out there’ that an observer notices. The observer constructs what he or she believes is information in the form of an interpretation of data that modifies the beliefs that reside ‘in him or her’ and constitute his or her knowledge. The authors also said that data may or may not be informative, depending on its relationship with a receiving person’s prior expectations i.e. his or her knowledge base. Strictly speaking, information and knowledge, being constituents of a person’s cognitive dispositional stance, do not flow. Thus, the best people can hope for in an organization is to set up resonances among the belief systems of the different people in an organization. People talk about ‘knowledge flows’ between agents but it always refers to data flows that resonate with the belief systems of the people in an organization, in the sense that the people exposed to the data flows will extract comparable interpretations from those data.

Information systems approach being KM tools when they focusing on the capturing, storage, and dissemination within the firm of useful employee knowledge. According to Kroeber (1982), managing information can be conceptualized as two main aspects: conceptual and physical. Computer hardware and the data processing function
Knowledge Management (KM) Using Enterprise Resource Planning (ERP) System

associated with it are facilitating elements of the physical component. The conceptual components of management, organizational structure, and decision-making are supported by the overall system Kerzner (2003) proposed his model of ‘Project Management Information Systems’ illustrated in Figure 2-3. This model helps to manage and reduce fears and uncertainty associated with risks and it permits a sense of management control that was identified as a key anxiety in promoting cultural aversion to risk-taking and adoption of innovation.

![Figure 2-3 – Project Management Information Systems (Kerzner 2003)](image)

Valuable information can be collected through these four information sub-systems. The *earned value information system* either captures or calculates the planned and actual value of the work, the actual costs, cost and schedule variances (in hours or dollars, and percent), estimated cost at completion, estimated time at completion, percent complete, and trends. The *risk management information system* stores and allows retrieval of risk-related data, it provides data for creating reports and serves as the repository all current and historical information related to project risk. The *performance failure information system* identifies the causes of the failure and possibly recommendations for the removal of the causes. The *lesson-learned information system* uses a ‘Post-mortem Analysis’ documenting lessons-learned approach focusing on: what was done right; what was done wrong; what future recommendations can be made; and how, when, and to whom should the information be disseminated. This moves towards a supporting infrastructure that can help the supply chain to share some knowledge that
can be viewed as ‘common’ while security protocols can enable ‘sensitive’ knowledge to be quarantined to authorized parties.

Knowledge that is gained via a project needs to be transferred to an organization’s memory for reuse on other projects. The challenge is to capture and index knowledge for retrieval while it is available because project teams are temporary organizations (Damm and Schindler 2002). KM plays an important role in this situation. The next chapter will provide deeper discussion relating to this literature and its relevance to this thesis. The point being made here is that within a context of a project involving an integrated supply chain; it makes sense for a supportive and facilitating information and knowledge system to be used to integrate information and knowledge within that supply chain. In this thesis, the vehicle proposed is an ERP and its ‘human element’ support system that allows innovation in processes that rely upon effective information and knowledge exchange to occur.

2.4 Relationship Contracting Context to CPM

The construction industry has been transforming itself from an isolated model of design>bid>build towards an integrated approach where a seamless model is offered with design and delivery elements being closely aligned with information and knowledge flows being enhanced. However, it is beyond the scope of this thesis to explore these forms because the aim is in this chapter is to merely highlight the importance of PM as a process of facilitating closer cooperation and effective delivery of benefits.

A range of relationship based PM approaches has been described by a number of authors (Davis 2006; Walker and Rowlinson 2008) ranging from partnering to alliances (Walker and Hampson 2003) and other forms of public private partnerships. Supply chain management has featured more prominently in the construction literature and, though still in its infancy (Akintoye, Beck et al. 2003) is being accepted as an advance on the traditional procurement approach (Walker, Bourne and Rowlinson 2008). Section 3.5 in the literature review chapter of this thesis describes the nature of these in more detail.
The significance here is that they involve an integrated approach to creating value through the synergistic association of organizations within a supply chain by sharing information and knowledge that reduces wastage in its more general sense. The premise that the case study organization works from, is that by working towards an integrated supply chain approach through use of its ERP will encourage (1) information and knowledge sharing that leads to value generation, and (2) leads to cultural alignment through shared commitment, trust and reduced transaction costs (Williamson 1993).

2.5 Chapter Summary

This chapter sets the context of the thesis. Construction projects highly depend on good project management practice and the construction industry provides significant contribution to the economies of many countries, and cities such as Hong Kong. Better management practices can help to minimize wastage in its broadest form and facilitate organizations to be more profitable and effective.

The first section of this chapter outlines the basic nature of the construction industry including its contribution to economies, productivity of construction industry, and its inherent risk-averse culture that inhibits innovation. The second section outlines the PM context of the ERP implementation focus of this thesis. The HKSAR Government has recognized that the construction industry in Hong Kong needs good management practice to improve its efficiency and effectiveness, therefore, the aim of this chapter is to briefly describe how project management, CPM and information management/KM systems can address that challenge. It concludes that KM can enhance the productivity of the construction industry and that the ERP is not only in part a KM tool, but it is also in itself an example of a culture-change management project.

In the next chapter, the focus of the literature review will turn to those specific aspects of PM theory that explain concepts used throughout this thesis, that help to frame the research approach and are used in making sense of and explaining research results.
Chapter 3  Literature Review

3.1  Introduction of the Chapter

There is a Chinese proverb “溫故可以知新” (wēn gù kě yǐ zhī xīn), means in order to gain new insights; people must always re-study through old materials because there are so many theories and researches built-up by other scholars. Reviewing the past can help people understand the present. Since history repeats, those that were ignored in the past are destined to re-live it in the future, and therefore “past” will be the best guide to the future. This is relevant for a researcher to review literature to ensure that no important variable is ignored that has in the past been found to have had an impact on the research problem (Sekaran 2000).

As shown in Figure 3-1, this is the Phase 1 of the research project which is for literature review. The purpose of this chapter is to review the previous relevant literatures and studies which are related to knowledge management, information communications technology (ICT), Enterprise Resource Planning (ERP) system, partnering strategy, leadership style and cultural impact.

The structure of the chapter is organized into six sections as illustrated in Figure 3-2.
In the last chapter, it was noted that the construction industry has a significant contribution to the economy (especially in Hong Kong) and good construction PM practice, especially by adopting KM policy, can improve the efficiency and effectiveness.

The impact of knowledge and its management is first reviewed. It begins with the definition of knowledge and then explains the knowledge stickiness and concludes the importance of the KM system. Organizations should create and maintain a suitable knowledge-sharing environment such that a knowledge advantage (K-Adv) is gained over their competitors. A sub-section is also included for knowledge benefits in the construction industry and this section ends with a concluding remark on KM.

Secondly, reviews of ICT include evolution of IT and ICT tools in construction industry and the trend of IT/ICT in the Hong Kong construction industry.
The third section examines Enterprise Resource Planning system (ERP). It begins with the definition of ERP systems and follows by its evolution. It also discusses its advantages and disadvantages and the relationship of ERP system and KM. These two sections provide a broad view of ICT and ERP can be used in construction industry which forms the foundation for the integration with other business strategy to improve the competitive advantages over other competitors in the industry.

The fourth section is about subcontracting and partnering which reviews the trends in supply chain management (SCM) and the necessity of subcontracting and benefits of partnering. Particular attention is devoted to subcontracting and partnering in the construction industry of Hong Kong. The review concludes that a partnering strategy is extreme useful and is an easy fit in Hong Kong construction industry.

The ERP system for KM and partnering strategy in the business model require top management approval. Therefore, the fifth section concentrates on leadership theory and styles that may affect PM practice. It focuses on the relevant leadership study in construction industry of Hong Kong and the relationship of leadership, trust and power in formulation of business strategies.

The last section presents the cultural impacts on various leadership styles. It includes various national culture dimensions and how it affects organizational culture and context of communication within the organization. Finally, it reviews the organizational support and cultural impact in strategy formulation. All sections relate to managing change.

The literature reviews presented in this chapter link with Chapter 5, 6 and 7 for exploratory surveys, descriptive study and actions research respectively:

- In preparing the questionnaire for exploratory surveys, the study of the ERP system, relationship of partnering strategy and leadership, power and culture issues in this chapter underpin the theoretical basis.
- In doing the descriptive study, the analysis of the ERP system, study of proper partnering strategy and leadership style provide useful guidelines to structure interview tools.
• When observing actions, the knowledge of the ERP system, different partnering strategies and leadership theory helps to identify clearly the critical intervention actions required to improve productivity.

3.2 Knowledge and Management

Dent and Montague (2004) stated that the evolution of knowledge as one of the key factors in current economic activity has led to businesses seeking to develop new practices (even in mature industries such as construction) by utilizing a greater breadth of internal and external sources to obtain, create and employ knowledge. According to Walker (2004), knowledge and understanding is becoming a far more important competitive advantage that is data and information. This is because the latter is merely the feedstock to understanding and this underpins strategy, design, decision making followed by taking the appropriate action. Therefore, data, information, and lesson learned must be translated to become useful knowledge.

3.2.1 Knowledge

Gamble and Blackwell (2001) stated that knowledge is both and social and contextual. The person who holds the knowledge also knows what it means, what its limits are and how it can be used. This surrounding context of tacit knowledge is sometimes lost when the information is saved somewhere else. Even transmitting the information to someone else is not the same as knowledge transfer. The receiver must actually pick up the information and learn how to use it in appropriate ways.

According to Maqsood (2006), knowledge is used, reused and iteratively re-constructed. The concept of knowledge can be described by a simple world “understanding”. This understanding gives birth to reality that humans construct in their minds as a result of experiences and interpretation.

Stewart (2000: p69) states that knowledge, while differentiating it from data and information, is “a conclusion that is drawn from data and information”. Data is just a raw product. Therefore, only when data is processed to provide certain useful context it becomes the information and can be used in decision making (Standards Australia 2001). Further processing of information provides an understanding and grasp of
reality that is then termed as knowledge. Knowledge is the power to act and to make value-producing decisions that adds value to the enterprise (Polanyi 1997; Kanter 1999).

Knowledge can be categorized by type. Knowledge types are about the ability to know-that, know-who, know-how, know-where, know-why, know-where. These are critical to gain and retain competitive edge in the dynamic environment of the new economy. The shift in culture has to be from “individual knowledge is individual power” to “organizational knowledge is organizational power” (Lehaney, Clarke et al. 2004). Zack (1999) used the following typology: declarative knowledge (knowledge about or know what); procedural knowledge (know how); causal knowledge (know why); conditional knowledge (know when); and relational knowledge (know with). Quinn, Andersen et al. (1996) described know-what or declarative knowledge as cognitive knowledge, and procedural knowledge as advanced skills and systems understanding as know why. They add a further concept that is useful to understand the self-motivated drive of creative intellect, or care-why.

Scharmer (2001) extended our understanding of knowledge and he saw it being much like an iceberg. Above the water line he envisages explicit knowledge and below is embodied tacit knowledge (knowledge in use) and deep below that, self-transcending knowledge (not yet embodied knowledge). This notion led him to categorize four types of action in using knowledge; delivering results that create value (performing); improving the process of performing (strategizing); reframing the assumption of performing (mental modelling); and re-conceiving the identity of performing (sculpting).

3.2.2 Knowledge Stickiness

Kulkki and Kosonen (2001) stated that the knowledge conversion process is not an easy and simple one which is affected by the stickiness of knowledge. Stickiness makes its transfer from one mode to other or from one individual to other difficult. It becomes a barrier to knowledge transfer. Burton-Jones (1999) argued that because tacit knowledge is “sticky”, it tends to stick to the person with that knowledge and is only transferred with a consideration and effort. Stickiness of knowledge poses considerable problems for organizations wishing to maximize the conversion of tacit knowledge in
people’s heads into explicit knowledge that has been codified. Szulanski (2003) conducted a series of studies into the transfer (often failure to fully transfer) of best practice within organizations and concluded that the three major sources of knowledge stickiness (barriers to transfer of knowledge) were absorptive capacity, causal ambiguity and the quality of the relationship between source and recipient of knowledge.

Cohen and Levinthal (1990) defined absorptive capacity as the ability of a firm to recognize the value of new external information, assimilate it and use it for commercial ends. It is a measure of an ability to absorb ideas, information and knowledge and applies to both external and internal sources of information and knowledge. Walker (2004) described causal ambiguity as the inability to be able to make a cause and effect link. The third major influence on knowledge stickiness is the relationship between the source and recipient of knowledge. In terms of electronic sources, they are notoriously cumbersome to engage with – not user friendly.

Snowden (2006) pointed out that for the past decade various attempts have been made to manage knowledge as an asset which needs to be converted from tacit (in the head) to explicit (written down). Such approaches have had partial success at best. The author proposes a new approach emerges in which we focus not on the management of knowledge as a “thing”, but on the management of the ecology of knowledge. The process of knowledge capture by KM experts frequently involves a massive loss of context. The naturalizing tradition in philosophy seeks to link thinking about knowledge with the physical sciences. Naturalizing approaches in KM are rooted in this tradition, but also seek to work with the way in which humans have evolved to know and share learning. Seeing knowledge as a manageable flow, not simply as an asset presents exciting theoretical and practical opportunities.

Gamble and Blackwell (2001) suggested that the easiest kind of KM system to justify is a knowledge base. A knowledge base is something that attempts to make the knowledge marketplace more efficient by making explicit knowledge easier to access. Unfortunately, making a repository of information available is not the same as transferring knowledge. It is only one (albeit important) step in a far more complex process.
3.2.3 Knowledge Management

Snowden (2006) argued that firstly, KM facilitates effective decision making because hindsight does not lead to foresight and probe can sense response. Secondly, it creates the conditions for innovation because creativity is an outcome but not a cause of KM.

According to (KPMG 1999), KM is about:

- Supporting innovation, the generation of new ideas and the exploitation of the organization’s thinking power;
- Capturing insight and experience to make them available and usable when, where, and by whom required;
- Making it easy to find and re-use sources of know-how and expertise, whether they are recorded in physical form or held in someone’s mind;
- Fostering collaboration, knowledge sharing, continual learning and improvement;
- Improving the quality of decision-making and other intelligent tasks; and
- Understanding the value and contribution of intellectual assets and increasing their worth, effectiveness, and exploitation.

KM refers to the systematic organization, planning, scheduling, monitoring, and deployment of people, processes, technology, and environment, with appropriate targets and feedback mechanisms, under the control of a public or private sector concern, and undertaken by such a concern, to facilitate explicitly and specifically the creation, retention, sharing, identification, acquisition, utilization, and measurement of information and new ideas, in order to achieve strategic aims, such as improved competitiveness or improved performance, subject to financial, legal, resource, political, technical, cultural, and societal constraints (Lehaney, Clarke et al. 2004).

KM is multi-faceted and incorporates different inter-linked processes (Egbu, Botterill et al. 2001). The purpose is to create a thriving working and learning environment that fosters the continuous creation, aggregation, use and reuse of both personal and organizational knowledge in the pursuit of a new business value (Kikawada and Holtshouse 2001). Quintas, Lefrere and Jones (1997) agreed and consider KM as the process of continually managing knowledge of all kinds to meet existing and emerging
needs, to identify and exploit existing and acquired knowledge assets to develop new opportunities. The integration of the key management issues and achievement clarity and cross-functional awareness is a key to be successful in KM (Webb 1998). Egbu, Botterill et al. (2001) presented their understanding of KM as the identification, optimization, and active management of intellectual assets to create value, increase productivity and gain and sustain competitive advantage. They point out that KM mobilizes the intangible assets of intellectual capital of an organization that is often of greater significance to the organization than its tangible assets. By developing a body of methods, tools, techniques and values through which organization can acquire, develop, measure, distribute and provide a return on their investment (Snowden 1999).

3.2.4 Importance of KM Systems

Sveiby (2006) argued that collaboration and knowledge sharing have clear benefits for people and enhance business performance. He identified knowledge sharing barriers as: a silo mentality; feeling knowledge is own power; lack of process; time constraints; no knowledge sharing instructions from top management; poor IT systems; lack of top management encouragement; and bureaucracy and resistance. This is globally an increasing problem in many organizations; both public and private and – even worse as many managers do not seem to know how to organize for improving the collaborative climate, some managers do their best to prevent sharing of knowledge among their staff.

Effective KM calls for reuse of organizational knowledge. However, each type of knowledge re-user has different requirements for knowledge repositories. Markus (2001) stated that knowledge creation is often viewed as somehow more important and more difficult to manage. The effective reuse of knowledge is arguably a frequent organizational concern and one that is clearly related to organizational effectiveness. Knowledge repositories play a relatively unimportant role in knowledge reuse. He argues that face-to-face communication and good knowledge sharing processes between the sources and intended recipients of knowledge are crucial to successful knowledge reuse. He also argues that there are generally four types of knowledge reuse situations involving different knowledge re-users: shared work producers, shared work practitioners, expertise-seeking novices, and secondary knowledge miners. Knowledge producers, who are frequently expected to produce high quality knowledge
repositories, often lack both the motivation and the resources to do so. Therefore, successful knowledge reuse requires providing proper incentives to the knowledge producers and shifting some of the burden of packaging and disseminating knowledge onto intermediaries. The records knowledge producers make purposely for their own use are not likely to meet the needs of others also, the records knowledge producers make for others may not meet their own needs, and therefore, they may not have adequate incentives to produce quality documents that meet the needs of others.

3.2.5 Focus Area of Knowledge Strategy

Knowledge processes are about the creation, retention, sharing, identification, acquisition, utilization, and measurement of information and new ideas, in order to achieve strategic aims, such as improved competitiveness or improved performance (Lehaney, Clarke et al. 2004). Fayyad (2006) discussed Knowledge Discovery and Data Mining (KDD) which combines machine learning, pattern recognition, statistics, databases, and visualization to automatically extract knowledge (or information) from databases. This extracted knowledge supports human decision-making, e.g. predictive modelling, forecasting, and classification tasks, summarizes the contents of databases, or explains observed events. Successful deployment of these technologies to e-business enterprise data requires: data warehouse construction and updating, and delivery of timely, interesting, and actionable results in a form consumable by business end-users.

Sveiby (2006) proposed the Knowledge Management Activity Planning (KMAP) process. This a highly effective process to plan a knowledge-based strategy and related activities, which is a question-based process, based on the knowledge-flow framework. He stresses the most important knowledge flows, which create value in an organization, allow people to rapidly screen ideas and focus on a discussion of activities that create value.

Dent and Montague (2004) advocated the five program steps within the knowledge strategy focus area with awareness and commitment being of utmost concern. Senior management support and encouragement of bottom-up KM initiatives are the first focus.
As far as strategy is concerned, organization should establish corporate KM vision and principles. There are two key bases for businesses to adopt KM principles and practices:

- To enable the improvement in the sharing of existing knowledge
- To create new knowledge to convert into valuable processes, services and/or products

Corporate strategy should link to knowledge strategy to enable employees to increase their understanding of the connection between KM and the business goal/mission.

A third focused area is culture where organizations should build conducive learning environments, and link organizational culture, knowledge and learning to the business objectives. Fourthly, organization must set up the incentivisation and reward system by not only encouraging good KM behaviours, but also rewarding staff for teamwork and knowledge sharing. Lastly, there must also be security and protection procedures which key knowledge assets are identified, captured and protected.

### 3.2.6 Knowledge Sharing Environment

Argyle, Furnham and Graham (1981) implied that one of the situational factors affecting cross-cultural communication is the “environmental setting”. Therefore, an effective KM system requires a good knowledge-sharing environment. Tsoukas and Mylonopolos (2004) argued that knowledge should be collected and properly analyzed for diffusion. Organizational politics play important role this as it creates competition for knowledge claims and so politics plays a decisive influence on the extent to which specialized bodies of knowledge are diffused across an organization. Managers should seek to complement practice-based approaches to organizational knowledge, by focusing on the politics of interpretation and the process of validating knowledge claims in an organization.

Effective project cost management requires access to accurate, current, reliable cost data and information and is concerned with establishing processes to monitor and control budgets. In addition, the data needs to be understood in the context of the specific case where the knowledge was created. For example, project cost management in the construction industry is a highly information and KM intensive activity. It
encompasses knowledge relating to expectations of parties in a supply chain; knowledge assets that can be shared and enhanced that relate to delivery methods/techniques, business models, opportunities for synergies and market intelligence etc. It needs:

- High levels of project context-specific cost estimation and budgeting knowledge and information to develop conceptual budgets and financial feasibility studies during the pre-tender phase through to the project design phase;
- Value management to question, probe and challenge the design to explore and evaluate alternatives that represent improved value for money;
- Generating marketing intelligence and knowledge to consolidate into a tender submission through evaluating tender submissions from outsourced entities;
- Generating relationship and cost minimization knowledge through negotiating costs and conditions of contract with outsourced suppliers and subcontractors during the tender phase;
- Extending project-contextual knowledge through managing and negotiating contract variations to the agreed contract sum (contract change management) at the project implementation phase;
- Generating both upstream and downstream supply chain expectation and relational knowledge through administrating head contracts with a client and contracts with outsourced subcontractors and suppliers. (Smith 1998; Smith and Love 2000; Hughes 2006)

3.2.7 Knowledge Advantage (K-Adv)

KM is seen as essential to the survival of organizations, to capture the creativity, sharing, and utilization of knowledge and expertise that provides an organization with competitive edge (Lehaney, Clarke et al. 2004). Gamble and Blackwell (2001) suggested that all companies are already involved in KM but often it is done implicitly and informally. The job of a formal KM program is simply to make knowledge marketplaces operate more efficiently. The motive for undertaking formal KM projects is very clear because organizations are recognizing that ownership of knowledge is a key competitive differentiator. The lack of a KM program means that they are losing money, or opportunities. Either because they are unable to find the knowledge that they
need, or because they are “reinventing the wheel”, or because they are making decisions based on inadequate information.

KM is supported by an effective ICT infrastructure that can facilitate competitive advantages in at least two ways – having a cost advantage or a differentiation advantage. By better knowing the source and context of costs, a firm can achieve cost advantage for example by having superior knowledge of the range and performance of sub-contractors or suppliers or by having a superior cost management system that allows better cause-and effect understanding for internal direct costs i.e. better knowledge of wastage rates and their reasons. Firms achieve a differentiation competitive advantage example when they have superior market knowledge or effective/innovative processes that make them partners of first choice. However, having this kind of knowledge is not by itself sufficient to guarantee competitive advantage. Thus, an effective KM system, allows construction firms to create share and use critical knowledge and this can provide the competitive advantage that distinguishes it from its competitors.

Data and information can then be contextualized, re-framed to reflect its current context, used and through this process become enhanced to form knowledge. The way that KM is approached is therefore becoming critically important in the project business model. Those organizations that can better harness their knowledge in their projects are more likely to realize competitive advantage from doing so. Whatever the KM strategy that is adopted, firms can develop what Walker referred to as a K-Adv.

The ICT support system, whether using a codification or personalization knowledge strategy, requires strategy and leadership that supports its effective establishment and maintenance. Moreover, the strategy needs to support the development of a knowledge sharing culture and reward system accordingly. This resonates with the concept of gaining a K-Adv (Walker, Wilson et al. 2004).
Figure 3-3 illustrates the K-Adv in more detail. Each of the three infrastructure elements is presented with their break down structure. Each of the above elements is linked into a capability maturity model (CMM) that helps to identify the level of maturity of the K-Adv implementation and adoption. Similarly, organizations can compete with others by using their specialist knowledge and professional competence, therefore Dent and Montague (2004) also suggested that the key KM issues for businesses are:

- Organizational infrastructure - organizational culture and environment, social networks and processes, leading to the sharing of values and experiences; and
- IT Infrastructure - platforms with enhanced sharing capabilities, enabling connections, communication and collaboration.

### 3.2.8 KM in the Construction Industry

Knowledge is being recognized as a vital resource and source of competitive advantage in today’s dynamic and changing business environment (Burton-Jones 1999). Organizational and individual knowledge is vital for business entrepreneurship and for managing change (Nonaka and Takeuchi 1995; Egbu 1999; Egbu, Botterill et al. 2001).
Knowledge identification, creation, acquisition, transfer, sharing and exploitation is now generally accepted as vital for efficient working in projects and for improving organizational competitiveness.

The foregoing is also true for the construction industry. Dent and Montague (2004) said that KM is not a purpose in itself rather. Organizations in the construction sector do not exist primarily to disseminate and enhance construction-related knowledge; rather they exist to sell the provision of services and products to the marketplace. But, as competitive advantage relies on informed decision-making within such companies, KM will be a decisive component of successful future businesses. Effective management of knowledge in the construction industry is likely to produce innovation, reduce project time, improve quality and customer satisfaction (Love, Li et al. 2000; Kamara, Augenbroe et al. 2002). Through the process of KM, the exploitation of an organization’s intangible assets creates value and knowledge both internally and industry wide (Snowden 1999; Davenport and Prusak 2000; Dulewicz and Higgs 2000; Walker and Nogeste 2004). In the project environment, KM will assist project managers to improve communications within teams. It will also provide informed knowledge to the project manager and project teams. KM can ensure better sharing of best practice documents, lessons learned, PM and system engineering methodologies, and review and document the rationale for strategic decision-making (Liebowitz and Megbolugbe 2003). Failure to capture and transfer project knowledge leads to an increased risk of “reinventing the wheel”, wasted activity, and impaired project performance. These potential benefits of KM are convincing enough for the construction organizations to venture into adopting its principles.

A successful KM initiative will install learning and facilitate knowledge-sharing culture and environment, provide vision and effective leadership to overcome learning barriers. This will help an organization to be transformed into a learning organization that is open to learn new techniques and continuously changes itself based on learned knowledge. This change increases the absorptive capacity of the organization, which is a function of how organizations retain and distribute knowledge internally to practically exercise KM (Cohen and Levinthal 1990). Furthermore, prior knowledge of particular knowledge domains tends to make it easier to understand new knowledge (Burton-Jones 1999). It enables organizations to recognize the value of new
information, assimilate it and apply it to commercial ends (Cohen and Levinthal 1990). Liebowitz and Megbolugbe (2003) observed that with the creation and capture of knowledge, learning takes place and knowledge is applied and embedded within individual and organizational processes. Organizations may learn effectively from the experiences and utilize them efficiently.

Dent and Montague (2004) concluded that for construction organizations, the highly fragmented nature of the business environment with its characteristics of hierarchical production structures, networks, restrictive contractual obligations, failures to recognize customer satisfaction requirements, and project uniqueness, contribute both difficulties and opportunities to be faced by adopters of KM and learning initiatives.

3.2.9 Concluding Remarks of Knowledge Management

According to Porter (2001), the evolution of ICT in business can be thought of terms of five overlapping stages. The earliest ICT systems automated discrete transactions, and then evolved to fuller automation and functional enhancement. The third stage involved cross-activity integration e.g. the enterprise resources planning system. The fourth stage enables the integration of the value chain and entire value system, encompassing those of tiers of suppliers, channels, and customers. Soon to be integrated is product development, which has been largely separate. Complex product models will be exchanged among parties, and Internet procurement will move from standard commodities to engineered items. In the last stage, IT will be used not only to connect the various activities and players in the value system but to optimize its workings in real time. Therefore, KM becomes very essential. Adopting KM in an organization is invaluable; it enables us to see links between organizational learning and the competitive advantage of a company through the development of its distinct capabilities. By seeing organizational knowledge as a “work”, people can further investigate how knowledge is diffused properly within the company. If knowledge is seen as a “work”, its content and form remarkably depend on the technologies available, the social relationships around which “work” is organized and the purposes for which knowledge is used.

The majority of the effort in establishing KM is going to be to provide a more economical working environment in order to save time and cost, and then create a better
competitive advantage. The current stage of using ICT in the construction industry has been gradually increasing. According to Deng, Li, Tam, Shen and Love (2001), a survey revealed the Internet-based or Internet related ICT solutions were reported to be very useful in the construction industry. Mostly, general Internet related solutions include E-mail, transfer files, shared database, Intranet and Internet. Although the use of web-based communication results in reduction in time and cost, the use of this method, like the National Museum of Australia (NMA) Project, is still not widespread. There is plenty of room for improvement.

As businesses evolve, more sophisticated means are developed for gathering, aggregating, and evaluating intelligence and information. As people learn to disseminate and act on knowledge, the competitive nature of the market will continue to increase in intensity. Given that it has become increasingly difficult to achieve significant advantage through labour, overhead, materials or other costs, it becomes imperative for organizations to rely on the judicious use of information developed outside of the organization.

Over the next five to ten years, knowledge will be one of the most powerful tools for success. Those organizations who know how to get it, manipulate it, and use it fastest, stand to win their market races. The path of KM runs from how an organization gathers its knowledge to how an organization learns from this knowledge to how an organization implements its new wisdom in business initiatives. From gathering knowledge to changing the course of the organization, KM serves as a guiding compass of any organization. A break anywhere in this path may cause this important tool to guide the organization in the wrong direction.

In this sense, technology is linked to ICT, and the organizational should be part of a partnering strategy. The human activity system is hinged on a supportive leadership style.

Finally, the above section on knowledge and KM leads to its role in transformational change of an organization. Moving from one organizational state to another requires as indicated in Chapter 1 Section 1.5 as illustrated in Table 1-1, KM can be used as a tool for achieving this. KM becomes an enabler of change and to some extent a driver in that
better transparency about causal links between productivity and improved business delivery helps to enhance the motivation to change business practices.

The following sections will review literatures about ICT tools, partnering strategy and leadership style.

3.3 Information Communication Technology Tools
Boisot and Griffiths (2001) stated that IT greatly affects the flows of data within and across organizations. Following the convergence of computing and telecommunications, IT can greatly increase both data processing (interpretation) and communication processes, impacting both how knowledge is structured in an organization and how it is disseminated within and between organizations. Thus one could simply say that technological developments have increased the volume of data that can be processed and transmitted per unit of time, while significantly increasing the number of people that can be reached per unit of time. The extent to which advanced ICT plays a supportive or impeding role in the knowledge strategy of an organization depends not only on the knowledge infrastructure of an organization, but also on the attitude of decision makers towards knowledge sharing, creation, and use, as well as the technology itself (e.g. Brindle (1999). The initial focus of KM strategies was concentrated on developing new IT applications to support the electronic capture storage, retrieval, and distribution of explicitly documented corporate knowledge bases. Any successful KM initiative needs to ensure that a process is established to ensure that there is continual checking that IT supports corporate knowledge needs (Dent and Montague 2004).

3.3.1 IT and ICT in Construction Industry
Research surveys for construction IT/ICT have been conducted in many regions for example in Taiwan (Tan 1996); Hong Kong (Futcher and Rowlinson 1999); Malaysia (Sharif and Omar 2008); United Kingdom (Sarshar, Tanyer et al. 2002); Denmark (Brandon, Betts et al. 1998); New Zealand (Doherty 1997); and Australia (Ireland 1994; Love 2001; Peansupap 2004), these findings indicated an increasing trend in the use of ICT in construction.
According to Mark (2001), the current stage of using IT in cost control for construction projects has not been able to efficiently achieve results. This is due to the nature of the procurement system in construction still uses traditional methods. However, it is a trend of using IT and ICT tools in the construction industry (Walker, Finegan et al. 2003). Much effort therefore, has been consistently applied to improve construction productivity. IT and ICT tools are an area worth focusing on because it can increase productivity through decreasing information processing time. IT applications can also improve operational improvement through improving the communication flow of information for effective decision-making and coordination and essential to achieving change because it aids communication. For example, visualization technologies improve the effectiveness of communicating project information between project participants (Froese, Rankin et al. 1997; Liston, Fischer et al. 2000). Before studying construction industry ICT issues, it is useful to discuss how IT/ICT is applicable in the construction industry. Therefore, organizations should prepare and update their management and internal practices to cope with this pace of change; otherwise they are in danger of losing their competitive advantage (Porter 1985; Tan 1996).

### 3.3.1.1 Importance to the Construction Process of ICT Use

BCT (1999) researched and revealed that 86% have a PC and ICT tools are used extensively by construction project individuals. This trend has been recently surveyed by Yusuf and Osman (2008) in Malaysia amongst architects, quantity surveyors, engineers, contractors, developers, suppliers and government agencies. The authors reported that 83% of the respondent was fully computerized for their work, while 17% was semi-computerized and none of them without a PC on their work. This indicated that ICT is important to the construction process.

A major construction process demands heavy exchange of data, information and knowledge transfer between project participants on a daily basis. In practice, most construction information in the past was composed in traditional ways using paper-based documentation with its attendant difficulties in managing information flows (Duyshart 1997; Bjork 2002). One of the benefits of using ICT is that all information is created and stored in electronic media formats so that it increases the capability for users to simultaneously and concurrently access and share information in different geographical areas (Hajjar and AbouRizk 2000). Duyshart (1997) noted that
much of the paper-based exchange during the construction phase involves duplication, continual translation and transcription from one medium or form to another, as well as the loss of information. The use of ICT minimizes such problems.

Secondly, ICT applications can help improve project planning, scheduling and cost control (Abudayyeh, Temel et al. 2001). Tam (1999) demonstrated that the development of a total information (knowledge) transfer system for PM can save considerable time and cost for document transfer. ICT can improve database distribution by the use of a web-based electronic document management system (EDMS), with all documents stored in central database and accessed from other locations (Bjork 2002). ICT also encourages information integration between construction processes; helps reduce data re-entry errors and support real-time construction project monitoring (Bjork 2002; Anumba, Egbu et al. 2005). Integrated electronic communication exchange provides various cost and time reduction tangible benefits and improved and effective service delivery intangible benefits (Duyshart, Mohamed et al. 2003).

ICT has not only been used to decrease these integration problems, but also is used as an effective way for experts to share knowledge and jointly solve problems. For example, the BP virtual office is where complex problems were solved using the expertise of a global network of experts linked electronically (Prokesch 1997); the T-40 management information systems (MIS) is also applied to construction management (Ireland 1994).

3.3.1.2 The Benefits of IT/ICT Use in Construction

Many research studies have identified potential benefits to be derived from using ICT in construction processes (Finch, Flanagan et al. 1996; Tam 1999; Abudayyeh, Temel et al. 2001; Kong 2001; Love 2001; Thorpe and Mead 2001; Hameri and Nitter 2002). The innovation of ICT is perceived as providing a key competitive advantage (Porter 1985; Tan 1996; Voordijk, Leuven et al. 2003). Gaining competitive advantage from using ICT in construction has been confirmed by several studies (Bjornsson and Lundegard 1993; Peansupap and Walker 2005; Maqsood 2006; Ruddock 2006).
Project-specific Web sites (PSWSs) give construction personnel new ways of pulling the information needed to design and build today’s complex projects (Thorpe and Mead, 2001). Nitithamyong and Skibniewski (2006) also suggested that Web-based construction project management systems promise to enhance construction project documentation and control and to revolutionize the way in which a construction project team monitors and administers projects. ICT tools such as Electronic Document Management System (EDMS) can provide a possible solution to this challenge (Finch, Flanagan et al. 1996; Bjork 2002; Hameri and Nitter 2002). Bjork (2002) pointed out that the use of EDMS is an essential way to manage and enhance communication because it allows the precise delivery of documents and information to the right person in time and can reduce waiting time within any decision-making process. Also, any EDMS document is also stored in a central database in which users can access and frequently update data and information. Thorpe and Mead (2001) argued the pro and con of project science web sites and found that the use of ICT such as a project-specific web site management system (PSWS) can speed information flows on construction projects and it could reduce the cost of construction works.

Thus, not only does IT/ICT increase the speed of knowledge and information transfer, but it also helps in updating knowledge and information such as drawings, specifications, and forms that help managers make decisions based on the current information. Several researchers have attempted to develop tools for PM using a web-based platform (Abudayyeh, Temel et al. 2001; Deng, Li et al. 2001; Thorpe and Mead 2001). Other authors reviewing the current web-based PM applications in construction highlight their potential use for supporting construction management (Skibniewski and Abduh 2000; Ahmad, Azhar et al. 2002). In particular, Skibniewski and Abduh (2000) reviewed current market web-based services that support PM systems (PMS). However, the use of these web-based PMS is still not widely prevalent in the construction industry (Alshawi and Ingirige 2002). A reason for this may be that most web-based PMS do not integrate the capability of project planning and control, but mainly focus on managing document and information. Skibniewski and Nitithamyong (2004) found that the barriers of using web-based PMS include password related problems, slow internet connection speed, lack of familiarity with current communication tools and immaturity of ICT use among project participants. Therefore, it is essential to explore how to best manage and diffuse an ICT application within
construction organizations. To illustrate these problems and provide solutions, this research will focus on an Electronic Document Management System (EDMS) application as the ICT application that best represents the current problems of ICT use facing the construction industry.

With the decrease of internet cost and the growth of the technology, the adoption of information and communication technologies should be affordable. However, several difficulties to IT/ICT use and adoption are found and the following sub-section will be reviewed those difficulties for OT/ICT use in the construction industry.

3.3.1.3 Difficulties of Using IT/ICT in Construction Industry

According to Marsh and Flanagan (2000), there is wide variation amongst construction organizations in the use of IT. The construction sector is under-performing in the use of IT compared with other industry sectors, with limited evidence of electronic exchange of information between companies. Flanagan, Ingram and Marsh (1998) also argued that despite many small and medium sized contractors and builders’ merchants using computer-based systems for holding materials and stock information, these are rarely sophisticated enough to exchange information electronically with trading partners. According to Thorpe and Mead (2001), those who have studied construction project management agree that there is a need to replace redundant paper-based systems with centralized Web-based project management systems (WPMS). However, construction companies still rely on personal contact, telephone and paper to manage information in the supply chain. Electronic exchange of information at the construction stage is rare, paper is undoubtedly the main medium (BCT 1999). According to Dossick and Sakagami (2008), the USA and Japanese economies are high-tech intensive, but a relatively small sector of the construction industry in each country has implemented WPMS to exchange information. Their study also revealed that Japanese and USA construction companies still requires a lot of paper documents although personal signatures or seals can be done electronically. Similarly, the use of ICT as a communication medium between clients and construction organizations remained low (Hassan, McCaffer et al. 1999). Difficulties can influence ICT use and adoption. These barriers can be grouped into three main areas: high investment cost, technical difficulties and lack of experience.
Williams, Bernold and Lu (2007) concluded that high cost and little return on investment are important barriers to the use of Web-based IT and wireless technologies within Korean and USA construction companies. The barriers of use ICT in Malaysia included high cost, insufficiency bandwidth, broadband access, fixed technologies such as fibre, DSL technologies etc (Sharif and Omar 2008). According to Dossick and Sakagami (2008), the technology must be reliable; users will abandon the system and go for a more reliable one. The next struggle of ICT adoption is technical problems and can be grouped into immaturity of technology, limited quality of technology, and non-standardization (Love 2001). Marsh and Finch (1998) concluded the major barriers included a general lack of awareness about the technologies, coupled with uncertainty about how to identify and measure potential benefits. CICA and KPMG (1993) and the BCT (1999) studies described similar concerns among firms relating to the evaluation of other forms of IT, including EDI, electronic trading and design systems. The lack of maturity of technology affects not only investment cost but it also influences service quality performance such as reliability and speed of access (O'Brien 2000).

The last barrier to ICT use and adoption is the lack of ICT management experience. According to Nitithamyong and Skibniewski (2006), the potential factors affecting the management performance of the service providers for an online project management system include prior practical experience and computer experience. Technologies that provide long-term benefits often represent a risk that contractors do not take (Norman 1970). The problem of identifying benefits of IT investment is not unique to the construction industry. It is a problem experienced in all types of business sectors and organizations (Hochstrasser and Griffiths 1991). However, the problem is more acute in construction as a result of the industry’s structure, fragmented supply chain and under capitalization (Andersen, Baldwin et al. 2000). Ruddock (2006) stated that assessment of the extent of the economic benefits for the UK construction industry from ICT is difficult to evaluate accurately but the results of his analysis find that this industry is beginning to reap the benefits on productivity from ICT investment. Many construction organizations try to gain benefits from ICT investment, however, they may merely obtain partial benefits if only a few people actually adopt and use it. Under these circumstances, an organization may not attain predicted overall productivity gains because staff will just work with both paper and electronic copy.
Failure to identify and measure the full impact of IT will result in viable applications being erroneously dismissed as uneconomic. An informed decision regarding the potential application of IT can only be made once all potential costs and benefits associated with its application have been identified and quantified. In turn, this requires an understanding of the mechanisms through which IT impacts the construction process. Problems of ICT have been presented in terms of difficulties relating to the nature of the construction industry, high cost of investment, technical difficulties, and implementation difficulties. The next section will focus on ICT management research literature.

3.3.2 Trend of IT/ICT in Hong Kong Construction Industry

According to CIRC (2001), IT will help improve construction efficiency through better information flow among project participants, improved design capability and enhanced project logistics management. There is a need to secure the commitment of senior management to invest in IT and to build up a critical mass of IT users within the industry to harness this potential. The construction industry and the Government should work together to set common standards and develop a common data infrastructure to facilitate seamless electronic communication among industry participants. There is also a trend to encourage the development of software applications that meet specific local needs.

The construction industry is an information-intensive industry. In view of the participation of multiple parties during the project delivery process, effective communication within the project team is crucial for successful project implementation. The ubiquity of the Internet and the increasing processing power of computers have enabled construction personnel to access and exchange project information and to transact with one another electronically in a seamless manner. IT has huge potential to bring all industry participants to work together more effectively and efficiently. The construction industry stands to derive extensive benefits from the wider use of IT tools through improved information flow along the construction value chain.

It is important to recognize that IT is an enabler, and not a solution in itself. To maximize the benefits of IT and to achieve significant productivity gain through
improved information flow across processes and disciplines, the industry should give priority to setting common standards and developing a common data infrastructure for seamless electronic communication among stakeholders. To successfully drive more extensive use of IT throughout the construction delivery process, we need to build up a critical mass of IT users within the construction industry. Major clients and other key stakeholders can facilitate this by taking a lead in adopting IT and committing resources for the successful implementation of various IT initiatives. Management and construction workforce training at all levels also needs to be organized to raise the IT literacy of the industry.

The HKSAR Government contributes to the development of a common platform for electronic communication in the industry. This include the: ongoing consultancy study on the alignment of planning, lands and works data; the consultancy study on CAD standard for drawings for works projects; pilot scheme to digitalize the building plans kept by the Buildings Department; and feasibility study commissioned by the Buildings Department on the development of an electronic system for building plan submission and document management. The Buildings Department is also closely monitoring developments in artificial intelligence technology with a view to testing the feasibility of introducing electronic checking of building plans when the technology becomes available.

3.3.3 Technology as Key Enabler for Knowledge Management

This prompts an interesting question, how ICT tools can improve the effectiveness of knowledge communication? There has been widespread acceptance that ICT is a key enabler of KM that enhances a firm’s potential for gaining competitive advantage. According to O'Dell and Grayson (1998), the ideal characteristics of an electronic network for KM are set out as follows:

- Keep the number of transfer steps in the transmission of information between individuals to one (or as few as possible) in order to alleviate the potential distortion of knowledge;
- Allow all employees access to the system;
- Allow all employees to make contributions;
- Make the system available from any location, 24 hours a day;
- Have a user-friendly system, able to search key words;
• Allow the users to contribute in their native language and provide appropriate translation facility; and
• Provide a system that updates automatically as information is provided.

Therefore, Gamble and Blackwell (2001) asserted that the IT support can be divided into two broad classes:
• Transfer and exchange systems which refers to databases, document depositories, pointers to expertise, document exchanges and video infrastructure; and
• Data analysis and performance support which includes data knowledge conversion systems, data mining decision support and real time intelligent data analysis.

On the other hand, communication is viewed as key to KM and it is also an essential ingredient in realizing change management, from an operational and strategic perspective. Improving technologies provide opportunities for increasing information exchange, but much organizational knowledge is tacit and cannot so easily be transferred electronically. Communication should not be regarded as just electronic information exchange, but a dialectic and critical process (Lehaney, Clarke et al. 2004).

For any KM initiative to be successful there is a basic requirement for a KM strategy, an implementation framework, and an IT infrastructure to support it. IT-based solutions for KM have been largely accepted because this supports the prevailing philosophy of early initiatives where KM was considered to be represented by explicit electronic information (Dent and Montague 2004). In fact, employees must also be made aware of the personal benefits of introducing new KM tools, and the overall value of corporate KM initiatives to the business. IT-based solutions are able to support the entire implementation process, and have the potential to be used as “quick wins” in a KM project.

Supporting KM with information technology is thus often characterized as primarily a technical challenge. To profit from knowledge assets, organization must first control
the proliferation of knowledge to bring it under control. In other words, organization must be able to appropriate the knowledge.

Managing knowledge in the information economy will require new concepts of knowledge, learning, and organizations, as well as new management structures, processes, and norms (Boisot and Griffiths 2001). In the following sub-section, review is focused on Enterprise Resource Planning (ERP) System as the key enabler for KM.

3.4 Enterprise Resource Planning (ERP) System

Voordijk, Leuven et al. (2003) analyzed the implementation of Enterprise Resource Planning (ERP) systems in a Dutch construction firm and advise that ERP systems have replaced non-integrated information systems with integrated and maintainable software. The implementation of ERP systems is a difficult task. ERP implementations have yielded more failures than successes. Zhang, Lee, Huang, Zhang and Huang (2005) have also completed a case study of four Chinese organizations using the ERP system and concur that the success of an ERP system is very difficult in Eastern as well. Voordijk, Leuven et al. (2003)’s study showed that the success of ERP implementations depends on consistent patterns between: IT strategy and business strategy, IT maturity and the strategic role of IT, and the implementation method and organizational change.

Managing a construction project can be difficult, no matter the size of project. Managing a project involves hundreds of thousands of documents that must be shared by project teams. However, a well-developed ERP system can deliver great job efficiency. This system for a construction project will have high possibility for success, economically and efficiently. More advanced solution to forecast and ensure the project, the virtual and real-field construction management system had been introduced to evaluate the productivity and safety as virtual simulations (Maruyama, Iwase et al. 2000). According to Nah (2002), ERP systems and KM promise organizations the benefits of enhancing competitiveness and continuous revitalization. Huang, Newell, Galliers and Pan (2002) research the relationship of ERP and KM to answer the following three research questions: (1) What are the similarities and differences between ERP and KM in terms of their characteristics? (2) How do ERP and KM
influence each other when they are implemented within a single organization? (3) How does the combination of ERP and KM influence organizational efficiency and flexibility?

In next sub-section, literature review is focused on ERP and the relationship of KM.

### 3.4.1 Definition of Enterprise Resource Planning (ERP) Systems

According to Liaquant, Jon and Rashid (2002), ERP or Enterprise Systems are software systems for business management encompassing modules supporting functional areas such as planning, manufacturing, sales, marketing, distribution, accounting, financial, human resource management, project management, inventory management, service and maintenance, transportation and e-business. The architecture of the software facilitates transparent integration of modules providing flow of information between all functions within the enterprise in a consistently visible manner. Corporate computing with ERP system allows companies to implement a single integrated system by replacing or re-engineering their mostly incompatible legacy information systems. Several definitions from the published literature are quoted to further explain the concept: “Enterprise Resource Planning (ERP) Systems comprises of a commercial software package that promises the seamless integration of all the information flowing through the company - financial, accounting, human resources, supply chain and customer information” (Davenport 1998); “One database, one application and a unified interface across the entire enterprise” (Tadjer 1998)”. “ERP systems are computer-based systems designed to process an organization’s transactions and facilitate integrated and real-time planning, production, and customer response” (O’Leary 2000). The concept of the ERP system can be illustrated, following Davenport (1998), with the diagram in Figure 3-4.

![Figure 3-4 – ERP Systems Concept (Davenport 1998)](image)
3.4.2 Evolution of ERP System

Liaquant et al. (2002) researched research that starting in the late 1980s and the beginning of the 1990s described new software systems known in the industry as ERP systems that have surfaced in the markets targeting mainly large complex business organizations. These complex, expensive, powerful, proprietary systems are off-the-shelf solutions requiring consultants to tailor and implement them based on the company’s requirements. In many cases they force companies to re-engineer their business processes to accommodate the logic of the software modules for streamlining data flow throughout the organization. These software solutions, unlike the old traditional in-house designed company-specific systems, are integrated multi-module commercial packages suitable for tailoring and adding “add-ons” as and when required.

During the 1990s ERP vendors added more modules and functions as “add-ons” to the core modules giving birth to the “extended ERP”. These ERP extensions include advanced planning and scheduling (APS), e-business solutions such as customer relationship management (CRM) and supply chain management (SCM). Figure 3-5 illustrates how ERPs have been evolving. The proliferation of the Internet has shown tremendous impact on every aspect of the IT sector including the ERP systems becoming more and more “Internet enabled” (Lawton 2000). In fact ERP is becoming E-business backbone for organizations doing on-line business transactions over the Internet. The extension to SCM and CRM enables effective business relationships between the organization, suppliers and the customers. A supply chain management has sub-modules for procurement of materials, transformation of the materials into products and distribution of products to customers. Successful supply chain management allows an enterprise to anticipate demand and deliver the right product to the right place at the right time at the lowest possible cost to satisfy its customers.
3.4.3 Advantages and Disadvantages of ERP Systems

The implementation of an ERP system is shown to promote operational, managerial, and strategic benefits (Al-Mashari, Al-Mudimigh et al. 2003). The Bergstrom and Stehn (2005)’s research aimed at examining ERP benefits and disadvantages and their research results showed a general lack of real drivers for ERP implementation and low awareness of the potential benefits and strategic importance, indicating that ERP is not yet regarded as a way of supporting and improving core business strategies. Since strategic ERP use requires high maturity in IT (Voordijk, Leuven et al. 2003), it indicated that IT maturity must increase to utilized the full potential of ERP while possible ERP system implementations must allow a gradual increase of IT maturity.

According to Lehaney et al. (2004), for businesses to succeed in a competitive climate, they have always needed to get the right information, in the right place, and in good time. Now they must also turn that information into new, viable ideas to improve effectiveness and efficiency. They must be creative, and they must retain their hard-earned knowledge. Ten years ago it was difficult to obtain information, let alone obtain information at the desktop. Today, information overload is experienced at the desktop, and intelligent tools are needed to help limit the time spent searching, filtering, and selecting. If such tools are not available at reasonable cost, the time spent dealing with customers and producing better quality products and services will decline, and an organization will be less competitive. Thus, technology plays a vital role in KM.

According to Wagle (1998), ERP systems can be a blessing or a curse. Many companies find ERP systems help them make better-informed decisions. Others discover too late that their purchase has been based more on faith than good judgment, and run up tens or even hundreds of millions of dollars in extra costs and schedule delays. However, ERP systems can reduce the financial reporting, purchasing, and support expenses of management information systems (MIS), and lead to more timely analysis and reporting of sales, customer, and cost data. According to Voordijk et al. (2003), ERP systems will play a strategic role within construction firms if they adopt tools for the inter-organizational standardization of primary processes (their front-office activities).
Liaquant et al. (2002) concluded that the high expectation of achieving all-round cost savings and service improvements are very much dependent on how good the chosen ERP system fits to the organizational functionalities and how well the tailoring and configuration process of the system matched with the business culture, strategy and structure of the organization. Overall an ERP system is expected to improve both backbone and front-end functions simultaneously. Organizations choose and deploy IERP systems for many tangible and intangible benefits and strategic reasons. In many cases the calculation of return on investment (ROI) is weighted against the many intangible and strategic benefits. The benefits that an industry standard ERP system may bring to organizations are shown in Table 3-1.
To reap the benefits of ERP systems, however, organizations need to overcome certain problems and disadvantages listed in Table 3-2.

<table>
<thead>
<tr>
<th>What Benefit</th>
<th>How</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliable information access</td>
<td>Common DBMS, Consistent and accurate data, improved reports</td>
</tr>
<tr>
<td>Avoid data and operations redundancy</td>
<td>Modules access same data from the central database, avoids multiple data input and update operations</td>
</tr>
<tr>
<td>Delivery and Cycle time reduction</td>
<td>Minimizes retrieving and reporting delays</td>
</tr>
<tr>
<td>Cost reduction</td>
<td>Time savings, improved control by enterprise-wide analysis of organisational decisions</td>
</tr>
<tr>
<td>Easy adaptability</td>
<td>Changes in business processes easy to adapt and restructure</td>
</tr>
<tr>
<td>Improved scalability</td>
<td>Structured and modular design with ‘add ons’</td>
</tr>
<tr>
<td>Improved maintenance</td>
<td>Vendor supported long term contract as part of the system procurement</td>
</tr>
<tr>
<td>Global Outreach</td>
<td>Extended modules such as CRM and SCM</td>
</tr>
<tr>
<td>E-Commerce, E-Business</td>
<td>Internet Commerce, Collaborative culture</td>
</tr>
</tbody>
</table>
Table 3-2 – Disadvantages’ of ERP Systems (Liaquant, Jon et al. 2002)

<table>
<thead>
<tr>
<th>Disadvantage</th>
<th>How to Overcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time consuming</td>
<td>Minimize sensitive issues, internal politics and raise general consensus</td>
</tr>
<tr>
<td>Expensive</td>
<td>Cost may vary from thousands of dollars to millions. Business process re-engineering cost may be extremely high</td>
</tr>
<tr>
<td>Conformity of the modules</td>
<td>The architecture and components of the selected system should conform to the business processes, culture and strategic goals of the organisation</td>
</tr>
<tr>
<td>Vendor dependence</td>
<td>Single vendor vs multivendor consideration, options for “best of breeds, long term committed support</td>
</tr>
<tr>
<td>Feature and complexity</td>
<td>ERP system may have too many features and modules that the user needs to consider carefully and implement the needful only</td>
</tr>
<tr>
<td>Scalability and global outreach</td>
<td>Look for vendor investment in R&amp;D, long term commitment to product and services, consider Internet-enabled systems</td>
</tr>
<tr>
<td>Extended ERP capability</td>
<td>Consider middle-ware ‘add on’ facilities and extended modules such as CRM and SCM</td>
</tr>
</tbody>
</table>

3.4.4 ERP System and Knowledge Management

According to the case study by Zhang, Tian et al. (2005) for organizational knowledge sharing based on the ERP implementation of ‘Yongxin Paper’, the author concluded that ERP system can assist an organization’s internal knowledge sharing. It cannot only integrate into the organization’s strategic plan and infrastructure, but it also brings a far-reaching influence on the organization’s development.

Many organizations use ERP systems as their ICT backbone. Al-Mashari, Al-Mudimigh and Zairi, (2003) described ERP systems as customized standard
integrated software applications that facilitate IT coordination in control aspects of management and other operational facets such as human resource management and logistics. ERP systems also can integrate numerous project management control processes such as cost and time management. They are thus intended to be integrated production solutions for manufacturing or project delivery. They also link to groupware that allows communication and coordination, joint problem solving and recording transaction histories. In this way they can be seen as facilitating (codified) KM in that they are capable of facilitating groups of people to solve specific problems (such as how to best manage project costs) and through the audit trail of data to trace the evolution of decision-making and its consequences.

An ERP system is not a KM system but a tool that in theory should reduce management effort in gathering, storing and using data or information so that more effort and creative energy can be devoted to analyzing and contextualizing information and refining it into knowledge (because it embodies context and thus embeds some of the tacit knowledge relating to hypothesized causal links and important work practice-specific cultural factors that may shape a decision). So the significance of an ERP system being used is not indicative of a KM application being used, rather that the unburdening of administrative effort through effective ERP tools allows management energy to be directed towards knowledge-based activities of creating meaning out of information, transferring the significance of that meaning to others and using the refined knowledge to practically solve problems. This perspective of ERP as an IT tool (and a precursor to a KM tool) allows us to focus upon how ERP system implementation effectiveness can facilitate KM initiatives to grasp space in a crowded corporate agenda for improvement, so that both efficiency and effectiveness are addressed. The strength of ERP systems, as well as other portal systems used for project control, is that they should unleash creative energies to use knowledge to improve productivity in its widest sense.

3.4.4.1 Differences and Similarities in Characteristic

The adoption of ERP emphasizes holistic improvement of efficiency through cost-reduction, enhancing decision quality and increasing productivity e.g. (Soliman and Youssef 1998; Scott and Kaindl 2000). In comparison to ERP’s production orientation, KM concentrates on the utilization of knowledge that is applied for product
and process innovation. The emphasis on learning and skills needs to be linked to the questioning of purpose and value in an organization. Therefore, continuous learning and benchmarking, at the individual and departmental levels, was found to be an alternative approach to improving productivity, and a critical source for organizational change and renewal (Jones and Hendry 1994). Knowledge codification was designed and implemented as a KM tool to facilitate knowledge transfer across company operations to avoid “reinventing the wheel” (Brown and Woodland 1999; Dixon 2000). Therefore, the KM initiative focused on avoiding repeated efforts in creating similar solutions.

3.4.4.2 Complementary or Contradictory

According to Al-Mashari, Al-Mudimigh and Zairi, (2003), the implementation of ERP concentrated primarily on the efficiency of producing, gathering and managing information. Efficiency improvements were sought through enhancing the information processing capability of the company, enabled by the systematization and centralization of information management and the adoption of standard approaches to the codification and processing of information. In other words, through a common IT infrastructure, information that was to be finally concealed became available throughout the organization in a predefined format (Wagle 1998). KM also concentrated on the mobilization of knowledge through encouraging the codification of explicit knowledge and the organization of learning and innovation communities as a means of sharing tacit knowledge (Von Krough, Ichijo et al. 2000). The exchange process can be facilitated through the organization of communities and the availability of a corporate wide expertise database.

These distinctive foci and orientations indicate that ERP and KM can be conceptually complementary because each system is designed and implemented for a clearly defined managerial purpose, notably managing organizational information or knowledge.

The two systems can be mutually reinforced, because an organization’s information processing capability strongly influences how knowledge can be effectively created, exploited and captured (Tenkasi and Boland 1996; Hackbarth and Grover 1999; Nambisan, Agarwal et al. 1999). Also, the distribution and availability of knowledge determines the way in which information is interpreted by organizational members.
Knowledge Management (KM) Using Enterprise Resource Planning (ERP) System

(Shrivastava and Schneider 1984; Huber 1991). However, such a co-relation resulting in the mutual reinforcement between ERP and KM can also mask and overlook the distinctive, and yet mutually interdependent, natures of information and knowledge.

Information has to be interpreted and this interpretation will depend on one’s knowledge. The design of ERP imposes a universal frame of coding and interpreting information as a means of enhancing consistency and efficiency. As such, the information is detached from its context However, in translating information into knowledge the context is important, since to detach knowledge from its context and conceptualize it in an abstract form might mean that it loses its meaning (Blackler 1995) because of the socially embedded and context dependent nature of knowledge (Tsoukas 1994; Spender 1996; Nonaka and Konno 1998). Therefore, the distinctiveness of information and knowledge not only suggests different implications and values for organizations, but it also suggests that both ERP and KM are needed in order to release and leverage the respective values of information and knowledge.

Therefore, in the construction industry, if organizations want to efficiently use ERP and KM, it should be integrated with other supporting strategies. Partnering has been a rising trend in the Hong Kong construction industry over the last 10 years. In the following section, focus of literature review is turned to the subcontracting and partnering that benefit the KM system and strategy.

3.5 **Subcontracting and Partnering**

Akkermans, Bogerd *et al.* (2003) researched the future impact of ERP systems on supply chain management (SCM) with 23 Dutch supply chain executives of European multi-nationals and concluded that there is a role for ERP in improving future supply chain effectiveness and a clear impact of ERP actually on SCM. ERP was seen as offering a positive contribution to (1) more customization of products and services; (2) more standardized processes and information; (3) the need for worldwide IT systems; and (4) greater transparency of the marketplace.

In the following sub-section, the review is on:

- Supply Chain Management
• Subcontracting
• Partnering
• Partnering in Construction Industry
• Subcontracting and Partnering in Hong Kong
• Relevance of Partnering in Hong Kong

3.5.1 Supply Chain Management and Knowledge Management

There are many problems challenge the world contracting. Baker (1990) for example identifies: poor communications; adversarial contractual language; cost overruns; continuity problems from project to project; extended schedules; poor-quality work; and change-order negotiations. In too many cases, the work is not performed in the most cost-effective manner so there is a particular need to practice SCM in the construction industry. Drexler and Larson (2000) surveyed 276 projects in North America and suggested that the client and contractor are mostly in an adversarial relationship and improvement should be made to benefit the supply chain. Wood and Ellis (2005) stated that the UK construction industry has attracted a great deal of criticism for its inability to meet the needs of its clients. To overcome such performance problems, one of the initiatives is to improve the supply chain relationships. According to Peters (2008), the traditional forms of construction contracts have been criticised for creating barriers rather than building relationships. Therefore, alternative SCM (such as a partnering process) have been developed to overcome such criticisms. Davis (2008) surveyed 13 construction professions in Australia and agreed that there are many factors that impact upon SCM success and the relationships of the parties is one of the major aspects of the SCM strategy. Relationship-based SCM tend to generate additional intangible assets; such as knowledge benefits and improved joint problem solving.

To strengthen the competitive position, construction companies must strive to improve the procedures, the working relationships, the cost effectiveness, and the performance. Contractors must change to respond to the needs of the marketplace by providing the environments for and capitalize on the synergies that will result from contractors, subcontractors and suppliers working together.
According to Christopher (1992), SCM is a term used to explain the processes supporting physical, information, financial, and knowledge flows for moving products and services from suppliers to end-users. In the construction industry context, the supply chain can be identified as a system through which design teams and construction contractors working together to deliver an end-product to their clients (Wong and Fung 1999). By analyzing and understanding the value chain, management organizations should concentrate on their core competence which is the difference between what you do and what you know, whereas non-core activities are those that provide no differentiation, or have no direct effect on the customer’s experience (Prahalad and Hamel 1990).

Through outsourcing, an organization can focus on the elements that are core to its business and outsource the others, while maintaining overall strategic control. “Outsourcing” is the delegation of non-core operations from internal production to an external entity (such as a subcontractor) that specializes in that operation. SCM is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Therefore, SCM spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption.

In the construction industry, organizations come together with their specialists and knowledge to complete a construction project. Each organization contributes its knowledge in a form of people, processes and technologies, to the construction process. Dent and Montague (2004) said that knowledge resources generated within an organization are strategically valuable because they tend to be exclusive, specific and tacit, making emulation by competitors difficult. Externally sourced knowledge, although seen to be more non-specific, costlier, and widely accessible to competitors, enables novel thinking and provides a benchmark for the corporate knowledge base. Common sources of external knowledge include publications, universities, government agencies, professional associations, consultants, clients and supply chains. Therefore, KM strategy links with consultants, clients and supply chains provide important sources of external knowledge. Trust-based relationships with supply chain partners are key enablers of knowledge transfer to deliver high levels of performance and innovation. The suppliers’ competition in each transaction is assumed to be the most
appropriate means of securing efficiency of operations. Therefore, actor constellations change all the time, making it difficult to utilize the experience gained in previous projects (Doubis and Gadde 2000). According to Cox and Thompson (1997), it creates inefficiencies as the supplier climbs a new learning curve for each project. Supply chain management (SCM) can deal with these problems by promoting relational contracting, long-term commitment and an atmosphere of high trust and commitment.

Through systematic KM, parties involved are able to minimize wasteful activities and improve productivity and efficiency. KM, together with SCM, ensures that knowledge, not information alone, is shared with the trading partners. Whereas the information may simply specify what is required of the involved parties, KM can help to determine how best to deliver that product or ensure the swift availability of the related knowledge.

SCM is built on a foundation of trust and commitment (Lee and Billington 1992). Spekman, Kamauff Jr et al. (1998) described four levels transition from being an important supplier to becoming a supply chain partner. The transformation is depicted as linear although it may be envisioned as a step function since the changes required to move from one level to another require changes in mind set and strategic orientation among supply chain partners. After “open-market negotiation”, the threshold level of supply chain interaction is “cooperation” involving exchange of essential information and engages some suppliers/customers in longer-term contracts. The third level of intensity is “coordination” where specified workflow and information are exchanged in a manner that supports seamless linkages between and among trading parties. The final stage is “collaboration” where partners engage in joint planning and processes beyond levels that reach in less intense trading relationships. Collaboration requires high levels of trust, commitment, and information sharing based upon partners who share a common vision of the future. An organization may work at any of these three levels of trust and commitment with other trading partner to facilitate SCM, and may modify its selection after monitoring the interaction to observe change in the effecting factors. These various interaction modes limit the magnitude of knowledge that can be shared with a specific trading partner. KM in this context would be helpful to provide detailed guidelines as to what sort of knowledge is appropriate to share in a certain mode of interaction.
The construction supply chain involves many different team members such as the clients, architects, planners, quantity surveyors, engineers, landscape architects, interior designer, main contractor, sub-contractors and the suppliers. Each team member is a link in a chain of activities, adding value at each stage, designed to satisfy end-customer demand in a win-win situation. The process also embraces all the information technology necessary to support and monitor the activities. Since the members of the construction supply chain process are fragmented across many diverse disciplines, each using different systems and approaches to comply with clients’ requirements, poor management and communication problems often occur readily (Barlow, Jashapara et al. 1998).

The control of time, cost and waste is of paramount concern to all parties involved in construction projects (London and Kenley 2001). Many problems related to issues of control result from inadequate communication of information within the supply chain as the amount of information flow in any construction project from start to finish should not be underestimated (Smith and Scherer 1999). Different types of information or data are required by various people in the construction supply chain in various formats (O'Brien 1996). Amongst identified problems are: fragmentation of professional expertise; lack of information sharing; and lack of awareness of available technology for integration. It is through proper management of all these that success of construction projects can be assured (London and Kenley 2001).

As such, construction SCM concerns the improvement of the system implemented to ensure improved project performance along various metrics such as speed, cost, reliability and quality. SCM in construction offers a way to integrate the traditional islands between the members of the construction team and thereby reducing the time and cost (Matthews, Pellew et al. 2000).

One important party in the supply chain of construction industry is the subcontractor and it also presents as a very major role in the business model of the construction organization. In the next section, review is therefore focused on subcontracting.
3.5.2 Subcontracting

There are several reasons for a construction contractor to use subcontractors. The main contractor’s in-house abilities might be limited in a particular area, and a subcontractor possesses specialized technical, engineering, or construction skills (Wong and Fung 1999). Rubery (1988) pointed out organizations increase emphasis in flexibility in structuring employment. The situation prevalent in Hong Kong aggravates the problem due to multi-layer subcontracting since the main contractor subcontracts the work to a subcontractor, who further subcontracts to a third party, which is usually unknown to the main contractor (CIRC 2001). There could be situation when the third layer subcontracts the work to the fourth party, resulting in loss of control and quality (Chuganai 1999). Players in the industry act as business brokers, who take commissions from their subcontractors and leave everything to their subcontractors.

3.5.2.1 Subcontracting and Workload

The contracting business fluctuates with few guarantees of a stable workload for contractors (Lai 2000). They have to compete, and the competition has been severe (Smith and Bohn 1999). A consequence of fluctuating workload is that contractors will tend to keep fixed costs down. Whether as a deliberate or as an emergent strategic process, one way to optimize performance (staffing flexibility, reduction in labour cost) is to hire through sub-contracting or employing contingent workers, rather than employing their own staff and equipment (Rubery 1988).

The unstable and seasonal demand (i.e. market volatility) does not justify the emergence of large construction firms that have the capability of carrying out the entire construction process with their own workforce and equipment (Low and Tan 1996). Subcontracting in the construction industry is also typically closely tailored to suit the specific needs of specific clients (Low and Tan 1996). Lai (2000) in particular concluded that the continuity of orders, confronting a construction contractor, is uncertain, as it is commonly lumpy and discrete. Unstable demand and seasonality causes construction firms to split into autonomous units and to rely on subcontractors to undertake some of the work packages. The construction contractor–subcontractor relationship therefore emerges as a rational response to the instability of demand in the industry and to problems caused by seasonality (Jones, Hesterly et al. 1997).
3.5.2.2 Benefits of Subcontracting

In addition to flexibility and access to new technology, subcontracting can provide further strategic benefits for the construction contractor. It offers the possibility to delegate the responsibility for supervision and this is important in an industry where the dispersed location of sites and the craft nature of the production process both make supervision difficult (Saboia 1997). Employing labour indirectly, through subcontractors, enables construction contractors both to get the flexibility they need and to pass the problem of labour control to the subcontractor. It can therefore contribute substantially to a reduction in costs, even if all labour regulations are adhered to for the subcontracted labour (Saboia 1997).

The outsourcing of labour also offers the opportunity to secure a further reduction in costs by avoiding restrictive labour legislation and welfare regulations (Saboia 1997). This opportunity is very appealing in construction as in other sectors and is particularly so in countries where the “on-costs” of labour are extremely high or where regulations are complex and therefore costly to implement. In these situations there is a strong incentive to recruit labour through subcontractors, who are more able or more willing to evade legislation (Saboia 1997).

3.5.2.3 Problems of Subcontracting

Williams (1993) discussed the conceptual, methodological and empirical problems involved in the use of the term flexibility and covered the views of its protagonists and critics. Pollert (1991), a leading critic of the flexibility model proposed by (Atkinson 1985), pointed out that the use of contingent/peripheral labour is not new, and that it is most extensive in sectors where it is already a well established practice. She found no empirical evidence at an aggregate level to support significant changes in employers’ human resources use strategies, and considers flexibility to be a neat and bold model fraught with methodological and conceptual problems. In her view, she objected to corporate human resource policies based on “flexibility” being portrayed as an essential ingredient of economic progress. She argued further that the model may be dangerous if interpreted as an appealing management policy, as it may pose problems of control and efficiency (Pollert 1988).
As construction contractors have realized that the greatest potential for cost savings lies with subcontractors, the prevalence of unfair contract conditions, subcontract auctioning and other onerous practices has increased (Pollert 1988). The construction contractor is faced with a dilemma (Matthews, Tyler et al. 1996) – the need to attain consistent levels of performance, while at the same time to be flexible to react competitively to external pressure (customer demand, price competition and fluctuating workload). When competition is severe, profit margin is low. With high uncertainties and risks, it is easy to lose moneys. There is then a temptation for the agent to indulge in an opportunistic behaviour (Williamson 1985). Unstable demand leads to unstable earnings and to minimize risk, the construction contractor will have to minimize overheads and be flexible. One way to optimize performance (staffing flexibility, reduction in labour cost) is to hire through subcontracting or employing contingent workers, rather than employing their own staff and equipment. Likewise the first layer of subcontractors passes the risk down to another layer and after two to three layers, control is lost and quality is difficult to maintain (Matthews, Tyler et al. 1996).

To resolve the opportunistic problem, some (Scherer 1964; Bradley and McCuiston 1972) have proposed that the amount saved in a contract and shared by the owner and contractor motivates contractor to save cost. McAfee and McMillan (1986) suggested the optimal incentive contract should be a trade-off between stimulating competition (a must for the Hong Kong Housing Authority in procurement using public moneys) in the initial bidding, and sharing risk between the contractor and owner, on the one hand, and giving incentives to the contractor to limit his production costs, on the other.

3.5.3 Partnering in Construction Industry

Widespread studies for the implementation between clients and main contractors have proved successful partnering implementation in the upper tier of the supply chain i.e. between clients and main contractors (Baker 1990; Lenard, Bowen-James et al. 1996; Tang, Duffield and Young 2006; Chen and Chen 2007; Chan, Chan et al. 2008). The following review is however for partnering between main contractors and subcontractors/suppliers.

As global markets have increased rivalries, manufacturing firms have discovered that traditional, adversarial relationships with suppliers have not allowed them to remain
competitive (Treleven 1987). In response to this, many firms have formed close partnerships with important suppliers which have produced significant managerial, technological and financial benefits and have allowed them to compete with foreign concerns (Hahn, Kim et al. 1986). Other advantages included improved communications as suppliers are provided with more accurate and stable purchase requirements data and can respond to requests with more helpful feedback about process capabilities, available alternatives, possible design modifications, and cost improvements (Carbone 1993).

Nonetheless, there are potential disadvantages with these partnerships or single-source relationships, as in the case of a strike or production disruption at the single-sourced vendor facility. The biggest problem with partnerships occurs when both parties fail to distinguish the arrangement from simple time-quantity agreements and in this situation; the partnership is badly implemented and often results in a deteriorated relationship between parties (Presutti 1992).

Top management must demonstrate support to this new alliance and set an example for others in the firm (Ellram 1991). In addition to these basic attitudes, there must exist some level of cultural compatibility or common philosophy of doing business between the two entities. Further, there must be a commitment to quality and total costs, and not just price. In summary, mutual interdependence needs to be given much more than just lip-service if the partnership is to survive and grow (Ellram 1991).

Moreover, activities in the construction industry are discontinuous, dispersed, diverse and distinct in nature (Tay 1994) and not many construction projects are free of conflict, disputes, delays, disruption, cost and schedule overruns, claims or deficient items / works (Melles and Wamelink 1993; Betts and Ofori 1994; Brandon, Betts et al. 1998; Matthews, Pellew et al. 2000). Therefore, a better way to ensure success of the construction projects is proper management of the construction industry supply chain, and organizations involved in the construction projects should treat each as collaborating partners (Bresnen and Marshall 2000). Agapiou, Flanagan and Norman (1998) also concluded that subcontractors are an important link within the construction supply chain and that partnering could help to improve the supply chain and reduce costs.
Management of the construction supply chain also requires the commitment between all the organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each organization’s resources and partnering comes into the theme (Dainty, Briscoe et al. 2001). Partnering is the relationship based on commitment, trust, dedication to common goals, and an understanding of each other’s individual expectations and values. According to Himes (1995), partnering is a process by which each of the organizations can achieve their respective goals while together achieving the owner’s goals for the project. Partnering is, and should be viewed as, a continuous process in order to achieve its greatest value. Partnering should be integrated into the project from its conception to completion. It acts as a claims-avoidance technique, a management tool, or communication technique and covers all of these things and more (Himes 1995).

The ultimate goal of partnering should be to achieve the owner’s goals by producing a “win/win” situation for all parties (Himes 1995). Once all goals of the respective parties are known to all other parties and buy-in is achieved to the concept and the goals, then real progress is made by creating partners to achieve one’s own goals (Himes 1995). Thus partnering goes hand in hand with proper management of the construction supply chain (Matthews, Pellew et al. 2000).

3.5.4 Partnering in Construction Industry Trends

In 2006, the Managing Director of a quantity surveyor firm that has been involved in a prestigious Singapore partnering project said “I would try enshrining the partnering principle of ‘no blame’ culture, including; early warning, pain-share/gain-share, risk sharing etc.” Partnering provides a major opportunity for improving project performance, whilst offering direct benefits to the whole of the supply chain (Wood and Ellis 2005).

It is more common to use the partnering approach in the supply chain of construction procurement, between client and main contractor but rarely appears in the downstream of the chain. Subcontracting plays an important role in the business model run by most construction companies. One of the most noticeable features of the construction industry is the extent to which the actual work of construction is not carried out by the
main contractor, but by its subcontractors that specialize in particular aspects of the project. According to Nobbs (1993), the contribution of subcontractors to the total construction process accounted for as much as 90% of the total value of a construction project. He suggested that the increased involvement of subcontractors in the shift away from the traditional craft-base approach has led to a greater reliance on increasingly sophisticated technological based products, which has led to construction contractors concentrating their efforts on managing site operations rather than employing direct labour to undertake construction work. This fragmentation of the work is not surprising in itself because increasingly sophisticated methods of building require a high degree of specialization. Domberger (1998) added that the benefits of subcontracting may be grouped under four headings: specialization, marketing discipline, flexibility and cost savings. Subcontracting is particularly applicable in the construction industry of Hong Kong where the contracting business fluctuates and there is no guarantee of a secure workload for any contractor. As a result, hiring subcontractors rather than employing one’s own labour is an emergent strategy. Finally, cost savings are achieved by the subcontractors due to economies of scale.

According to Smyth (1999), partnering is divided into three main types:

- Strategic partnering: long term alliances that continue across a series of project opportunities.
- Project partnering: objective driven, tactical and short term in approach.
- Framework agreements: a hybrid, which packages a series of projects having a known life span.

Bennett and Jayes (1998) also defined strategic partnering as a set of strategic actions, which embody the mutual objectives of a number of firms. This is achieved by co-operative decision-making aimed at using feedback to continuously improve their joint performance. On the other hand, Stralkowski and Billon (1998) described project partnering as a process in which two or more parties co-operate to an exceptionally high level to achieve their separate but complimentary goals and objectives.

The main emphasis which is applicable to the supply chain of construction subcontracting procurement is strategic partnering and project partnering. According to
Barlow, Cohen Jashapara and Simpson (1997), project and strategic partnering are expected to be the two most popular types of partnering. It is known that strategic partnering involves achieving and attaining a competitive advantage, while project partnering is simply used to improve project performance (Harback, Basham et al. 1994; Eillison and Miller 1995). Greenwood (2004) revealed that in the case of U.K. local authority partnering, the most significant cost and value benefits came only ‘where selected supply chain partners had been strategically engaged’ by the partnering main contractors. Thus, the author concluded that a strategic partner provides a beneficial partnering arrangement. Ng, Rose, Mak and Chen (2002) also stated that the Australian Government construction projects use project partnering because of the potential benefits achieved from effective implementation of the project partnering arrangement.

Clearly, project and strategic partnering are the most common types of partnering. Project partnering is the establishment of a co-operative relationship between parties for a single project, while strategic partnering involves a long-term commitment beyond a discrete project.

3.5.4.1 Factors Affecting Partnering Success
The perceptions and experiences of partnering relationships are generally positive, although the early optimism at the beginning of such arrangements is seldom sustained throughout the project lifecycle (Wood and Ellis 2005). Management of the construction supply chain requires commitment between all the organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each organization’s resources and partnering comes into the theme (Dainty, Briscoe et al. 2001). There are tangible and intangible transaction costs of searching, writing agreements, negotiating, monitoring and control in the partnering process; the implementation of this method of procurement is by no mean easy. Therefore, it is advisable to undertake research to unearth any unknown factors prior to partnering implementation. Cheng and Li (2001) stated the importance of identifying the critical factors affecting partnering success. Partnering can be disruptive and painful if the involved parties pay little or no attention to these factors. Identification of key success factors enables scarce resources of time, manpower and capital to be allocated properly helps to determine prerequisite components of a partnering arrangement.
Various academics have researched the critical factors affecting partnering success. Beazant (2004) used six key elements: culture, communication, performance measurement, opportunities, processes and management as the tool to measure the success of partnering. Phua and Rowlinson (2004) also implied that the cultural factor is one of the most important determinants for adopting partnering. National culture may affect the decision of the partnering procurement. Contractual issues are important but Harback et al. (1994) concluded that even when some construction parties agree to establish informal partnering, an agreement is formed. Usually, such an agreement is associated with a list of goals and objectives to be achieved by all agreed parties.

According to Cheng et al. (2000), open communication in partnering is vital for the free flow of resources in terms of ideas, knowledge, information, skills and technology through different effective channels. Mohr and Speckman (1994) added that coordination in partnering is the perception of one party towards the expectation of other parties in fulfilling a set of tasks. Cheng et al. (2000) and Mohr and Speckman (1994) agreed that joint problem solving, made by the partnering team to create alternatives for problematic issues, including conflicts, disputes and claims, is central to the concept. Schultzel and Unruh (1996) argued that searching for breakthrough opportunities to leap forward leads to enhanced performance and that creativity generates new ideas in the partnering process. Therefore, creativity and communication are significant affecting partnering. Loraine (1994) believed that team building is critical to success. The establishment of a partnering team should consist of members from all involved parties where these representatives should be key executives and possess the authority to act on behalf of their organizations. Crowley and Karim (1995) pointed out that if each involved party supplied adequate resources to share with other members in a partnering relationship, this would be enough to support successful partnering.

### 3.5.4.2 Effects of Partnering

Keil (2007) presented two cases in USA in which partnering were a huge success. Under partnering arrangement, the U.S. Army Corps and their contractors were able to work together until both sides agreed to a compromise, all the while preserving their business relationship. They eventually reached an agreement for the
Tennessee-Tombigbee waterway project, settling a potentially US$55-million liability at US$17.5 million. The other successful story was a massive energy conversion project in New York City in late 20th century. Using partnering approach between the power company and contractors, not only the project time and cost was reduced. The exposure to liquidated damages (US$1 million per month), for the high-stakes contract between New York City Transit and the power company, due to the delay in installing the conversion utilities was reduced as well. The author therefore pointed out that those typical benefits to be expected from partnering are:

- Reduced exposure to litigation.
- Improved project outcomes in terms of cost, time, and quality.
- Lower administrative and legal costs.
- Increased opportunity the innovation and value engineering.
- Increased chances for financial success.

As far as revenue is concerned, contractor’s profit is increased by 4% with project schedule is reduced by 5%. In Australia, according to Lenard and Bowen-James (1996), the benefits of partnering from the CIIA Survey agreed that there was:

- Reduced exposure to litigation through open communications and issue resolution strategies.
- Lower risk of cost overruns because of better cost control.
- Lower risk of delays because of better time control.
- Better quality product.
- Lower administration costs because of elimination of defensive case building.
- Increased opportunity for a financially successful project because of the non-adversarial attitudes.

A prestigious project in the centre of Singapore’s business district costing S$100M completed in 2004 using the partnering procurement approach. The Managing Director of the involved quantity surveyor firm concluded, “Our client was very happy. There was no arbitration or litigation, and in fact we did not evoke the Alternative Dispute Resolution clause in any shape or form. High quality was provided and the finished
product was at least 10% cheaper than that which would have been possible using other procurement methods.”

3.5.4.3 Evaluation of Partner
There is a rising trend for the selection of contractors using multi-selection criteria. In Australia, this approach has been adopted in the public sectors. For example, the Australian Northern Territory Government Agencies are required to ensure that all tenders received are dealt with in a fair and equitable way. One derivative of partnering that has evolved is alliancing where the partnering arrangement is extended to the extent that all parties to the agreement jointly share risks and rewards under a pre-alliance formation negotiated agreed formula. The way that partner evaluation is undertaken can be equally applied to the subcontractor selection discussed in this thesis. According to Walker and Hampson (2003), the National Museum of Australia (NMA) Rigorous Selection Criteria delivered the:

- Ability to complete the full scope of works including contributing to building, structural mechanical and landscaping design;
- Ability to minimize project capital and operating costs without sacrificing quality;
- Ability to achieve outstanding quality results;
- Ability to provide the necessary resources for the project and meet the project program;
- Ability to add value and bring communication to the project;
- Ability to achieve outstanding safety performance;
- Ability to achieve outstanding workplace relations;
- Successful public relations and industry recognition;
- Practical experience and philosophical approach in the areas of developing ecologically sustainability and environmental management;
- Understanding and affinity for operating as a member of an alliance;
- Substantial acceptance of the draft alliance documented for the project including related codes of practice, proposals for support of local industry development, employment opportunities for Australian indigenous peoples; and
- Commitment to exceed the project objectives.
However, the selection criteria for the appointment of partners are far more stringent than for subcontractors. The reason is that both the contractor and subcontractor are looking for a longer business relationship. According to Lendrum (1998), the author analyzed the partner’s selection criteria, some of the more important of these include:

- Strategic fit to business plan;
- World class or potential;
- To be willing to share information, vision, strategies etc;
- Partnership culture and compatibility;
- Focus on long term at least over 5 years;
- Degree of mutual risk and benefit;
- Quality of previous partnering experience;
- Benefit from the internal and external motivator degree of and potential to: add value, reduce costs, improve communication, develop trust, resolve conflicts, remove hidden agendas, provide leadership, empower people, gain commitment, develop ownership, break down departmental barriers and remove fear.

3.5.4.4 Relationship and Trust in Partnering

Mayer, Davis et al. (1995) argued that there is a “need for trust” when different parties are working together, because it often involves interdependence, and people must therefore depend on others to accomplish their personal and organizational goals.

In creating a relationship, trust is required. Johnson-George and Swap (1982) defined trust as the willingness to take risks and it may be one of the few characteristics common to all trust situations. Virtually, trust is not taking risks per se, but rather a willingness to take risks. The level of trust will affect the amount of risk the trustor is willing to take in the relationship. The level of trust is determined by ability, benevolence, integrity and propensity to trust may be constant. The specific consequences of trust will be determined by contextual factors such as stakes involved, the balanced of power in the relationship, the perception of the level of risk, and the alternatives available to the trustor. The long-term good relationship is the dynamic nature of trust. Trust is one of the essences in partnering and relationship is always
linked to trust. According to Kimber (1996), business can take place with a high level of distrust but it is a more expensive and more painful process. Trust is therefore agreed as the primary principle which underpins the creation of long term relationships within and between organizations. “Business Trust” means that the companies have:

- Confidence that the promises others make to the companies will be met and that the companies’ interests/welfare will be looked after by others as much as their own and to the best of their ability even when faced with difficulties;
- A belief that the other party will not take advantage of the companies and that the companies will be treated fairly and justly by the other party and that the companies have an obligation to do likewise;
- Confidence that others will be open and not deceitful in the way a relationship with the companies is conducted. All that should be disclosed will be disclosed in a way that is clearly understood by both parties;
- An understanding that the relationship is influenced by discretion. The companies will not be embarrassed or the companies’ position weakened by indiscretions coming from someone with whom the companies have been open;
- Faith that future problems, negotiations, etc. can be carried out in a harmonious way or at least in a way which leads to maximum mutual benefits for both parties;
- A belief that the relationship will be predictable, usually cordial and harmonious, transparent, probably long term, and conducted in a way which completes the dealings which have been agreed to;
- A belief that the rights, responsibilities, personal habits, and idiosyncrasies of either party will be accepted and respected by the other party; and
- A relationship which approaches what is expected from the best of family relationships. This suggests a sense of interdependence which will be long lasting; will be protected at all costs; and can continue after disagreement. The relationship can weather difficult periods and will not be easily broken.

3.5.5 Subcontracting and Partnering in Hong Kong

According to Murdoch and Hughes (1995), the basic contractor’s obligation is to carry out and complete the contract works for the client, which is governed by the standard of
work and the time within the contract requirement. With reference to the Hong Kong Standard Form of Building Contracts 2005 Edition (HKSFBC), Clause 2 describes the main contractor’s obligations in general and in Clause 2.2 it states clearly that the main contractor shall remain wholly responsible for carrying out and completing the works in accordance with the contract.

Multi-layered subcontracting has frequently been cited as a key factor contributing to substandard work in local construction. Owing to the fact that different skills involved at different stages of the construction process, the increasingly complex nature of construction projects and the fluctuating construction workload, the engagement of subcontractors for the provision of labour, specialist service and construction plant and equipment is an economically efficient means to deliver construction projects. But in the absence of proper safeguards, subcontracting has led to the following problems:

- Non value-adding layers in the project delivery team, complicates communication and reduces the profit margin of the party carrying out the actual work;
- There is no sanction for non-performers and those subcontractors producing substandard work may continue their business with impunity; and
- Poor quality of construction.

### 3.5.6 Relevance of Partnering in Hong Kong

Chan, Chan and Ho’s (2003) study in Hong Kong yielded 78 project participant completed questionnaires to indicate the relative importance of partnering benefits. The perceived benefits were measured and ranked from the perspectives of the client, contractor and consultant for cross-comparison. The results revealed that “Improved relationship amongst project participants”, “Improved communication amongst project participants” and “More responsive to the short-term emergency, changing project or business needs” were the most significant benefits derived from the use of partnering in Hong Kong. The authors also conclude that more partnering arrangements should be actively introduced into the construction procurement process so that every party can enjoy the full benefits of partnering.

From the perspective of culture, partnering is relevant in Hong Kong. It is because partnering calls for a relationship which fits the culture of Chinese/Hong Kong. Trust is
Chinese termed trusted relationships as "關係" (guān xì). Liu, Fellows and Fang (2003) maintained that Chinese culture of "guān xì" has a major influence on management. Trusted relationships are thus very critical in the Chinese business world. Trust and mutual respect are important values in the Chinese community. According to Low and Leong (2000), personal relationships are very important in Asian cultures. Asians have a tendency to first develop personal relationships with their business partners before getting down to the specifics of negotiation. Gibson (2005) stated that companies that work with trusted partners do well when venturing into China (including Hong Kong). Rowlinson and Root (1996) observed that Hong Kong professions are face-orientated in the relationship and do not like to lose face in management. Ting-Toomey and Kurogi (1998) stated that “face” refers to a claimed sense of favourable social self-worth that a person wants; it is a vulnerable identity-based resource because it may be enhanced or threatened in any uncertain social situation. According to Gibson (2005), the concept of “face” is essential to Chinese relationships. One must “give face, keep face and never lose face”. This may mean showing a willingness to compromise to preserve harmony, which is immensely valued. Chinese people view social relationships as important.

This was echoed by the Managing Director of a leading quantity surveying firm in Singapore which has extensive experience on partnering project that partnering boils down to what the Chinese call “guān xì”. It is difficult to simply insert a legal clause that creates a meaningful relationship, but people can mandate that “guān xì” processes are part of the contract to encourage its development. This includes early warning, notification and trust. However, it requires an enlighten industry to achieve the full benefit. As partnership is hinged on relationships – the “guān xì”, partnering fits with the Hong Kong culture.

In order to create and maintain good relationship for partnering strategy to facilitate the ERP system for KM, the navigation and contribution by the leader of the organization is
a determinant factor. The upcoming area of literature review, in the next section, is therefore on leadership.

### 3.6 Leadership Theory

Finkelstein and Hambrick (1990) stated that strategic leadership is seen as a unique resource in the knowledge-based view of the organization. Strategic decision theory describes the role of top management executives as organizing, coordinating, commanding and controlling agents (Foyal 1949). Therefore, it is a need to review various leadership theories that will affect the implementation of ERP system and integration with the partnering strategy.

Crainer (1995) stated that there are over four hundred definitions of leadership (see e.g. Handy 1993 for a literature review on leadership theories). There is a different taxonomy for each of the main leadership theories: the leader’s behaviour impacts on performance of the group (Likert 1961; Blake and Mouton 1964; McGregor 1987; Blake and McCanse 1991); the style of the leader’s behaviour on followers (Likert 1961; Tannenbaum and Schmidt 1973). House (2004) defined “leadership” organizationally and narrowly as the ability of an individual to influence, motivate and enable others to contribute towards the effectiveness and success of the organizations of which they are members. Research by Turner and Muller (2005) suggested that emotional intelligence (EI), particularly social competencies to influence others, and the personality and leadership style of the project manager, are factors affecting success for projects and further that different competence profiles are appropriate for different project types. This EI aspect is critical in leaders identifying and developing effective business strategies.

#### 3.6.1 Leadership in the Business World

Leadership is entering a new era, as knowledge-intensive companies become a central feature. Moreover, many organizations are facing the challenge of managing change processes to respond to competitive pressures and to become more customer focused. Many of these process changes are necessary when investing in new or expanded ICT platforms and systems to address the competitive environment. One key leadership task is to effectively develop and deliver strategies to instigate changed processes and
technology and to do this through gaining commitment from employees to embrace and effectively use advanced ICT technologies.

Managers of today face the challenge of recruiting and retaining competent employees in organizations where value added is difficult to supervise. Many people in Hong Kong and holding to the Confucian cultural view of leadership/followership are guided by military strategy thinking. “孫子兵法” (sūn zi bīng fǎ) was a Chinese military text written during the 6th century BC by Sun Tzu. It has long been praised as the definitive work on military strategies and tactics prior to the collapse of Imperial China. Verses from the book occur in modern daily Chinese idioms and phrases. For example, Jomini (1862), a military strategist, still revered in military thinking, said of leadership that a first requirement for a man’s success as a leader is that he/she be perfectly brave.

In Chinese, leadership is pronounced as “lǐng dǎo” (領導) which is a concept of navigating. There is a Chinese idiom from the “The Art of War” - “同舟共濟 (tóng zhōu gòng jì)” which means when people are crossing a river in the same boat and are caught by a storm, they will come to each other's assistance just as the left hand helps the right. Successfully reaching the other side of the river, the team must be navigated by a leader. He/she has to know the follower’s strength and concern their feeling, and then he/she can work hand-in-hand with the team-mates towards the goal. As Bass (1997) states, leadership behaviour depends upon a leader’s ability to inspire, motivate, and create commitment to common goals is crucial – that is transformational leadership (Burns 1978; Bass 1985b). In recent times these ancient leadership concept have been applied to business management, which turn to military strategies to provide inspiration and advice on how to succeed in competitive business situations. Transformational leadership is thus crucial to the success of business strategies.

According to Gupta, Surie, Javidan and Chhokar (2002) in the Global Leadership and Organizational Behaviour Effectiveness (GLOBE) study, the south Asian cluster of people is distinguished as being transformational-charismatic and team-oriented and that this culture emphasizes societal relationships. The societal culture is highly group oriented and has strong group collectivism. Hongkongese is part of south Asia and its
national culture is characterized as relationship-oriented. Therefore, transformational leadership is viewed as most applicable in the Hong Kong situation.

### 3.6.1.1 Transformational Leadership

Several studies have documented significant correlations between transformational leadership and organizational functioning. Transformational leadership has been linked to a variety of outcomes, such as employee commitment to the organization (Barling, Weber et al. 1996), organizational commitment and lower levels of job stress (Podsakoff, Mackenzie et al. 1996), and job satisfaction and satisfaction with a leader (Koh, Steers et al. 1995; Lowe, Kroeck et al. 1996). Beyond individual levels, the effectiveness of transformational teams and organizations has been documented (Tichy and Devanna 1990; Bass 1997).

Unlike traditional leadership theories, that focused mainly on rational processes, theories of transformational and charismatic leadership (House 2004), emphasized emotions and values (Yukl 1994) and implied that leaders and followers raise one another to higher levels of morality and motivation (Burns 1978).

Yukl (1994) also provided guidelines for transformation leadership that require leaders to not only articulate a clear and appealing vision but to also confidently and optimistically explain how to attain the vision. Leaders need to express confidence in followers and empower them to achieve the vision. The transformational leader communicates this by using symbolic actions to emphasize key values and lead by example.

Bass (1985a) also found that the transformational leadership dimensions of charisma, individual consideration, and intellectual stimulation were more closely related to perceived effectiveness than were transactional issues. He stated that people described charismatic leaders as those that made people enthusiastic about assignments, that inspired loyalty, that commanded respect, that had a special gift of seeing what was important, and that had a sense of mission. Bass found that followers had complete faith in the leaders with charisma, felt proud to be associated with them, and trusted their ability to overcome any obstacle. By contrast, Bennis and Nanus (1985) concluded that leadership is a transaction between leaders and followers. These authors built their
leadership view on four strategies: creating focus; meaning through communication; trust through positioning, and the deployment of self through positive self-regard.

Bass (1990) argued that transformational leaders make the difference between success and failure and that transformational leadership is characterized by: “charisma” to provide vision and sense of mission, that instills pride, gains respect and trust; “inspiration” to communicate high expectations, using symbols to focus efforts, expresses important purposes in simple ways; “intellectual stimulation” to promote intelligence, rationality, and careful problem solving; and “individualized consideration” by giving personal attention, treating each employee individually, by coaching and advising. This contrasts to the transactional leader who uses “contingent reward” by contracting exchange of rewards for effort, promises rewards for good performance, recognizes accomplishments. This is actioned through exercising control using “management by exception” by actively and passively not only watching and searching for deviations from rules and standards to trigger corrective action; but to also intervene only if agreed standards are not met.

Transformational leadership theory is purported to be a behavioural theory and a central assumption is that transformational behaviours can be learned (Bass 1998). However, the components of transformational leadership are conceptually related to personality traits assumed to represent stable dispositions. Several studies have linked personality to transformational behaviour. Using the five-factor model as a framework, Judge and Bono (2000) found that extraversion and agreeableness positively predicted transformational leadership when analyses were based on 14 samples of managers from more than 200 organizations. Other studies have suggested that transformational leaders could be portrayed by high self-confidence, personal adjustment, and pragmatism (Bennis and Nanus 1985; Ross and Offerman 1997). Dubinsky, Yammarino and Jolson (1995) found risk taking and abstract orientation to be related to transformational leadership dimensions. Moreover, intelligence, although it is traditionally not included as part of personality measures, has been emphasized both in transformational theories (Bass 1997; Den Hartog, House et al. 1999) and in studies of leader selection on a general basis (Mount and Barrick 1991; Tett, Jackson et al. 1991; Melamed and Bozionelos 1992). Such findings (whether they concern fundamental measures of personality, specific trait characteristics, or variables such as individual
intelligence) raise questions about the extent to which transformational leadership can, in fact, be learned.

Hetland and Sandal (2003) investigated links between transformational leadership and personality in using the Multifactor Leadership Questionnaire (MLQ) developed by Avolio and Bass (1995). This measured evaluations of effectiveness, satisfaction with the leader, and work motivation. The MLQ is a questionnaire containing 45 items describing behaviour, each rated on a 5-points scale (0 = seldom, 4 = to a large extent). One of the major finding of this study was the modest relationship between transformational leadership and the personality measures, suggesting that the context in which leadership occurs might be a more important determinant than the leader’s individual traits. Specifically, perceptions of the leader appeared to be strongly related to the role of the rater, highlighting that leadership is a dyadic process. Transformational leaders are also found to use contingent rewards frequently, which could be another explanation of high correlation between these variables. However, transformational leadership is within theory considered to be a higher order factor, which points to the fact that contingent reward could be a necessary platform to build transformational behaviour upon, but that transformational leadership adds something beyond exchange of rewards. Findings from confirmatory factor analyses (Avolio, Bass et al. 1999) supported transformational leadership as a higher order factor.

Studies (Hater and Bass 1988; Hetland and Sandal 2003) support transformational leadership as being positively correlated with how effective the manager was perceived, how much effort the subordinates said that they were willing to invest for their manager, and the degree of satisfaction with the leader. This is also consistent with research by Judge and Bono (2000), whose results showed that work motivation, or willingness to exert extra effort, is the outcome variable best predicted by transformational leadership by subordinates’ ratings and studies linking subordinates’ ratings of transformational leadership to concepts of femininity and nurturance (Ross and Offerman 1997). Correlation strength between warmth and transformational leadership is equal to that between agreeableness and transformational leadership (Judge and Bono 2000).
Transformational leadership is strongly associated with the outcome measures in both subordinates’ and superiors’ ratings, when controlling for the impact of transactional and passive-avoidant leadership (Hetland and Sandal 2003). McCauley and Van Velsor (2004) stated that organizations can have a capacity for leadership defined as the collective activity of organizational members to accomplish the tasks of setting direction, creating alignment, and gaining commitment. In a flat organization, potentials must exist in all individuals for leadership to become a skill. In practice, this is a big challenge. If a firm is a trans-global entity, local cultural values will vary and with them the application of global principles – like gender equality or gratuities. In such firms an atmosphere of trust must be in place if people are to be coaxed to accept values for work that are likely different from those utilized in their private lives.

Christensen and Walker (2004) addressed the concept of vision in a study about information technology and PM and link vision to transformational leadership and argued that projects are in fact transformations, and as such should benefit from transformational leadership.

### 3.6.1.2 Good Transformational Leader

Bass and Stogdill (1990) reviewed the study of communications, power, empathy, and trust. They stated that competence is relative to the leader, follower, and the situation. Practice confirms that a leader does not necessarily need to be a knowledge expert in a field to be competent and so being knowledgeable of the technical terminology, reasonably intelligent, intuitive, and a good listener is often adequate. They however agreed that charismatic leadership involves faith, transformation and trust, and that inspirational leadership communicates high performance expectations. Intellectual stimulation enables one to think of old problems in new ways and individualized consideration is empathic.

Cohen (1900) argued that building and maintaining morale and esprit de corps, requires that a leader must allow others to participate in the ownership of his/her ideas; be cheerful; know what is going on and take action to fix or capitalize on it; lead by personal example whenever possible, maintaining high personal integrity; demonstrate concern for your group, and focus on contribution not personal gain. Leaders must address followers’ self worth in order to engage them and to make them commit to the
Transformational leaders broaden and elevate the interests of followers, generating awareness and acceptance among followers, and motivating followers to go beyond self interest for the good of the group (Bass 1997). Transformational leadership operates through emotionally intelligent leaders but Emotional Intelligence (EI) competencies are learned and are not innate (Goleman, Boyatzis et al. 2002). When leaders are too tense and impatient, this could in turn lead to frustration and tension in followers (House and Howell 1992). Heifetz and Linsky (2002) stated that a leader must face problems that require leadership and adaptive change, and include such things as challenge to habits, beliefs, values, uncertainty, loss, etc. Adaptive change may require people to express disloyalty to others and other cultures, to question aspects of their identity, and to question their competence. They also said that leadership is an improvisational art that cannot be scripted. It requires the leader to see what is happening to them and their initiatives and adjust as these unfold. An interesting connection can be made to the work of Kubler-Ross and Kessler (2005) on death and grieving – the ultimate change. She says that people go through five phases when a person dies: denial, anger, bargaining, depression, and acceptance. In managing change, fear and danger will be issues that people will face. A leader must act as a guide and anchor during such times.

3.6.2 Relevance of Leadership Study in HK Construction Industry

Leaders’ behaviours, attributes, and organizational practices are universally accepted and effective across cultures. The universal and culture-specific aspects of leader behaviours, attributes and organizational practices are explained in terms of underlying theory that accounts for systematic differences across cultures. These national cultural values and practices affect leaders’ behaviours, organizational culture and practices. In turn, leaders affect organizational form, culture and practices. Rowlinson, Ho and Yue (1993) found that Chinese culture has a major influence on the leadership style adopted by the construction professions and the preferred power exerted on their subordinates. Hong Kong is a city of multi-cultures with people who have migrated from different countries of distinct cultures and they work together. People from different cultures join
the organization and may have different perceptions of leadership and power. In implementing any strategy, an organization needs leadership. From the above perspective, it may be concluded that leadership is crucial in the organization and is particularly relevant to the Hong Kong construction industry.

Therefore, studies of leadership for construction professions have been done. For example Lomas (1997) examined the leadership styles of project managers and made comparisons with leadership styles of their western counterparts. Fellow, Liu and Fong (2003) undertook an empirical study investigated aspects of leadership style and power within quantity surveying in both clients’ and contractors’ project’ teams’.

3.6.3 Leadership, Trust and Power

Trust and power are viewed as very important management tools that can be exercised by the leader (Onsman 2003). Mirta (1998) empirically tested the relationship between vision, trust and effective leadership and concluded that trust that is born and kept alive by follower trust lies at the heart of all great leadership. A trust relationship is established between the leader and the follower when individuals are influenced by a leader to enable leaders and followers to display integrity and respect for others. Ledeen (1999) stated that a strong leader must balance the use of power with that of empathy, and that without fear of punishment men will not obey laws that force them to act against their passions—both virtue and corruption flow from the top down. The lessons from history about leaders suggest that a leader must be trusted, demonstrate empathy, be transformational, communicate effectively, and wield power appropriately.

Millard (1992) reviewed books for power-leadership theory and practices and concluded that today's complex and rapidly changing organizational environment produces leaders who become so committed to achieving short-term results that the bulk of their time is spent “fighting brush fires” rather than exercising the power of leadership and that far too many organizations are over managed, at the expense of farsighted visionary leadership.
3.6.3.1 Leadership and Trust

The interactions between the leader and follower and the leader’s ability to handle the level of trust amongst team members to the project are different. This essence explicates the impact on strategy formulation, because working together often involves interdependence, and people must therefore depend on others in order to accomplish their personal and organizational goals. Trust is required to make strategy successful. Mutual trust provides one mechanism for enabling followers to work together more effectively and reduces unnecessary friction for a more efficient environment in the workplace. Yukl (1994) listed the ten most important leadership characteristics with an emphasis on “trust, communication, empathy, power and transformation”. Mayer, Davis and Schoorman (1995) presented a trust model in an organizational setting involving two specific parties: a trusting party (trustor – usually the followers) and a party to be trusted (trustee – usually the leader). Trust is affected by ability, benevolence, and credibility. It is important how the followers trust the leader because trust is a “psychological state” about the follower’s intention to accept vulnerability based upon positive expectations of the leader’s intentions or behaviour (Rousseau, Sitkin et al. 1998). It is the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party. Rotter (1967) defined interpersonal trust as an expectancy held by an individual or a group that the word, promises, verbal or written statement of another individual or group can be relied upon.

Leaders must therefore demonstrate “ability, benevolence and integrity”. Ability is a part of the group of skills, competencies, and characteristics that enable a party to have influence within a specific domain. Benevolence is the extent to which a trustee is believed to want to do good to the trustor, aside from an egocentric profit motive. The relationship between integrity and trust involves the trustor’s perception that the trustee adheres to a set of principles that the trustor finds acceptable. The level of trust affects the amount of risk the trustor is willing to take. Specific consequences of trust will be determined by contextual factors such as stakes involved, the balance of power in the relationship, the perception of the level of risk and the alternatives available to the trustor.
3.6.3.2 Leadership and Power

Many scholars have researched the inter-relationship between leadership and power. However, different industries and cultures may view leadership and power differently. Leadership has an inextricable link with power and the power relations are likely to be significant in the highly interdependent construction industry. All organizations face increasing globalization pressures and should build an organization that accommodates inter-cultural management.

According to Grint (2005), leadership is essentially related to results, and in some cases, power is the prime mover of people and events; leaders who make the greatest contribution and use power wisely can affect an organization’s performance. Power relations are likely to be significant in highly interdependent areas of business such as the construction industry. However, the relationship of power and leadership takes up a significant amount of the resources in effective and efficient management. Without an adequate understanding of the use of power strategies and tactics by leaders, many otherwise healthy strategies fail. Power is the capacity to influence strategic choices (Hambrick 1981) and the attitudes and behaviour of people in a desired direction. The Chinese concept of “陰陽” (yīn yáng) – “水能載舟,亦能覆舟” (shuǐ néng zài zhōu, yì néng fù zhōu) is relevant here as it means not only can water float a craft, it can also sink it. Power is a useful tool and necessary but may be dangerous if it is not used properly.

Yukl (1994) categorized the dimensions of leadership into characteristics of the leader, follower, and situation and also describes the types of power (legitimate and reward power etc.) associated with leaders from (French and Raven 1959), and (Yukl and Flabe 1991). Such descriptions provide a useful basis for the relationship of leadership and power which will be presented in the following text.

Many definitions of power stem from Weber’s (1964) assertion that power is the ability of a person to carry out his own will despite resistance. Katz and Kahn (1966)

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14 In Chinese concept, yīn and yáng are two opposing elements of the universe; an imbalance of the yīn-yáng ratio can cause serious damages.
distinguished the difference between power and influence. Power is the capacity to exert influence. Influence is a transaction in which one person acts in such a way as to change the behaviour of an individual in some intended fashion. Understanding the distinction may help a leader to predict future organizational outcomes over which power has not yet been enacted and to explain why seemingly powerful actors do not appear to have much influence over certain organizational events. Organizational actors do not always use their power directly, because this would reduce the appearance of objectivity and therefore, the legitimacy of resource-allocation decisions. Instead, organizational actors, particularly at the subunit level, often use their power to influence those who control resources to base allocation decisions on those legitimate and objective criteria that favour the actor. The use of power in macro organizational contexts is often subtle, unrecognized, indirect and anonymous. This has made it difficult to predict future organizational outcomes because one cannot always tell which measures reflect the unused capacity to exert influence. Beyond that, in measuring enacted power, Provan (1980) assumed that organizational outcomes were affected by the use of power. Because of the costs associated with the use of power, leaders are probably selective in their decisions to enact power over others. This leads to the next phase of the review and the following context covers the applications of power by a good leader:

- Use of power
- Ethical concern of using power
- Empowerment

Child (1972) recognized that power is central to strategic choice. Strategic decisions are exemplary nonprogrammable decisions so power can be seen to hold a central position in strategy making. According to Castka, Bamber, Sharp and Belohoubek (2001), as long as the leader can manage the politics, trust and commitment, it is very likely to build a first class leadership enabling a high performing team to deliver a successful project. It is the leader’s choice of how to exercise power by upwards, sideways and downwards use, while being aware of the needs and skills in positively using power.

Walker and Newcombe (2000) used the terms ‘authority’ and ‘power’ synonymously. When power is positively used to further objectives, it will be directly compatible with
the organization’s objectives. In its negative form, it will achieve objectives that do not belong to the organization. Many lessons have been learnt from history but tragedies tend to recur. Power is indeed capable of making leaders deteriorate as exemplified by the aftermath of the misuse of power by Hitler in Germany and Chairman Mao in China. Leaders may intentionally exert power over dependants in order to achieve their own goals. This leads to highlighting the nexus of two seminal forces in politics, administration and conflict. Many successful and admired corporate leaders consciously reject the ethical issues related to performance. They perceive these issues as inappropriate, impractical and irrelevant to the task their boards have hired them to do, which is to create wealth. They say their responsibility is to their shareholders, not their employees, and if the social responsibility of employee development interferes with profit-making, then workers’ needs must be sacrificed. Nevertheless, if organizations consider leadership to be manifested only or primarily through results and nothing else, then people should not be surprised by corruption and mismanagement: if shareholders only recognize result-based leadership, then ethical process issues tend to be sidelined. Walker, Segon and Rowlinson (2008) stressed the need for ethics, corporate responsibility and corporate governance to be uppermost in the minds of project managers when the use of their power in considering project procurement options.

George (2003) described what he calls authentic leaders who genuinely desire to serve, and are more interested in empowering people than they are in power, money, or prestige. Avolio, Gardner, Walumbwa and May (2004) defined authentic leaders as those individuals who are deeply aware of how they think and behave and are perceived by other as being aware of their own and others’ values/moral perspective, knowledge, and strengths; aware of the context in which they operate; and who are confident, hopeful, optimistic, resilient, and high on morale character. They proposed a framework linking authentic leadership to follower’s attitudes and behaviours and suggest that hope, trust and positive behaviours impact the relationship between authentic leaders and their followers (as indicated in Figure 3-6). Authentic leadership is therefore positively related to followers’ personal identification with leader and social identification with the collective.
One specific dimensions of empowerment that has garnered significant attention in the positive psychology movement is the meaning that individuals experience in life and, more specifically, in the workplace (May, Gilson et al. 2004).

To speed up the decision process, a leader may empower his followers. Onsman (2003) provided a clear definition of empowerment: it is giving subordinates the resources, both psychological and technical, to discover the varieties of power they themselves have and/or accumulate, and therefore which they can use on another’s behalf. Wilkinson (1998) suggested that empowerment is regarded as providing a solution to the age-old problem of Taylorised15 and bureaucratic workplaces where creativity is stifled and workers become alienated, showing discontent through individual or collective means. Forrester (2000) said that empowerment focuses on delegation and

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[15] Taylorised system is a kind of scientific management, also called Taylorism or the Classical Perspective, is a method in management theory which determines changes to improve labour productivity. The idea was first coined by Frederick Winslow Taylor in The Principles of Scientific Management. Taylor believed that decisions based upon tradition and rules of thumb should be replaced by precise procedures developed after careful study of an individual at work. In management literature today, the greatest use of the concept of Taylorism is contrasted with a new, improved way of doing business. In political and sociological terms, Taylorism can be seen as the division of labour pushed to its logical extreme, with a consequent de-skilling of the worker and dehumanisation of the workplace.
on passing power from higher organizational levels to lower ones. Empowerment gives employees independence to make decisions and commitments instead of suggesting them. It does not mean giving up power as a leader, but it does mean giving power to others. By doing so, leaders should aim towards the whole brain of the organization working together (Leonard and Straus 1997). Different people and different professions have different styles and methods of thinking and making decisions. If leaders want the organization to improve, they need to hire, work together with and promote people; even those who make them feel uncomfortable.

To summarize this section: the more sensitive a leader is to the nature and application of power, the broader the leader’s perception will become and thus be able to use power with more wisdom which in turn helps to create a vision for people to follow, build up the organization and improve performance. The influential process between leader and staff is not unidirectional any more. Leaders exert power to the staff, but staff also have a certain influence over leaders. Moreover, in large organizations, the effectiveness of middle managers depends on their influence over superiors and subordinates. The direction of power is no longer downward but also expands upwards and sideways. Leaders should not think that releasing power to others means reduction of autonomy. Another aspect of how leadership operates that has been evident from the review of the literature is the role that culture plays in the leader/follower relationship as well as its role in effective KM and organizational learning, especially in multi-national organizations, (Kald and Nilsson 2000).

3.7 Culture
Gamble and Blackwell (2001) considered culture in relation to KM and learning patterns that are relevant to supporting knowledge transfer about ERP and other new business processes being adopted and they argue that there are obvious national differences. For example, the German culture tends to produce a general preference for classroom-based learning delivery. However in countries such as the United States, where people are much more used to learning in a self-directed, self-motivated manner, online delivery is more acceptable. Not only are there country cultural issues, there is potentially a range of other professional issues. Depending on the background or discipline of the individual, he or she may be more or less used to being given a book
(or manual) to read and told to get on with the job of learning. Whilst certain individuals are happy to just get on and read a book or document, others may prefer a more communicative “touchy-feely” approach, and prefer to learn from a tutor or mentor. There are therefore many issues in moving knowledge transfer from the classroom to a knowledge network. However, companies are under such pressure to retrain their workforce or to distribute knowledge rapidly, that the traditional delivery mechanisms can no longer meet their requirements.

Gamble and Blackwell (2001) also added that KM is task-focused at work, whereas in some other cultures, human relationships are considered more important. So in a country such as Spain or Mexico, the substance of personal relationships overrides task orientation. It is considered important to know the people with whom you are going to do business or with whom you are going to work. From a KM point of view, this brings us back to the issue of mutual trust. In a relationship-based, trust culture, trust plays a much larger role in either doing business or in learning. This presents interesting challenges for the design of a KM system to be used in a multicultural environment. The basic question is how the system should deliver knowledge. If it is delivered in an ineffective way, users of the system may be unable to learn from it. The “sage on the stage” directive learning style would be very uncomfortable for students who were more accustomed to the “guide on the side”. The former approach is sometimes referred to as the banking model, where the knowledge base deposits learning in a person’s head. The latter is referred to as the midwife model where the system should be designed to help the managers absorb and conceptualize the information themselves. It is therefore useful to take into account some of the design elements that need to be considered.

Dent and Montague (2004) added the cultural barriers for KM in the construction industry that combine to hinder any general implementation of improved KM and learning approaches. These include: training tends to be task- or regulatory-specific; a general lack of education in soft skills development; the perceived threats of broader-based education by the trades, professions and institutions; and the pragmatic and unique nature of construction practice and problem-solving. Putting this in perspective, Zhang and Huang (2005) completed a case study qualitative research of four Chinese organizations using ERP systems and concluded that considering national
and organizational culture as being linked to and part of an ERP adoption process, provided a uniquely critical success factor for ERP implementation.

Hong Kong is a city of multiple cultures comprising immigrants from an array of different countries with distinct cultures who work together. Project management skills that utilize the value of different perspectives that employees from distinct cultures offer can drive the organization to success. A primary organizational goal for ERP adoption strategy formulation is to develop methods, rules and procedures to manage the impact of cultural differences. In order to analyze cultural aspects of this thesis’ case study’s relating to the adopted KM strategy and viability of the use of a partnering or relationship approach to the ERP system implementation, the following cultural matters are discussed:

- Dimensions of various national cultures;
- From national culture to organizational culture;
- Culture and leadership;
- Communication context in construction organization;
- Organizational-Cultural factors affecting KM/communication;
- Organizational support in KM/Communication;
- Strategy formulation.

3.7.1 Dimensions of Various National Cultures

People joined the case study organization from different cultures. So in order to identify the effects that national cultural issues might have on organization, it is essential that cultural differences between nations are recognized.

Culture also has many meanings. Bodley (2000) stated that in more broad terms, culture involves what people think, what they do, and what they produce. Culture has several properties: it is social heritage or tradition; it is shared, learned human behaviour; and it is symbolic and based on shared, assigned meanings of the members of a group. Schein (2004) mentioned that culture is a pattern of shared assumptions, invented, discovered and shared by a given group as it learns to cope with its problems of external adaptation and internal integration, that has worked well enough to be valid, and, therefore is to be taught to new members of the group as the correct way to perceive, think and feel in relation to those problems. This applies to organizational culture and national culture.
Hofstede’s (1994) study of national culture identified five dimensions of cultural differences that he describes as: power distance; uncertainty avoidance; individualism; masculinity; and long-term orientation. Power distance is the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally. This is measured from the subordinates’ perspective and provides information concerning dependence relationship. The larger the index, the larger is the dependence. Uncertainty avoidance, measured from weak to strong, is the extent to which members of a culture feel threatened by uncertain or unknown situations. The higher the index, the stronger is the tendency. Individualism stands for a society in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family only. The opposite of individualism is collectivism. Collectivists, from birth onwards, are integrated into strong, cohesive in-groups, which throughout their lifetime continues to protect them in exchange for unquestioning loyalty. Masculinity pertains to social gender roles that are clearly distinct: men are supposed to be assertive, thorough and focused on material success; women are supposed to be more modest, tender, and concerned with quality of life. Femininity is the opposite of masculinity and it stands for a society in which social gender roles overlap: both men and women are supposed to be modest, tender and concerned with quality of life. The fifth dimension is long-term orientation and labelled as “Confucian dynamism” which was developed by questioning Chinese scientists; it captures the extent to which people have a future-oriented perspective rather than a focus on the present.

In every culture, such phenomena as authority, bureaucracy, creativity, good fellowship, verification and accountability are experienced in different ways. Managers must operate on a number of different premises at any one time. These premises arise from their cultural origin, the culture in which they are working, and the culture of the organization which employs them. For example, pay-for-performance has in many instances been a failure on the African continent because there are particular, though unspoken, rules about the sequences and timing of rewards and promotions. However, it has worked well in the cultures of the USA, the Netherlands and the UK. In more collectivist cultures, like many Asian countries, it may not be so successful (House, Javidan et al. 2002). Employees may not accept that individual members of the group
should excel in a way that reveals the shortcomings of other members. This classification of broad cultural dimensions have been accepted and refined by most researchers of culture. For example Trompenaars (1993) had a similar dimension and more recently the GLOBE’s study authors mentioned in section 3.6.1 (see House, Javidan et al. 2002) and discussed later, have also based their dimensions on those first proposed by Hofstede (1980).

Yamazaki (2005) also offered six typologies or dimensions of cultural difference and learning styles. These are: (1) high-context or low-context culture; (2) shame or guilt culture; (3) strong or weak uncertainty avoidance; (4) O-type (Japanese) or M-Type (Western) organizations; (5) the interdependent-self, or independent-self; and (6) the field-dependent or field-independent style. This study will help to assess the organization style of KM.

### 3.7.2 From National Culture to Organizational Culture

There is a close relationship between national cultures and organizational cultures because organizations are made up of employees who came from different cultures evolved from different backgrounds.

According to Hofstede (1994), the difference between national and organizational cultures is due to the different roles played in each by the manifestations of culture. The term organizational culture first appeared casually in English-language literature in the 1960s uses the synonym of “climate” for culture. The equivalent to corporate culture, coined in the 1970s, gained popularity after a book by Deal and Kennedy (1982) carrying this title, appeared in the USA. There is no standard definition of organizational culture but (Hofstede 1994) summarized it as follows,

- Holistic referring to a whole which is more than the sum of its parts;
- Historically determined reflecting the history of the organization;
- Related to the things anthropologists study like rituals and symbols;
- Socially constructed created and preserved by the group of people who together form the organization;
- Soft;
- Difficult to change.
Peters and Waterman (2004) studied sixty-two companies and in Chapter 3 of their book wrote that without exception, the dominance and coherence of culture proved to be an essential quality of the excellent companies. Moreover, they added that the stronger the culture and the more it was directed toward the marketplace, the less need was there for policy manuals, organization charts, or detailed procedures and rules. Also, in these companies, people throughout the organization know what they are supposed to do in most situations because the handful of guiding values is crystal clear.

An occupational culture level can be also seen as a further expression of organizational culture and Schein (1996) suggested that entering an occupational field requires acquisition of both values and practices. Thus, national culture is inextricably link to organizational culture. In the following context, the effect of national culture to organizational culture and subsequently affects the KM strategy are illustrated based upon a construction organization in Hong Kong.

House et al. (2002) undertook the GLOBE research study program (first mentioned in Section 3.6.1) which is focused on culture and leadership in 61 nations. In the survey of thousands of middle managers, GLOBE compares their cultures and attributes of effective leadership. The intention is to explore the cultural values and practices in a wide variety of countries and to identify their impact on organizational practices and leadership attributes.

Gupta, Hanges and Dorfman (2002), proposed 10 a priori clusters and used discriminant analysis\(^\text{16}\) to confirm the clusters in a split half sample. Cross-validation was performed on the bold out sample. The results provide strong support to the existence of those 10 national cultural clusters:

\[\text{discriminant analysis}\]

\(^{16}\text{Discriminant analysis is a linear statistics function of measurements of different properties of an object or event that is used to assign the object or event to one population or another.}\]
Knowledge Management (KM) Using Enterprise Resource Planning (ERP) System

- South Asia – Indonesia, Philippines, Malaysia, Thailand, Iran and India
- Anglo – England, Australia, South Africa (White Sample), Canada, New Zealand, Ireland and USA
- Arab – Qatar, Morocco, Turkey, Egypt and Kuwait
- Germanic Europe – Austria, Switzerland, Netherland and Germany
- Latin Europe – Israel, Italy, Portugal, Spain, France and Switzerland (French Speaking)
- Eastern Europe – Hungary, Russia, Kazakhstan, Albania, Poland, Greece, Slovenia and Georgia
- Confucian Asia – Taiwan, Singapore, Hong Kong, South Korea, People Republic of China and Japan
- Latin America – Costa Rica, Venezuela, El Salvador, Guatemala, Mexico, Colombia, Bolivia, Brazil, Argentina and Ecuador
- Sub-Sahara – Namibia, Zambia, Zimbabwe, Nigeria, and South Africa (Black Sample)
- Nordic Europe – Finland, Sweden and Denmark

This GLOBE model is useful to test leadership, power and culture perception for their impact on the implementation of “ERP” and “Partnering” in this research project.

According to Dent and Montague (2004), organizational culture is a set of values, norms and processes which determine the way people work and interact, and have a significant influence on the successful implementation of KM initiatives. Commentators contend that the dynamic, boundary-spanning nature of knowledge-focused activities cannot be supported by conventional formal, hierarchical organizational structures developed to overcome issues such as market demands, and task uncertainty. To a great extent, therefore, KM depends on the interaction of employees and management within an open culture of shared values and staff empowerment.
3.7.3 Culture and Leadership

Different cultures view leadership and power differently. According to Rowlinson et al. (1993), Chinese culture has a major influence on the leadership style adopted by the construction professions and the preferred power exerted on their subordinates. According to Provan (1980), many scholars view power as a pervasive part of organizational and life. Researchers have attempted to explain organizational events and outcomes in terms of the power relationships that exist between organizations; between organizational subunits; between organizational levels and among organization members. Therefore, there is a close relationship between leadership, power and culture.

Effective application of power would be different for different industries, organizations and cultures. Patterns of culture differ, as reflected in the organization of knowledge, ideology, values, laws, and day-to-day ritual. Various studies have been conducted in the 1980s and 1990s on cultural considerations of organizational behaviour, power and leadership (Hofstede 1980; Westwood and Chan 1992; Rowlinson, Ho et al. 1993; Trompenaars 1993; Hofstede 1994; Rowlinson and Root 1996; Liu 1999). Results of these conclude that Western societies tended to be individualistic, masculine, have low power-distance and low uncertainty; while the Eastern world was found to be low in individualism, have large power-distance, low certainty avoidance and masculine. Blunt and Jones (1997) explored the limits of Western leadership theory being adopted in East Asia and outlined the preliminary alternatives to Western notions of leadership, thereby attempting to show “how” culture might be taken into account. Although the project approach originated in Western cultures, these cultures are not necessarily the best ones for influencing and controlling staff. It may be quite educational for Western cultures to honour alternative approaches to measure and exert power, particularly where other cultural attitudes existed. For example, Japanese people view the organization as a collective to which employees belong and make lifelong commitments, rather than just a workplace. They perceive power from a superior as a necessity, unlike the workers in Western societies who ask why they have to obey orders.
Turner (1999) suggested that different cultural styles lead to better performance at different stages of the project life cycle and it is applicable to ERP project for “KM → K-Adv. → Partnering” integration in different stages.

Berrell, Wright and Van Hoa (1999) found that members of different cultural groups often felt squeezed by very different ways of managing the workplace. The business world is now no longer constrained by national boundaries, and international managers must be constantly aware of the influence of culture on management behaviour. They further suggested that the implementation of an inter-cultural management development model can make a sound contribution to improving management practices in an international environment. The importance of culture on leadership in a PM context was also recently examined, explored and confirmed by Grisham (2006).

3.7.4 Communication Context in Construction Organization

International organizations live with the increasing pressures of internationalization and globalization and should therefore strive to build an organization that accommodates cross-cultural management practices. It is common on international projects to find multi-cultural teams located in multiple countries. It is not uncommon to find such projects led by Project Managers who come from many different countries. It is not unusual for example having a cable stage bridge built in Hong Kong where the cables may be procured from Sweden but the designer may be from the USA with an installer from China. Even in historically monolithic markets like the USA, it is far more common to have multi-cultural teams and foreign competition. In addition, the pressure on the industry to increase productivity and reduce costs is unrelenting. This leads to flatter project structures and the need for communication multiple-culturally.

The construction organization under study in this thesis had different regional offices with different employees from different cultures. It runs projects over different countries and requires different professions from various countries to contribute different technical skills to increasingly complicated projects. Thus the implementation of an inter-cultural management model can make a sound contribution to improving management practices in an international environment. Moreover, considering the subtle influence of culture on management communication behaviour, international
organizations should significantly increase the level of inter-cultural management to both local and expatriate staff.

Another potential project relating to potential communication misunderstanding stems from cultural stereotyping. Matsumoto (2004) argued for improving the understanding of ethnocentrism and stereotypes to avoid the negative communication impacts of prejudice and discrimination. Organizations need to search their own culture to discover the reasons why stereotypes have persisted and how their own culture maybe fostered or facilitated. Stereotypes can be used as course grained templates of group behaviour as a starting point to understand individual behaviour (Osland and Bird 2000). By recognizing group and individual difference and by acknowledging rather than ignoring their influences within the organization, organizations are free to allow themselves to engage with people on a common ground rather than prejudging their actions, behaviours, and reasons via stereotypes based entirely on our ground or theirs.

Employees come from different national cultures and their contribution is critical to the development of organizational culture. All employees have their own stakes in the organization and they may have valuable knowledge to help the organization to succeed its objectives. Employees from different cultural background may use different methods to accumulate, reuse and communicate their knowledge with others. However, this knowledge may be tacit and sticky. Therefore, it is important for leaders to provide an effective platform for them to manage the knowledge and communicate efficiently.

3.7.5 Organizational-Cultural Factors Affecting KM/Communication

The communication style of different cultures varies within an organization, Gudykunst Matsumoto, Ting-Toomey, Nishida, Kim and Heyman (1996) researched the impacts of “Individualism-Collectivism” on communication styles and the indirect effect that is mediated through self construals and values. They find that individualism and collectivism exist in all cultures. Members of individualistic cultures learn some collectivistic values and acquire views of themselves as interconnected with others, and members of collectivistic cultures learn some individualistic values and acquire views of themselves as unique persons. The cultural individualism-collectivism has a direct effect on communication because it affects the norms and rules that guide behaviour in
individualistic and collectivistic cultures. Individuals learn their values through the socialization process. The values that are predominant in the culture influence the values that individuals learn, but individual value structures are different from cultural value structures. According to Triandis (1995), individualistic cultures emphasize the goals of the individual over group goals, whereas collectivistic cultures stress group goals over individual goals. Gudykunst et al. (1996) also stated that in individualistic cultures, individuals tend to assume responsibility only for themselves and their immediate family; in collectivistic cultures, individuals tend to belong to in-groups that look after them in exchange for the individuals’ loyalty which in-groups are “groups of people about whose welfare one is concerned, with whom one is willing to cooperate without demanding equitable returns, and separation from whom leads to discomfort or even pain”. Triandis (1995) contended that in-groups are more important in collectivistic than in individualistic cultures.

Irwin (1996) highlighted the importance of face and face saving to explain the common practice across many Asians cultures of using intermediaries or third parties in both personal and business dealings. While third parties act as protectors of face, they often slow down interactions in ways that are frustrating for “outsiders” not aware of, and experienced with, this type of interaction and the reasons for it. In organizations everything management does communicates, some organizations send strong, consistent messages that are readily grasped by employees. Other organizations are less easy to interpret; they do not communicate clearly, or their messages are incongruent. Some time one part of the organization communicates one thing and another part receive something else. The cues around which these organizational and cultural messages are organized are as different as the languages with which they are associated. Most important, their meaning is deeply imbedded and therefore harder for management to change when making transition from one to another. Hall and Hall (1990) professed that each cultural world operates according to its internal dynamic, its own principles, and its own laws – written and unwritten. The requirement and adequacy of information in a communication process is described as high- and low-context. According to Hall (1988), low-context communication involves the use of explicit and direct messages in which meanings are contained mainly in the transmitted messages. High-context communication, in contrast, involves the use of implicit and indirect messages in which meanings are embedded in the person or in the
socio-cultural context. For example, communicating with Germans, who are low-context requires lots of in-depth detailed information. However, the French are high-context and will not require as much as information (Hall and Hall 1990). Gudykunst et al. (1988) contended that low-context communication is used predominantly in individualistic cultures, whereas high-context communication is used predominantly in collectivistic cultures. Gudykunst et al. (1996) found eight dimensions of low-context and high-context communication styles. The first dimension focuses on respondents’ perceived ability to infer others’ intentions, needs, and feelings; the second dimension focuses on using indirect communication; the third dimension involves interpersonal sensitivity in communicating with others; the fourth dimension focuses on the use of dramatic communication; the fifth dimension focuses on the use of feelings as a base to guide behavior; the sixth dimension deals with openness in conversations, and it is related to disclosing person-based information; the seventh dimension focuses on precise communication and the eighth dimension deals with respondents’ positive perceptions of conversational silences. These dimensions should be included in the KM strategy.

There is a strong relationship between culture and KM, Gulati (1996) concluded that the obstacles to knowledge transfer within an organization created by distance, cultural differences, and other factors. Therefore, after the critical organizational-cultural factor is discussed, the knowledge management system can be designed.

3.7.6 Organizational Support in KM /Communication

Organizational support and KM system are inter-related. Zack (1999) stated that KM is required to be firmly associated with the organization’s business strategy. However, there is always too much attention given to the hardware and too little to the software aspects of disseminations. Turner (1999) asserted that new communications technologies are powerful tools but managers frequently fail to live up to their promise. The key lesson is not to fall into trap of believing that e-mail, electronic and video conferencing, groupware and other technologies get people communicating. The personal relationship and networks need to be built in part first, and then the technologies can help dramatically to develop these networks further. Get the basic
hardware in place at beginning and supplement these with necessary software where the key is the support by the organization.

There exist sub-organizational cultures, McDermott and O'Dell (2001) stated that culture is often seen as the key inhibitor of effective knowledge sharing. Culture is rooted in the organization’s core values and assumptions. Following this definition, in an organization with a knowledge sharing culture, people would share ideas and insights because they see it as natural, rather than something they are forced to do. However, there are always subcultures, sometimes simply different from the organization as a whole, sometimes in opposition to it. The most obvious place to begin understanding an organization’s culture is to read the espoused values, philosophy and mission. Therefore, KM must administrate to fit their cultures, because culture does play an important role in the success of a KM effort. The authors found many examples where well designed KM tools and processes failed because people believed they were already sharing well enough, that senior managers did not really support it, or that, like other programs, it too would blow over. Organizations that successfully implement KM do not try to change their culture to fit their KM approach. They build their KM approach to fit their culture because there is a visible link between sharing knowledge and solving practical business problems. The approach, tools and structures to support knowledge sharing should be supported by the overall style of the organization. Sharing knowledge is tightly linked to the organizational support and networks for sharing knowledge build on existing networks people use in their daily work.

3.7.7 Culture and KM Strategy Formulation

There are various issues arose in formulating KM strategy associated with cultural factors, the benefit of ICT communication to KM is obvious and worth to invest, but when the KM strategy for communication is formulated, cultural issues about repository must be taken into account. Mowery and Silverman’s (1996) research revealed that U.S. organizations’ alliances with non-U.S. organizations seem to result in lower levels of inter-organization knowledge transfer than those involving only U.S. companies. It shows that cultural difference affects knowledge transfer between people from different cultures. Their results demonstrated that the less forbidding barriers of culture, language, educational background, and distance associated with domestic
alliances should result in higher levels of knowledge transfer. Larry and Richard (2004) suggested the following when communicating between different cultures: developing empathy; being aware of cultural differences in listening; encouraging feedback; developing communication flexibility; learning to tolerate ambiguity; learning to manage conflict; and learning about cultural adaptation. To develop empathy is to understand empathy and avoid hindrances to empathy; improving empathy is pay attention, communicate empathy, use culturally accepted behaviours and avoid ethnocentric responses; be aware of cultural differences in listening is the most important ingredients embedded in communication components; encourage feedback and develop communication flexibility will allow people to respond to various conditions, people, and situations. Lastly, learn to tolerate ambiguity and learn to manage conflict are based upon learning about cultural adaptation: language, disequilibrium, and host culture.

According to Barkema and Vermeulen (1997), organizational culture is often defined as a system of shared values that serves two critical functions: to solve problems of external adaptation and to solve problems of internal integration. Power distance and individualism directly bear on issues of internal integration and influence relationships with personnel, such as the organization choice of control forms, reward systems (Hofstede 1994). Internal integration is relevant to the organization’s relationship with its employees which, in turn, is influenced by attitudes towards power distance, individualism and masculinity (Schneider 1989). Differences in uncertainty avoidance lead to differences in how partners perceive and respond to events in the environment of the IJV, which will likely breed disagreement and dispute between the partners, and have a detrimental impact on the IJV’s chances of survival. Organizations will take not only expectations of future returns into account but also risks and knowledge transfers.

Saad, Cicmil and Greenwood (2002) stated that cultural factors affect technology policy. Virtually, the choice of the form of transfer is influenced by the recipient’s knowledge and technical capabilities as well as the economic, social, cultural, institutional and political environment. Transfer is a highly complex and dynamic process and it has to encompass a crucial consolidation stage, which often includes adaptation, modification, and sometimes reinvention. A high accrued base level of information and knowledge would, for instance, enable the recipient or user to be more
involved in playing a significant and active role in successfully acquiring, implementing and adapting technology and a more unpacked or fragmented type of contract could be adopted. The failure of those technology transfer projects that the authors researched in Algeria demonstrates a significant number of social, cultural, organizational and economic features can make it difficult or impossible to replicate from one country to other countries. Technology transfer projects are complex and risky in that they convey a great deal of uncertainty made up of technical, organizational, market, social, political and cultural factors. They concluded that technology transfers have essentially failed as a result of restricted availability of indigenous knowledge and information; poor preparation procedures before negotiations; lack of proactive search for projects and partners; selection of projects and partners not based on national realities; significant dependency on learning-by doing and codified knowledge and ignoring the dynamic dimension of the process of technology transfer and the consolidation stage. This has led to a significant incompatibility between the imported and the recipient environment. It is obvious that cultural factors affect those technology transfer projects which are equally applied to formulate strategy for KM in organizational culture with different national cultural environment (Szulanski 1996).

It is therefore obvious that dimensions of various national cultures will affect the culture of an organization and the style of leadership. It is important that such organizational culture and leadership style will subsequent affect the KM/communication methodology and formulation of business strategy: partnering. Organizational support therefore plays a significant role in KM/Communication.

3.8 Chapter Summary

Literature reviewed topics addressed in this chapter build upon contextual topics presented in Chapter 2. Those topics discussed in this chapter include: knowledge and management, information communication technology, Enterprise Resource Planning (ERP) system, subcontracting and partnering, and leadership theory and cultural impact. The aim was to present current and historically relevant literature that supports an understanding of the complex nature of the case study organization adoption of the ERP as a KM tool to improve its competitive advantage, how its leadership style and
approach affected this adoption and how cultural aspects shaped its leadership response. The ERP is also being integrated with that to be used by key supply chain partners and so there was a need in this chapter to also explore the literature on subcontracting and partnering because the goal of the case study organization to integrate the firm’s ERP with that used by its key supply chain partners. In Chapter 1 the following literatures were highlighted as being explored in more detail as follows (Table 3-3):
Table 3-3 – Summary of Literatures being Reviewed

<table>
<thead>
<tr>
<th>Literature Source Categories</th>
<th>Relevance to this Thesis</th>
<th>Section Containing Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Communication Technology (ICT): Trends in ICT used in the construction industry; ICT and technology as a knowledge-enabler that drives business process change.</td>
<td>The research is centered on an ERP and so the development of ICT as a tool chosen by G-Force is relevant.</td>
<td>Section 3.3</td>
</tr>
<tr>
<td>KM: KM concepts and processes; KM as a strategic tool for business process change; KM in the construction industry; Measuring KM maturity levels.</td>
<td>Adoption of the ERP was contingent upon not only mechanically rolling out the technology but its adaptation to and role in transforming the organization’s business processes.</td>
<td>Section 3.2</td>
</tr>
<tr>
<td>Enterprise Resource Planning (ERP) System: ERP concepts and evolution; ERP in practices as a change agent; ERP’s role in business transformation.</td>
<td>The focus of the thesis is how the ERP was adopted and so its characteristics and history needs to be clearly stated to supply the context to this study.</td>
<td>Section 3.4</td>
</tr>
<tr>
<td>Leadership: Leadership’s link with influence through trust, commitment and power in group decision making processes; Transformational leadership versus management and transactional management; Leadership’s influence on stakeholders to drive innovation and change.</td>
<td>The ERP presented a radical change in the way that G-Force conducted its business. Clearly leadership strategy and a supportive leadership environment needs to be in place to facilitate drivers and inhibit barriers to adoption of the ERP and attempt to integrate it with key supply chain partners.</td>
<td>Section 3.6</td>
</tr>
<tr>
<td>The influence of culture (organizational and national); culture and the process of change.</td>
<td>Clearly change involves challenging ‘the way that things are done’ and the leader/follower relationship is influenced by the group’s cultural norms.</td>
<td>Section 3.7</td>
</tr>
<tr>
<td>Procurement choices: The nature of traditional and evolving procurement choices; Relationship procurement forms and choices; supply chain management.</td>
<td>The thesis is centered on ERP and its influence in the management of the whole supply chain that G-Force is a part of.</td>
<td>Section 3.5</td>
</tr>
</tbody>
</table>

It is recognized that this thesis assumes many theoretical concepts such as business strategy and other management areas of theory that could have been included but would have extended the thesis beyond its scope. Where possible authorities are cited.
to support assumptions and some of these are not elaborated upon beyond the context of their citation and their relevance to the discussion.

These literature reviews lead to and link with the subsequent chapters. In Chapter 5, this chapter helps to underpin the theory basis for the questionnaire of the exploratory survey. In Chapter 6, it helps to structure the interview tools for the descriptive study. In Chapter 7, the literature review provides the insight for critical actions to improve productivity.

The next section of this thesis outlines the research philosophy and methodology chosen to answer the identified research questions.
Chapter 4  Methodology

4.1  Introduction of the Chapter

There is a Chinese proverb “工欲善其事，必先利其器” (gōng yù shàn qí shì, bì xiān lì qí qì). It means that if workers want to do their job well, they have to sharpen their tools first. This is also applicable to a research project that proper methodology is essential for the success. This chapter is going to explain how to use a proper methodology to find the answers and to investigate research questions including how information will be generated, analyzed and reported.

There are four main sections contained in this chapter for methodology. Based upon the research onion described by Sauders Lewis and Thornhill (2003), the first section discusses the nature of different research options, data collection methods and the rationale of selection for the appropriate option and strategy. The second section describes, in details, two research approaches used in this thesis: Capability Maturity Model (CMM) and Soft System Methodology (SMM).

The third section introduces four phases of the research design: literature review, exploratory survey, descriptive study and action research. Having review literatures in Phase 1, both survey questionnaires and a case study interview approach are developed to collect data to explore and describe the problem about ERP system, partnering strategy and leadership style. Three exploratory surveys would be adopted as Phase 2 of the research project to unearth the problem about ERP systems, partnering strategy and leadership style. The first survey investigates the drivers/inhibitors of the implementation of ERP system using the CMM. The second survey explores the viability to implement partnering strategy and its integration with the existing ERP system. The third survey aims at finding the proper leadership style and cultural impact in implementing the ERP system and partnering strategy. The scope of the surveys is limited to explore factors. These findings form basis for the case study interview of descriptive study in Phase 3 to determine how they influence this large contractor organization. SSM is used to map the findings and concluded with list of actions. It
follows by the Phase 4 action research, which is undertaken to observe how improvements are being progressed by the case studied organization.

The fourth section is about the research administration matters which include ethical concerns and recruitment research participants. This chapter closes by a summary.

4.2 Research Option

Saunders et al. (2003) proposed the “research onion” which is useful to determine the research option. This comprises an outer core of the research philosophy surrounding the next layer, the research approach. Inside that, they lie the research strategy and then the time horizon of the study and finally at the core is the research data approach. I feel that it is important to firmly establish which ontological stance is appropriate to this research. Therefore, these should be first explained to clarify the available options.

4.2.1 Research Philosophy (Paradigm)

According to Neuman and Kreuger (2003), each paradigm is constructed, observed and measured using a different social reality or way to understand the world. Research paradigms point to the appropriate methods of inquiry and also direct the researchers to how to conduct the research properly and guide them to success, and the way of knowledge is gained. However, there is no common agreement regarding the types or numbers of paradigms. Saunders et al. (2003) described the three most common philosophies: positivism, interpretivism and realism.

4.2.1.1 Positivism

Positivism is associated with the natural sciences. According to Kvale (1996), the founding of the social sciences was closely tied to positivism. Positivism began as a reaction against religious dogma stressing a return to observable data. Positivist science was to determinate laws of society with possibilities of socially engineering society. The researcher in this tradition assumes the role of an objective analyst, coolly making detached interpretations about those data that have been collected in an apparently value-free manner with an emphasis on a highly structured methodology to facilitate replication (Gill and Johnson 1997) and on quantifiable observations that lend
themselves to statistical analysis. The assumption is that the researcher is independent of and neither affects nor is affected by the subject of the research (Remenyi and Sherwood-Smith 1998). Saunders et al. (2003) also add that qualitative data is able to be used in positivist research.

4.2.1.2 Interpretivism
Interpretivism requires the researcher to seek to understand the subjective reality and meaning of participants. Cavana (2001) adds to this by stating that this paradigm is used by the researcher to uncover the socially constructed meaning, as an individual or group of individuals understands it. The strongest argument the interpretivist could mount is the details of the situation in order to understand the reality or a reality working behind them (Remenyi and Sherwood-Smith 1998). Interpretivism is often associated with constructionism, or social constructionism.

4.2.1.3 Realism
Realism is based on the belief that a reality exists that is independent of human thoughts and beliefs. Realists believe in, and seek to understand, the existence of an external and objective reality that influence people’s social interpretations and behaviors but which may not be perceptible to them. It also recognizes that people themselves are not objects to be studied in the style of natural science and recognizes the importance of understanding people’s socially constructed interpretations and meanings. Therefore, this paradigm provides the researcher with the advantage of a holistic view of the research situation. However, researchers of this paradigm need to keep in mind that differences may remain between the real world and their particular definition of it (Riege 2003).

4.2.1.4 Suitable Research Philosophy
Positivism holds that genuine knowledge is derived from and validated by science, and that the only knowledge is scientific knowledge. It relies more on quantitative observation data and statistical analysis which may not be available in this research. Interpretivism, in epistemology, views all knowledge as a matter of interpretation from daily activities and events. It generally requires the researcher to have a flexible plan to respond to information provided by the research participants. Realism represents things as they really are favoring practicality and literal truth (Riege 2003). It is the ‘the happy
medium’ between positivism and interpretivism by obtaining knowledge from a more holistic spectrum.

Realism is therefore suitable for this research situation to assemble the multi-faceted views of reality.

4.2.2 Research Approach

There are two sub-sections discussed here: the research purpose and methodological strategy. These inform the decisions I made highlighted in Section 4.2.6 in Figure 4-1.

4.2.2.1 Research Purpose

A research approach is influenced by the research purpose and may also be affected by the types of data or evidence that is needed to answer research questions. Lawrence (1997) suggested that a research approach can be categorized as exploratory, descriptive, and explanatory. Exploratory research can be considered to be useful when the research purpose is to uncover or highlight issues of a phenomenon under study. It is also used to acquire evidence to answer a ‘what’ type research question. It aims to unearth the problem and has the goal of formulating problems more precisely, clarifying concepts, gathering explanations, gaining insight, eliminating impractical ideas, and forming hypotheses. Exploratory research is characterized by its flexibility and can be performed using a literature search, surveying certain people about their experiences, focus groups, and case studies. When surveying people, exploratory research studies would not try to acquire a representative sample, but rather, seek to obtain views from those who are knowledgeable and who might be able to provide insights concern. Exploratory research may also develop hypotheses, but it does not seek to test them.

Descriptive research: describes variables and possible models that may explain the phenomena being investigated; identifies overlapping areas; and constructs paradigms that offer a more complete theoretical picture (Sekaran 1992). This approach is more rigid than exploratory research and can seek to describe users of a product, determine the proportion of the population that uses a product, or predict future demand for a product. It should define questions, people surveyed, and the method of analysis prior
to beginning data collection—the who, what, where, when, why, and how aspects of the research should be defined (Yin 1994).

According to Saunders et al. (2003), explanatory research seeks discovery and reporting of relationship among different aspects of the phenomena under study. Neuman and Kreuger (2003) add that it focuses on explanations of phenomena. Thus, the researcher needs to consider a number of factors including whether their starting point is defined by the literature or the research situation and whether they plan to closely follow a recipe or design and conduct their study to fit the situation.

4.2.2.2 Methodological Strategy

According to Babbie (1993), the two most commonly described research approaches use deductive and inductive reasoning. These are explained in Table 4-1. Qualitative research may be conducted using either an inductive or deductive perspective (Saunders, Lewis et al. 2003). Deductive reasoning is essential for working within the positivist and critical theory paradigms while inductive reasoning begins with detailed observations of the world and moves toward more abstract generalizations, ideas, and relationships (Sekaran 2000); developing theory from observable facts (Neuman and Kreuger 2003). Inductive reasoning is used within the interpretivist and critical theory paradigms while deduction is theory testing that is subjected to a rigorous test. As such, it is the dominant research approach in the natural sciences (Hussey and Hussey 2003). Induction is ‘building theory’ i.e. a theory would follow data rather than vice versa as in the deductive approach. Both approaches can be used in combination in a research project, if the research question directs such an approach (Saunders, Lewis et al. 2003).

Table 4-1 – Types of Research Approaches (Babbie 1993)

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deductive approach</td>
<td>Identifies relevant theory, developing hypotheses, making observations relevant to testing the hypotheses and comparing the hypotheses and observations</td>
</tr>
<tr>
<td>Inductive approach</td>
<td>Begins by making observations about a set of relevant data and then seeks to discover patterns that may point to more general theories</td>
</tr>
</tbody>
</table>
A methodological strategy need not to be an either-or decision and can be a combination of both the inductive and inductive. Any research plan should be balanced to suit the induction and deduction reasoning following the research questions.

In this research, a combined inductive/deductive approach was adopted.

4.2.3 Research Strategy - Technique

There is a common misconception that the various research strategies should be arrayed hierarchically (Yin 1994). Researchers have a wide variety of research options to choose from, none of which are necessarily mutually exclusive. Combinations of research options are valid, as long as they can be sufficiently well justified. Yin (1994) argues that case studies are only an exploratory tool and cannot be used to describe or test propositions. Because case studies are far from being an exploratory strategy the more appropriate strategies is to adopt a pluralistic one. Table 4-2 provides a useful table from Yin (1994) that guides the research framework and will be discussed in detail.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>For of Research Question</th>
<th>Required Control over Behavioural Events?</th>
<th>Focus on Contemporary Events?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>How, why</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey</td>
<td>Who, what, where, how many/much</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Archival Analysis</td>
<td>Who, what, where, how many/much</td>
<td>No</td>
<td>Yes/no</td>
</tr>
<tr>
<td>History</td>
<td>How, why</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Case Study</td>
<td>How, why</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

4.2.3.1 Survey Research

Neuman and Kreuger (2003) state that survey research is the most widely used data-gathering technique for social research. This methodology is able to test several hypotheses in a single survey and can be conducted through the mail, or electronically,
using a self-administered questionnaire, by telephone or in person. It can be done in low
cost and is easily administrated by a single researcher. However, there is often a low
response rate and little opportunity to know or control the conditions of response.
Telephone interviews are flexible and have a much lower cost than face-to-face
interviews; interviewers control the sequence of questions, but compared to
email-based questionnaires they are high-cost, and the researcher can only conduct one
interview at a time rather than the broadcast effect of mail-outs.

4.2.3.2 Field Research
Field research is also called participant-observation research (Neuman and Kreuger
2003). It focuses on actual events, activities, process, people and relationships,
employing an evolving set of multiple methods as field observations proceed, and
producing theses and publications that incorporate rich descriptions and analysis of
context and practices (Burton and Steane 2004). Field research serves a variety of
purposes, including presenting detailed accounts of organizational practices,
penetrating the cultural perceptions and understandings of organizational actors,
interpreting management practices in their theory data, and clarifying prior research
contradictions and superficiality (Silverman 1993). It is appropriate when the research
question involves learning about, understanding, or describing a group of interacting
people (Neuman and Kreuger 2003). Field researchers may use many methods of data
collection - questionnaire, interview, observation, and secondary data; it is ideal for
events in the present time (Neuman and Kreuger 2003). Archival data can be used to
investigate and analyze past events and historical trends.

4.2.3.3 Case Study Research
Case studies are increasingly being used as a research tool (Yin 1994), and involve
either single or multiple cases, and numerous levels of analysis (Eisenhardt 1989). The
case study methodology can be flexible in form; in depth as small number of cases or
breadth across a large number of cases. A combination of data collection methods such
as archives, interviews, questionnaires, can be used to provide descriptions, test theory,
or generate theory (Sekaran 1992). It is also a preferred research methodology for
addressing “how” or “why” questions. Fellows and Liu (1997) offer choices between a
broad but shallow investigation (questionnaire) and a narrow and deep investigation
(case study) or an intermediate position (interview). The aim of case study research
should be capture cases in their uniqueness, rather than use them as a basis for wider
generalization or theoretical inference. Concerns have been raised over its lack of rigor
of case study research when investigator may be too sloppy allowing equivocal
evidence or biased views to influence the direction of findings and conclusions (Yin
1994). They may also take too long and they result in massive, unreadable documents
(Feagin, Orum et al. 1991).

4.2.3.4 Grounded Theory
Grounded theory is often thought of as the best example of the inductive approach,
although this conclusion would be too simplistic (Glaser and Strauss 1967). Saunders et
al. (2003) stated that a grounded theory methodology develops theory from collecting
data through direct contact with the research situation without the necessity for being
guided by forming an initial theoretical framework. This is applicable for inductive
generation and discovery of theory from collected and analyzed field data (Burton and
Steane 2004). These data lead to the generation of predictions that are then tested in
further observations which may confirm, or otherwise, the predictions. Theory emerges
from the researcher’s investigation through having no preset guidelines so new insights
are integrated as they arise (Stiles 2003). Whilst often considered the simplest form of
an inductive research approach, grounded theory can also be considered as theory
building through a combination of induction and deduction (Saunders, Lewis et al.
2003). Data of grounded theory are analyzed by coding field notes and interview
transcripts and writing interpretive memos concerning the characteristics of codes
assigned by the researcher (Burton and Steane 2004).

4.2.3.5 Action Research
Action Research is undertaken in the researcher’s own organization. This can be
applied to spectrum of issues and setting, including systems improvement, change
management, innovation, specific problem solving on theory generation. It attempts to
create a more direct link between theory and practical action, to improve the context,
understanding and application of practice, and to involve practitioners in developing
definitions of problems and in implementing change (Burton and Steane 2004). It is an
emergent inquiry process in which applied behavioral science knowledge is integrated
with existing organizational knowledge and applied to solve real organizational
problems on real problems in the systems (Argyris, Putnam et al. 1985). This involves
experiments that focus on particular problems and intended changes through undertaking action research projects typically involving re-education. These challenge the status quo and existing patterns of thinking and action that are presently well established in individuals and groups. Finally, action research is an evolving process that is undertaken in a spirit of collaboration and co-inquiry. It is neither pure research that focuses on the theoretical, nor applied research that focuses on the practical (Easterby-Smith, Crossan et al. 2000). It generates practical theory (McNiff and Whitehead 2000), but most important of all, those who have participated in it will have increased their knowledge through their participation (Coghlan and Brannick 2005) and the organization will benefit from both the outcome and the process of the research itself. Action research facilitates the movement of knowledge from the “high ground” of the professions and abstract ideas to the ‘swampy lowlands’ of the everyday work of the practitioner, and in the other direction (Schon 1983), and across the ‘theory-practice gap’ (McNiff and Whitehead 2000).

The process of action research consists of defining the initial concept and designing the research strategy, based on the goals and objectives arising from the research objectives, in a cycle of planning and implementing the defined action, and then monitoring and evaluating the results, learnings and effects of this implementation (Kemmis and McTaggart 1988).

4.2.3.6 Choice of Technique

Three conditions influence which strategy to adopt (Yin 1994), they are:

- Type of research questions posed
- Extent of control by researcher
- Degree of focus on contemporary as opposed to existence event

This research project involves an organizational and management study and therefore the case study research technique must fit this purpose. In addition, it concerns management system’s improvement and solving specific management’s problem leading to theory generation. It also involves practitioners in developing management strategy and its follow-on implementation.
The action research technique is therefore also applied.

4.2.4 Time Horizon

According to Saunders, Lewis et al. (2003), an important question to be asked in planning the research is ‘Do I want my research to be a “snapshot” taken at a particular time or do I want it to be more akin to a ‘diary’ and be a representation of events over a given period?’ The meaning of the ‘snapshot’ approach is ‘cross-sectional’ while the ‘diary’ perspective is ‘longitudinal’.

4.2.4.1 Cross-Sectional Studies

Cross-sectional studies often employ a survey strategy (Easterby-Smith, Thorpe et al. 2002). These studies sample the population to make measurements at a specific point in time. They may seek to describe the incidence of a phenomenon or to compare factors within the organization. This kind of research is often used in marketing research. A special type of cross-sectional analysis is a cohort analysis. This tracks an aggregate of individuals who concurrently experience the same event over time. Cohort analyses are useful for long-term forecasting of product demand and on the relationship between expenditure on customer care training for sales assistants and sales revenue.

4.2.4.2 Longitudinal Studies

Longitudinal studies are time series analyses; the main strength of longitudinal research is the capacity that it has to study change and development. Adams and Schvaneveldt (1991) point out that in observing people or events over time the researcher is able to exercise a measure of control over variables being studied—provided that they are not affected by the research process itself. In longitudinal studies the basic question is ‘Has there been any change over a period of time?’ (Bouma and Atkinson 1995).

As the study of the change in this thesis’ organization is run over a period of a year, this study approach would therefore be a longitudinal.

4.2.5 Research Data Collection

Research can be divided into two broad methods quantitative and qualitative (Cavana 2001). According to Peshkin (2001), both methods are absolutely essential to the research process. The early decision to be made is whether to follow a predominantly
qualitative or quantitative path. In principle, there is little forsaken by taking either the qualitative or quantitative approach because at the highest level, quantitative and qualitative research share the common goal of understanding available evidence sufficiently well to be able to explain it in terms of a theory (Gillham 2005).

Page and Meyer (2000) state that the qualitative approach can be conceptualized as having a focus on words and feelings – the quality of an event or experience i.e. the more people-orientated the research, the more qualitative the approach. A qualitative approach investigates a non-numerical examination and interpretation of observations for the purpose of discovering underlying meanings and patterns of relationships. It is generally considered to be exploratory and inductive in nature. It is used to get a general sense of what is happening and to form theories that may be tested—using further quantitative research, which is viewed as confirmatory and deductive by its nature. Qualitative research methods are often used to gain better understanding of intentionality and meaning. Researchers from the latter group concern themselves with observation of research phenomena within their naturally occurring context.

Generally, qualitative research studies rely on three basic data gathering techniques: participant observation, interview, and document or artifact analysis (Wolcott 1995). Each of these techniques represents a continuum from less to more structured (Adler and Adler 1987; DeWalt and DeWalt 2002). Various studies or particular techniques may rely more heavily on one data gathering technique than another. The qualitative approach is seen as subjective and preferring language and description.

Conversely, the quantitative approach is seen as objective and can be conceptualized as a focus on numbers. A quantitative approach places greater value upon information that can be numerically manipulated in a meaningful way, and this is the traditional scientific approach to research. It begins with collection of real data, observations or questionnaires that may help explain the studied phenomena (Page and Meyer 2000).

In general, the qualitative approach is typically used to answer questions about the complex nature of phenomena, often with purpose of understanding and describing the phenomena from the participants’ point of view. It is also referred to as the interpretative, constructivist or post positivist approach. In contrast, the quantitative
approach is used to answer questions about relationships among measured variables with the purpose of explaining, predicting, and controlling phenomena. This approach is sometimes called the traditional, experimental, or positivist approach.

The differences between applying qualitative and a quantitative approach are not judged on being better or worse rather as a matter of appropriateness to the question asked. Table 4-3 presents the differences between qualitative and quantitative results. The ‘qualitative–quantitative’ issue concerns the scope of the research project. The primary question to be addressed here is: ‘What research depth and breadth is warranted for this project?’ Page and Meyer (2000) stress that while there is need for both hard facts and numbers of the quantitative approach and a need for the qualification of meaning provided by the words and perceptions gathered in a qualitative approach. It is usually possible and desirable to include both approaches. In this research, both quantitative and qualitative approaches are therefore adopted.
Table 4-3 – Differences between Qualitative and Quantitative Approach (Ranjit 2005)

<table>
<thead>
<tr>
<th>Difference with respect to:</th>
<th>Qualitative Research</th>
<th>Quantitative Research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Underpinning philosophy</strong></td>
<td>Empiricism: &quot;The only knowledge that human beings acquire is from sensory experiences&quot;</td>
<td>Rationalism: &quot;That human beings achieve knowledge because of their capacity to reason&quot;</td>
</tr>
<tr>
<td><strong>Approach to inquiry</strong></td>
<td>Unstructured / flexible / open methodology</td>
<td>Structured / ridged / predetermined methodology</td>
</tr>
<tr>
<td><strong>Main purpose of investigation</strong></td>
<td>To describe variation in a phenomenon, situation, issue etc.</td>
<td>To quantify extent of variation in a phenomenon, situation, issue etc.</td>
</tr>
<tr>
<td><strong>Measurement of variables</strong></td>
<td>Emphasis on description of variables</td>
<td>Emphasis on some form of either measurement or classification of variables</td>
</tr>
<tr>
<td><strong>Sample size</strong></td>
<td>Fewer cases</td>
<td>Emphasis on greater sample size</td>
</tr>
<tr>
<td><strong>Focus of inquiry</strong></td>
<td>Covers multiple issues but assembles information from fewer respondents</td>
<td>Narrow focus in terms of extent of inquiry, but assembles required information from a greater number of respondents</td>
</tr>
<tr>
<td><strong>Dominant research value</strong></td>
<td>Authenticity but does not claim to be value-free</td>
<td>Reliability and objectivity (value-free)</td>
</tr>
<tr>
<td><strong>Dominant research topic</strong></td>
<td>Explores experiences, meanings, perceptions and feelings</td>
<td>Explains prevalence, incidence, extent, nature of issues, opinions and attitude; discovers regularities and formulates theories</td>
</tr>
<tr>
<td><strong>Analysis of data</strong></td>
<td>Subjects responses, narratives or observation data to identification of themes and describes these</td>
<td>Subjects variables to frequency distributions, cross-tabulations or other statistical procedures</td>
</tr>
<tr>
<td><strong>Communication of findings</strong></td>
<td>Organisation more descriptive and narrative in nature</td>
<td>Organisation more analytical in nature, drawing inferences and conclusions, and testing magnitude and strength of a relationship</td>
</tr>
</tbody>
</table>

4.2.6 Selection of the Research Option

Having identified and explored various research approach options, the chosen approach will now be presented and justified. Figure 4-1 presents the selected research option in respect of research philosophy (paradigm), research approach, research strategy, time horizon and data collection.
This research aims to explore factors that influence ERP system at the actual implementation stage within large Hong Kong construction organization and to identify the successful factors of partnering strategy and its integration into the existing ERP system. The research also investigates what leadership style influence the ERP system and partnering strategy and to identify the cultural impact on leadership style as well.

The suitable research philosophy is realism to assemble the multi-faceted views and it can be categorized as an exploratory and descriptive approach using combined inductive/inductive reasoning. The preferred research strategy is related to organizational and management and its improvement, therefore the case study as well as action research technique fit. The research also runs over a period of a time and is a longitudinal study. Research’s data will be collected both quantitatively and qualitatively.
4.3 Tools Used to Data Gathering, Analysis and Sensemaking

This next section presents several tools that were used for both data gathering and making sense of data gathered. These are use of a capability maturity model (CMMs) to help both map and strategise change initiatives. Second, the soft systems methodology (SSM) approach was also used to understand ‘messy’ and unclear situations that were observed in the field following the implementation of the ERP system and to offer change management initiatives to be implemented to improve the ERP system implementation elsewhere within the organisation. These two tools will now be explained in more detail.

4.3.1 Capability Maturity Model (CMM) Approach

Part of this study responds to a concern of how to assess and evaluate the effectiveness of using IT tools. Paulk, Curtis, Chrisses and Weber (1993) stress the need for a process maturity framework to prioritize improvement actions. Their Capability Maturity Model (CMM) describes management practices that characterize organizations as they mature their processes for developing and maintaining (in their context) software. They further conclude that the CMM represents a common sense engineering approach to software process improvement. These maturity levels, key process areas, common, features, and key practices were extensively discussed and reviewed within that software community.

CMMs help identify the level of organizational maturity of implementation and adoption of process (such as IT and ICT). A CMM can describe organizational maturity as scaled for the various following elements:

- Being inactive and only barely aware of a given aspect;
- Being pre-active in terms of initiating plans for becoming active;
- Being active in adopting the particular element;
- Being pro-active in accepting and adopting the approach, and then adapting it to suit the context and circumstances of the organizational unit concerned;
- Being embedded with the adaptation and having become routine and infused as the natural way of doing things (but in a dynamic sense that recognises that circumstances and context continually change and that any
advanced and mature organization would review and improve their process to meet the needs of a dynamic operating environment).

The CMM approach provides a map where an organization is positioned on the maturity matrix. The results of surveys undertaken in for this thesis can be evaluated using a CMM to help improve processes that meet the needs of the organization operating in a highly dynamic business environment. For example, according to Walker (2004), for the high level element ‘IT Enabling Infrastructure’, Table 4-4 offers a CMM tool to categorise an organization’s maturity level as evidenced from observation, interview responses or any other investigative form of research into how KM is approached in the organization.
Table 4.4 – Maturity levels of ICT Enabling Infrastructure (Source: Walker, Wilson et al. 2004: p23)

<table>
<thead>
<tr>
<th>Maturity</th>
<th>ICT Software &amp; Hardware Infrastructure</th>
<th>ICT System Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>How can the ICT Enabling infrastructure support K-Adv by a</td>
<td>Developing an appropriate software and hardware infrastructure</td>
<td>Providing a proactive support for the 'people' and the 'systems' aspects of ICT.</td>
</tr>
<tr>
<td>Inactive: AWARENESS</td>
<td>Very low availability, functionality and reliability (20% &lt;); very old version of h/w (5 yrs); No sharing of s/w; Incompatible packages used; Use of discs/CDs for data transfer; Phone and paper used with supply chain; No access records or controls.</td>
<td>Poorly resourced help facility; Small number of tutorials or manuals; Unaware of CoP; Mutual mentoring on problems; Sporadic and crisis-based T&amp;D; Minimal external T&amp;D; User needs not defined; No emergency procedures; Systematic storage or security not planned.</td>
</tr>
<tr>
<td>Pre-active: INITIATION</td>
<td>Low availability, functionality and reliability (40% &lt;); Old version of the h/w/3-5 yrs); s/w Compatibility &amp; h/w connectivity for one site only; Only standard applications; Low bandwidth connections; Password access, but no tracking.</td>
<td>Centralised help facility (e.g. call centre); Web enabled resources (e.g. FAQs); Wary approach to CoPs; Rigid T&amp;D (eg on-line tutorials); Focus on current needs; Inconsistent support to BUs; Local focus on h/w &amp; s/w synchronisation; Global access to archives.</td>
</tr>
<tr>
<td>Active: ADOPTION</td>
<td>Medium Availability, Functionality And Reliability (60%&lt;); H/W Lags By (~3yrs); Task Specific S/W Eg. Estimating; Cross Projects Interoperability; Servers With Emails; Moderate Bandwidth; Web Applications; Graded access.</td>
<td>Almost adequate resources and feedback; Well-resourced web and on-line help; Passive encouragement to CoPs; Network support and Training reactively driven by the BU needs; Planned, not necessarily current retrieval system; Planned, not necessarily current archival system; 24/7 expert help systems; Industry-based CoPs; Proactive T&amp;D plans with links to education; 'Scenario planning' for future needs; Proactive approach to technology; System synchronised with supply chain; Flexible &amp; seamless access to archival systems.</td>
</tr>
<tr>
<td>Pro-active: ACCEPTANCE + ADAPTATION</td>
<td>High availability, functionality and reliability, (90% &lt;); h/w lag (3yrs); Web based s/w for policy and knowledge; B2B links with supply chain; Hardwired groupware and utilities; High security systems.</td>
<td>On-line and staff-based diagnostic support; Chat rooms to integrate CoPs; Mentoring &amp; experiential learning supported; Life-cycle planning &amp; h/w/s/w harmonisation at organisational level; Well-indexed and needs based archival systems.</td>
</tr>
<tr>
<td>Embedded: ROUTINISATION + INFUSION</td>
<td>24/7 availability, 100% functionality and reliability; h/w lag (1 yr); Network integrates supply chain; Active interaction; Wireless access; ERP systems; Video conferencing; Full tracking of security.</td>
<td>24/7 expert help systems; Industry-based CoPs; Proactive T&amp;D plans with links to education; 'Scenario planning' for future needs; Proactive approach to technology; System synchronised with supply chain; Flexible &amp; seamless access to archival systems.</td>
</tr>
</tbody>
</table>

Using CMM tables, it is possible for organizations to assess a picture of what the organization’s current CMM position is and where it would like to be at a future time ‘t’. This enables gap analysis to take place and from that, the organization can develop a strategy to improve KM practices.
4.3.2 Soft System Methodology (SSM)

Finegan (1994)(Finegan 1994) stated that the complex systems associated with human activity are often poorly defined, Soft System Methodology (SSM) provides an effective and efficient way to carry out a systems analysis of processes in which technological processes and human activities are interdependent. Barry and Fourie McIntosh (2001) recommend that SSM, which incorporates systems thinking and systems concepts, is an approach that provides the opportunity for incremental improvement that is needed to address messy and uncertain problems. In particular, SSM offers a framework to involve all the stakeholders in a continual learning cycle. It offers an empirically based theoretical foundation for thinking about, analyzing, and responding to wicked problems. A wicked problem is one in which there are no clear rules to guide solutions but rather choices among potentially sub-optimal outcomes i.e. the least bad choice and that these tend to be once-off and uncertain in ways to evaluate the outcome (Bruce and Cote 2002). The traditional systems approach to problem solving is generally based on a reductionist technique in which problems are solved by a fragmentation through a one stage at a time approach. The participative nature and strong focus upon human activity systems of this methodology has facilitated to deal with messy, ill-structured complex and problematic situations, and the notion that systems should be engineered to meet explicit objectives. As the ERP system is adopted as a KM tool and a partnering procurement method was associated with the leadership style for implementing the ERP system, this does involve human activity and it does seem to support using a SSM tool for the research.

SSM is a powerful methodology for inquiring into complex situations. It is a dynamic method that offers a people centered way to examine the problem areas and focuses to intervene in a situation in order to improve it. This methodology developed by Checkland (1981), which uses a 7-stage research process where complex and rich contextual issues are exposed and studied. One of the key elements of SSM is developing rich pictures that are developed jointly between the researchers and subjects to better understand complex situations. These lead to developing an ideal situation and gap analysis to identify actions that can be taken to improve a current situation to move it towards the idealised situation. Further, by using gap analysis to position a group on a CMM such as that illustrated in Table 4-4, actions can be recommended for
improvement in making a change. The use of SSM and CMM provides a third part of
the triangulation required for a rigorous study. In addition to this, the action part of the
outcome from the SSM and CMM study resulted in a series of recommendations for the
action learning approach. The researcher is an active and facilitating member so this is
an entirely appropriate approach.

SSM has been applied widely as a methodology for scholarly research. According to
Brown-Syed (1993), the publications that have resulted from SSM research
undertakings include doctoral dissertations, master's theses, monographs, consultants’
reports, and journal articles. There were about 30 graduate theses which involved SSM
listed in Dissertation Abstracts International by 1994. As well, SSM has been adopted
as an ongoing management tool by organizations such as the Library and Information
Service of Western Australia.

SSM has been used in various management improvement studies and different
industries, for example knowledge management in construction industry (Green 1999;
Maqsood 2006). Brown-Syed (1993) also summarized that SSM geographically
disparate in Australia (Watson and Smith 1988), Canada (Rennie 1989; Cubero
Venegas 1991), South Africa, and the United States (Cook 1987; Summers 1988;
Koble 1990; King 1992). The ranges of disciplines to which the methodology has been
applied is likewise diverse and includes various sub-disciplines of psychology
(McBeath 1986; Powers 1987), agriculture and agronomy programmes (Summers
1988), geography and fisheries development (Rennie 1989), national health services
(King 1992; Marcias Chapula 1992), government information services (Cubero
Venegas 1991), community development (Cook 1987), and engineering problems such
as the design of flight systems for military pilots (Koble 1990).

It is becoming a concern that industries with entrenched traditional structures,
including the building, construction and engineering, are under particular pressure to
improve their knowledge management process to enhance efficiency. SSM provides a
useful qualitative tool for developing maps of processes and investigating problematic
issues. Green stated that SSM has been usefully employed in conducting value analysis
exercises in the construction industry. In this context, Elliman and Orange (2000)
recommend SSM as an approach to facilitate effective change and to improve work
practice. In particular, SSM is able to stimulate debate and capture the vision for the future of participants. They observed that a soft systems approach allows the exploitation of individual and socially constructed group knowledge and experience. Green (1999) also identified wicked problems in the building and construction industries and suggests that the potential of SSM lies in the early stages of a project to assist stakeholders to achieve a common understanding of the problem situation. Cushman, Venters, Cornford and Mitev (2002) observed that the construction industry is ultimately a very complex, multi-disciplinary activity and there is a need to integrate the kind of design and management processes in terms of skill and the knowledge that people possess. To achieve this, such needs are appropriately met using the SSM approach where rich pictures and root definitions are used to identify responsible actors, key transformations, and knowledge resources.

SSM is an approach to organizational process modelling that can be used both for general problem solving and in the management of change. Although other systems approaches, such as ‘Critical Systems Thinking’ have incorporated many of its ideas, SSM remains the most widely used and practical application of systems thinking.

There are two main modes within SSM, real world activities and systems thinking about the real world. Initial work involves undertaking interviews and meetings to gain an understanding of the problem situation which is represented by the use of rich pictures. SSM works within a seven-step framework. However, it may not always treat taking sequential steps as being necessary. Generally, the first four steps are undertaken with a number of iterations and overlaps. The 7-steps process is described as follows.

Step 1: Finding out about the problem situation. This is the basic research to locate “who” is the key players and how does the process work now

Step 2: Expressing the problem situation through “Rich Pictures”. As with any type of diagram, more knowledge can be communicated visually.

Step 3: Selecting how to view the situation and producing “Root definition”. This definition is then tested against a group of elements known by the
mnemonic “CATWOE” and the different perspectives of a situation must be considered:

C  Customers - the victims or beneficiaries of a transformation
A  Actors - those who would do the transformation
T  Transformation process - the conversion of input to output
W  Weltanschauung - the world view which makes the transformation meaningful in this context
O  Owner(s) - those who could stop the transformation
E  Environmental constraints - elements outside the system which is taken as given

Step 4: Building conceptual models of the system for improvements

Step 5: Comparing of the conceptual models with the real world to see where they differ and are similar

Step 6: Identifying feasible and desirable changes to improve the situation

Step 7: Proposing actions to improve the problem situation

4.4 Research Design

A research design helps the researcher to plan how to collect and analyze data. This research design is categorized as a case and action study that helps us to know the ERP system, partnering strategy and leadership style of a leading Hong Kong construction organization. It consists of both quantitative and qualitative data. In Phase 2, quantitative data were gathered using a questionnaire as the principle tool to gather data about users’ experience on variables that influence the implementation of ERP system, partnering strategy and the effect of proper leadership style. The resultant findings can help to identify the main drivers that influence ERP system, partnering strategy and leadership style and these were used to conduct interviews during the Phase 3 of the case study. Action research was selected as the main research methodology, because it addresses the dual imperatives of action and research.
The details of the research design are illustrated in Figure 4-2.

Coghlan and Brannick (2005) summarized action research into four basic steps in a cycle: diagnosing, planning action, taking action and evaluating action. Similarly, Page and Meyer (2000) proposed a six-steps action research model that is diagnosis, collection, feedback, action planning, implementation of action and evaluation. This research project is designed based upon the six steps model as shown in Figure 4-3.
Using action research as a model of a social research process, the researcher needs to diagnose the problem in a similar way to a medical doctor undertaking diagnosis (Page and Meyer 2000). Phase 1 is ‘Diagnosis’ through a literature review. This involves identifying issues on the basis of which action will be planned and undertaken and the articulation of the theoretical foundation of action is also involved in this phase. It is important that the diagnosing step is a collaborative venture and questionnaires in the surveys are carefully designed and based upon the literature to explore matters related to the ERP system, strategy of working with supply chain partners and the leadership style that is used to adopt the ERP.

Phase 2 is ‘Collection’ and ‘Feedback’ which involves exploratory research. Page and Meyer (2000) argue that the action research process is one of collecting data relating to the source of these problems. This is because the fundamental concepts discussed have been related to the end result; data are the raw numbers, pictures and words gathered by a researcher. Then, these data should be analyzed. Data collection and analysis are completed in Phase 2 of the research i.e. three surveys to explore the problems. In Phase 2, the research first focuses on quantitative data by using surveys. The reason for using a survey is to collect data from a large number of respondents in a short period of time and to minimize the cost (in terms of researcher resources) of collecting data. A survey
approach also gives respondents an opportunity to think before completing the questions, thus potentially enhancing the reliability of data. A CMM is used in this phase. This follows from the analysis of the context and purpose of the research, the framing of the issue and the diagnosis, and is consistent with them to explore the problem of the ERP system, strategy of working with supply chain partners and its leadership style used to adopt the ERP.

Phase 3 ‘Action Planning’ is descriptive i.e. it uses statements to describe a course of action. The research uses the insights gained from that work in the previous phase to better understand the phenomenon of the ERP system strategy of working with supply chain partners and the organization’s leadership style. Qualitative data from interviews are then analyzed. Action plan are prepared and plans are implemented with observations made which is represented by the next phase of the research.

Phase 4 is ‘Action’ and ‘Observation’ which is represented by the action research. Actions observed to be taking place in the case study target organization, according to Page and Meyer (2000), the outcomes of action, both intended and unintended, are examined with a view to seeing: if original diagnosis was correct; if action taken was correct; and if the action was taken in an appropriate manner.

The work investigates only the ERP system, strategy and leadership style for working with key supply chain partners from the perspective of both the individual and organization without attempting to study this from an industry perspective. Nothing is perfect, so the evaluation will lead to a diagnosis of remaining or newly revealed problems, and so the development cycle may repeat itself (Page and Meyer 2000).

In the following sub-sections, the detail research design of each phase is discussed:

- Literature Review
- Exploratory Survey
- Descriptive Study
- Action Research
4.4.1 Phase 1 – Literature Review

According to Burton and Steane (2004), the very first step of the research is to search out and access key pieces of relevant literature and then carefully study them, making sure to achieve a thorough understanding of their field of study.

Without a thorough literature review, solid theoretical framework to guide this thesis cannot be built. In this research, literature review related to ERP system, partnering strategy in the construction organization, leadership style and cultural impacts has been done and presented in Chapter 3 of the thesis.

4.4.2 Phase 2 – Exploratory Survey

Many exploratory studies are the first step in a research program designed to develop a new theory or model that has broad applicability, or is at least generalizable beyond the research setting (Page and Meyer 2000). It looks for ideas, patterns, or themes and therefore an exploration of a phenomenon/ event/issue/problem.

Exploratory surveys are useful where not much is known about the subject of interest, and particularly where there is contradictory evidence. This phase represents the second phase of the research project (as shown in Figure 4-3). According to Eisenhardt (1989), exploratory research can be appropriate in assisting the researcher to better define and describe the problem. Its primary objective is to develop insights into the problem. In order to facilitate the broader research, exploratory surveys are therefore conducted to define the problem of ERP improvement more precisely. It also assists to clarify concepts, gather explanations and eliminate impractical ideas. The results of research though may not be used for decision-making, but this is the initial step in the overall research design framework and it may give some indication as to ‘how’ something occurs. The findings allow for further studies by providing a significant insight into a given situation; therefore, it is useful for further research.

The survey questionnaire is designed and used in this phase of this research which attempts to understand current practice. Collected data from a pilot survey of current users of the ERP system is presented. By using the CMM, it explores in an evaluation framework for improving the use of ERP tools and integration of the partnering
strategy. It also helps to explore factor affecting leadership style and assist the works in Phase 3 of the research.

A qualitative approach to the collection of data is mainly adopted. The reason for choosing this approach is because, according to Glesne and Peshkin (1992), this is appropriate to serve the purpose of ‘interpretation’, which enables researchers to gain insights about a particular phenomenon and discover problems that exist within the phenomenon.

### 4.4.3 Phase 3 – Descriptive Study

A descriptive study sets out to describe a phenomenon or event, as it exists, without manipulation or control of any elements involved in the phenomenon or event under study. A common form of descriptive research in management is the case study.

This phase represents the planning action of the research (as Figure 4-3). Miles and Huberman (1994) suggested guidelines for analyzing qualitative data. These are categorizing and placing evidence in a matrix, putting information into different arrays, creating data display, and tabulating the frequency of different events. This research adapted their suggestions by:

- Putting individual transcript data into a table
- Categorizing data based on factors that influence ERP application
- Summarizing all individual data into a table to compare each case study

A descriptive study can be undertaken with various tools that can be developed or adapted. Mapping is one common tool that will be used to map out relationships of the explored factors. This phase of the research helps to see the as-is situation in order that action can be planned for ERP system, partnering strategy and leadership style.

With such a study, there is no effort made to change of anything, and the findings are not generalized. This purely descriptive information can reveal the elements that are most relevant to the issue of interest, and these elements can then be integrated with other knowledge (Page and Meyer 2000). Unstructured interviews were used through
the seven SSM steps. They lead actions to improve ERP system, integration of the partnering strategy and indicate proper leadership style for the implementations as identified in Phase 4 of the research.

Data was collected using a qualitative interview process which sought to cover both factual and a meaning level. According to Kvale (1996), qualitative research interview aims at obtaining nuanced description from the different aspects of the interviewee’s life world; it works with words and not with numbers. Precision in description and stringency in meaning interpretation correspond in quality interviews to exactness in quantitative measurements. The interviewer may seek to formulate the ‘implicit message’, ‘send it back’ to the subject, and obtain an immediate confirmation or disconfirmation of the interviewer’s interpretation of what the interviewee is saying.

4.4.4 Phase 4 – Action Research

Action was planned in accordance with the descriptive phase using the result of SSM. It is about undertaking action and studying that action as it takes place in the organization. These actions are about improving practice through intervention, and demand rigorous preparation, planning, action, and attention to process, reflection, re-planning and validating claims to learning and theory generation (Coghlan and Brannick 2005).

The goal of the research within the organization is improvement and value adding to the existing system. According to Coghlan (2001), it provides opportunities for both effective action and learning and contributes to the development of theory of what really goes on in the organization. Action research is therefore building/testing theory within the context of solving an immediate practical problem in a real setting. It thus combines theory and practice, researchers and practitioners, and intervention and reflection. Collaboration with practitioners and their learning is vital. Both, the researcher and the practitioner emerge with enhanced learning.

Actions to improve the ERP system, integration of the partnering strategy and proper leadership style for the implementations are therefore observed in this phase. Data is collected by observation. The observed actions and activities are those where author would note what happen and what is done at the particular timeframe. Notes and logs
are kept for those observations, including change in procedures, process, communication patterns and organizational structures, for analysis. Data collection for observational measures can be taken in real time as they occur for later analysis (Page and Meyer 2000). Saunders, Lewis et al. (2003) argued that observation is a systematic approach recording, description, analysis and interpretation of people’s (organization’s) behavior and the effect and impact being how the organization acts. Researchers will observe activities without taking part into those activities in the same way as the ‘real’ research subject. Its emphasis is on discovering the meanings attached to the actions and improvements that the organization attained as a result of such actions.

4.5 Research Administration

The following issues will be discussed under this section:

- Researcher’s role
- Political issues
- Ethical matters

4.5.1 Researcher’s Role

Observational techniques are common in research and where the researcher has the option simply to observe, or to participate and observe at the same time (Page and Meyer 2000). The involvement of researcher may range from being a passive observer to being a very active participant in actors’ and their organizations’ activities. Participation can be vital strategy that allows you access to otherwise obscured or hidden sources of evidence and interpretation. When considering the following representation of participant/observer researcher roles, the researcher started off by conducting surveys and interviews in Phase 2 and 3 for the initial exploratory and descriptive phases and as ‘Participant as Observer’ in the final action phase.

The observation condition can be either naturalistic or contrived (Page and Meyer 2000). In a contrived setting, specific conditions are set up, such as different working conditions or experiences, and introduce participants to them in order to observe their responses. Contrived settings are problematic, as it is not known to what extent, if at all; the finding can be generalized outside of the study setting. With naturalistic
observation, the researcher observes participants in the natural surroundings and circumstances. With participant observation, the researcher becomes fully immersed in natural situation, acting as one of the participants. However, a danger here is that the researcher’s present will both add to and alter what would have happened if he or she had not been involved. The line will then become blurred between ‘reality’ with respect to the topic, and researcher effect.

Page and Meyer (2000) stated that as a general rule of thumb, participant observation should be reserved for researcher who are getting a feel for an area, rather than used as a form of data collection, utilized to draw general conclusions. The role of ‘Participant as Observer’ is a fieldwork relationship where the researcher works with the research participants. In this research, the author is the data collector. Therefore, the author is well aware of himself being included in the research context i.e. the research context including a researcher context comprising the author’s own multiple roles of researcher, learner, practitioner, member of professional organizations and DPM student. With the goal being to hone rather than remove the author’s perspective, so that the researcher is equipped as possible to make a sophisticated analysis and argument about the phenomena observed.

In any event, just like any other measure, observation techniques require systematic and objective measurements that are operationally defined. Date collection for observational measurements consists of recording when a target behavior or incident occurs. Observational measures can be taken in real time as they occur for later analysis (Page and Meyer 2000).

4.5.2 Political Issues

Moral research behavior is more than ethical knowledge and cognitive choices; it involves the person of the researcher, their sensitivity and commitment to moral issues and action (Kvale 1996). More than this, they need two attributes: the sensitivity to identify an ethical issue and the responsibility to feel committed to acting appropriately in regard to such issues (Eisner and Peshkin 1990).
Coghlan (2001) observed that managers are increasingly undertaking action research projects in their own organizations. Manager-researchers’ pre-understanding, organizational role and ability to manage organizational politics play an important role in the political process of framing and selecting their action research project.

4.5.3 Ethical Matters

The university, professional associations and the studied organization govern guidelines for ethical behaviors. The ethics matters related to this research can be classified as:

- DPM candidate’s ethics
- Professional ethics
- Business ethics

4.5.1.1 DPM Candidate’s Ethics

The RMIT University Human Research Ethics Committee governs both the ethical design and practice of the research study described in this thesis. The author’s research design proposal was approved by this committee and the author must comply with RMIT ethical requirement throughout the research (See Appendix C).

4.5.1.2 Professional Ethics

Being a professional practitioner: MRISC, MHKIS, MCIOB and AAIQS, my professional ethics is guided by various regulations set out by these professional bodies to their members. Each of these professional bodies have a similar code of ethical conduct that require members to conduct themselves in a manner which is neither derogatory to their professional character nor likely to neither lessen the confidence of the public in the Institute or the profession nor bring them into disrepute.

4.5.1.3 Business ethics

As I am employed by the organization, the main point is how I can maintain confidentiality of my valuable insiders’ information in a safe manner. The action research journey also evolves over time. Informed consent must be meaningful. When an author collaborates with research participants, confidentiality must be maintained as the top priority. All these concerns are governed by the employee handbook that any
information concerning the business or affairs of the company both during the course of the employment and thereafter should be kept confidential.

4.6 Research Participants

Most of the research participants are directly or indirectly employed by the studied organization when the research was undertaking. They were chosen because the organization has been using the ERP as IT tools for information and KM. Naturally, it was not feasible to interview all employees of the studied organizations and so the choice of respondents depended upon availability and willingness to participate in the study, these respondents are all known to the researcher.

4.6.1 Characteristics of Participants

The number of participants was based on their: willingness to participate in the research and also special characteristics to make sure perspectives gathered from the research will be as comprehensive as possible. At least ten of the respondents from the selected sample of about 100 were asked to accomplish the questionnaire. The age of participants ranged from around 25 to 50 years old. 3 surveys were undertaken and subsequently 32 respondents were interviewed.

4.6.2 Source of Participants

Most of these participants were team members of past and current projects being researched as employees or subcontractors/supplier of the studied organization, where the principal research currently works. Participants are colleagues of the principal investigator and not a direct report. Supply chain participants for the research phase on how supply chain members perceive the use of the company’s ERP system, were given an opportunity to participate in the study and while these individuals may work for firms engaged by the studied organization, these participants were not directly accountable to the principal investigator.

4.6.3 Recruiting Participants

Participants were personally contacted individually, initially by email or phone, and asked whether they are willing to participate in the research. Confidentiality was
maintained in any write up of data gathered through using pseudonyms or position and not referring to them by name i.e. Manager ‘A’ etc.

4.7 Chapter Summary

This very important chapter in the thesis discusses how the research approach was designed and carried out. Firstly, it explains the research method and design in order to clarify the choice of research methodology and to provide a rationale for the choice. It begins with a basic background of the philosophical different research paradigms, the research techniques, research methodology and method to collect research data; leading to the selection of the proper research approach. The focus moves to the introduction and application of the CMM in the exploratory phase of the research, as the evaluation framework for ERP systems, and the use of SSM in the descriptive phase of the research. It then follows by a detail introduction of the research design:

- Phase 1 – Literature Review (includes in Chapter 3)
- Phase 2 – Exploratory Surveys (includes in Chapter 4)
- Phase 3 – Descriptive Study (includes in Chapter 5)
- Phase 4 – Action Research (includes in Chapter 6)

This chapter also discusses the research administration matters including researcher’s role, political issues and ethics matters arising due to the research. As well, the characteristics, source and recruitment of participants are reviewed. Finally, the chapter closes by this summary.
Chapter 5  Exploratory Survey

5.1  Introduction of the Chapter

There is a very meaningful Chinese idiom “歸根究底” (guī gēn jiū dǐ) which suggests that in order to find the cause of a phenomenon one should delve deep into its original roots. This concept is also relevant to the exploratory study; researchers should make a thorough investigation by chasing back to the source in order to inquire more deeply into the cause of the problem. According to Eisenhardt (1989), exploratory research is appropriate in assisting the researcher to better define and describe the problem. Its primary objective is to develop insights into the problem, in order to facilitate a broader research project. Exploratory surveys are useful to define the problem of ERP systems more precisely. They can also help clarify concepts, gather explanations and eliminate impractical ideas. The results of such surveys are generally not used for decision-making. However, this exploratory stage is the initial step in the overall research framework. The findings of the exploratory research will provide an insight into a situation and form the basis of further studies.

This is the Phase 2 of the research project as shown per the following Figure 5-1. It includes collection of data and feedback from participants. The study comprises three exploratory surveys, not only investigate factors influencing the ERP system at the implementation stage, but also identifying the possibility of the integration of partnering strategy into the existing ERP system. Lastly, leadership style, empowerment and cultural impact on organizational leadership that would affect the ERP system and partnering strategy are also acknowledged.
Figure 5-1 – Phase 2 Exploratory Survey

The purpose of exploratory surveys is to link to the literature search by posing exploratory questions in order to collect data. The structure of this chapter is therefore arranged as follows. Firstly, the background of the ERP system adopted by the studied organization (G-Force) is investigated. The results and conclusions of the surveys are then presented in this chapter and details presented in Appendix D-F. There were three surveys undertaken for the exploratory research:

- Survey 1: ERP system
- Survey 2: Partnering strategy
- Survey 3: Leadership, power and culture

Finally, a summary is provided.

5.2 Background and Perspective of ERP System in G-Force

ERP systems are expensive and complex and present significant challenges to implement. Organizations which adopt them would generally have built absorptive capacity through previous experience. In order to study the ways in which to improve the ERP system implementation, it makes sense to select an organization that has considerable experience with IT and ICT. G-Force, the case study organization, fits that specification.
In early 2001, G-Force started to consider using an ERP platform for its ICT infrastructure, in order to enhance its information management as part of its broader KM strategy. The impact of ERP on organizational memory was found to vary from division to division, as well as department to department. According to past research this is often influenced by the location where knowledge is created and embedded (Murray 2005). Through use of the ERP system, different parts of G-Force aimed to use configurable information systems packages that integrate information and information-based process within and across-functional areas. The objective of the ERP system was one of “bridging” and “bonding” parts of G-Force’s information and knowledge resources. The aim was to allow different departments to be linked by an ERP system in order to facilitate a common ICT infrastructure and thereby enhance information flow. The system’s design facilitates existing organizational process and allows possible improvements to be made to increase the diffusion of information throughout partner organizations. With respect to “bonding”, it is intended to discourage the domination of self-interest over collective interest. The aim is to facilitate more effective knowledge sharing and joint decision making, using the ERP system as a platform for creating, sharing and processing information and storing and archiving data, information and codified knowledge. The ERP system is expected to link people together to create internal communication within the team, a necessary step that must be forged before embarking on the integration of diverse organizational knowledge sets.

The aim of deploying the ERP system is to streamline and standardise procedures, reduce duplicate administration costs and facilitate a better “Knowledge Platform”. It is hoped that it will facilitate improved decision making through better information flows and improved reliability of cost reporting and estimating. The ultimate goal is to increase profitability by enhancing efficiency and reducing overheads and paper work.

Every month, the “Management Report” is updated and published, based upon the data, information and knowledge entered into the ERP system. This management report contains a broad range of information from each of the different departments within the organization, and also from the wider industry. This ERP system represents the “heart” of the KM process of the organisation and relies on the commitment of all the staff. The
following Figure 5-2 shows the relationship of the ERP system and “Knowledge Platform” for decision making within the organisation.

Figure 5-2 – ERP is the “Heart” of KM

To begin with, G-Force decided to purchase an “off-the-shelf-software” ERP package\(^\text{17}\) and also to employ an external consultant to customise it to suit the company’s estimating, tendering and cost management requirements. Whilst an external consultant was employed, G-Force understood the need for internal support and knowledge transfer, so internal staff were seconded to the project. Their role was to form a working group that was able to deal with the design and implementation of the ERP system. A

\(^\text{17}\) The J.D. Edwards & Causeway Estimating System ERP packages were used.
new project manager with strong IT background was employed to lead the team. The internal ICT staff were responsible for ICT matters, including modifications to the base functionality, as well as operational needs such as software deployment, personal computer inventory and technical architecture, systems support and maintenance, infrastructure design and overall training. The responsibility of the project team was to provide information (including activity and work flow of the existing system) identify changes to the existing processes and operational requirements, confirm users, assist in their training and prepare data for conversion and transition.

Figure 5-3 illustrates the implementation strategy. The external consultants were appointed to provide explicit knowledge on how to customise the ERP system. Organizational IT support staff worked with the external consultants to customise the ERP system so that internal staff could use a combination of explicit procedural knowledge and tacit knowledge about the way that G-Force’s functional activities worked. In addition, it was important that the cultural and contextual tacit knowledge necessary to ensure successful implementation were retained as part of the project. These groups were also involved in experimental knowledge generation in refining and customising the ERP system, on-the-job informal and formal training and knowledge development activities.
The ERP system was put into operation during December 2002, and it became focus of the case study and its cost management group in Hong Kong implementation was the unit of analysis. In addition, G-Force also considered the integration of the partnering strategy into the system to be an add-on vital component of the ERP implementation.

According to Nobbs (1993) the contribution of subcontractors to the total construction process accounts for as much as 90% of the total value of a construction project. He suggested that the use of subcontractors has led to a shift away from the traditional craft-base, and therefore a greater reliance on increasingly sophisticated technological-based products, which in turn has prompted construction contractors to concentrate their efforts on managing site operations rather than employing direct labour to undertake construction work. This fragmentation of the work is not surprising in itself because increasingly building requires a high degree of specialization. Domberger (1998) and Singh and Tiong (2005) suggested that the benefits of subcontracting may be grouped under four headings: specialization, marketing discipline, flexibility and cost savings.

The success of any construction project depends significantly on the basic philosophy of “the right contractor for the right project” (Singh and Tiong 2005). The selection of the most appropriate contractor for the project under consideration is a crucial challenge faced by every construction project striving to derive maximum value for money. This is also relevant to the selection of subcontractors. Construction partnering is increasingly adopted as an important part of project performance (Phua and Rowlinson 2004). Therefore, further to selection of subcontractors there is an increasing tendency for the main contractors in Hong Kong to adopt the partnering approach.

According to Himes (1995), partnering is a process by which each of the organizations can achieve their respective goals while together achieving the owner’s goals for the project. Partnering is, and should be viewed as, a continuous process in order to achieve the greatest value for the project. It is important to both the relationship of main contractor to subcontractor and vice versa. The ultimate goal of partnering is to achieve the owner’s goals by producing a “win/win” situation for all parties involved (Himes 1995).
Approximately 60% of all work in the studied organization is outsourced to subcontractors; this represents the major part of the company’s business. The subcontractor is an integral component of G-Force’s business model. G-Force is aware that the integration of the ERP system with the partnering strategy is crucial to the success of the business.

Leadership plays an important part in the usefulness of the ICT infrastructure because it improves the K-Adv of an organization. According to Walker (2004), an organization’s K-Adv is its capacity to liberate latent creativity and innovation potential through effective management of knowledge, both from within its organizational boundaries and from its external environment. The K-Adv requires a coordinated approach in addressing leadership actions. This entails establishing and deploying a vision of what the K-Adv means to the organization and supporting the infrastructure necessary to effectively use knowledge in their business activities. However, ICT investment decisions are not only about financial considerations but also about people. According to Groeneveld (2005), “the good old days of big ICT spend allocated with few questions asked are long gone”. Investment in ICT will only add value if resources are managed in a way to support the business needs, motivate employees and give an organization the agility needed to respond to the business and market conditions.

Whether an organization decides to use the ERP system to improve KM or to integrate partnering into the subcontractor supply chain management is less important than the ultimate goal, which is to obtain a competitive advantage over other players in the market. In this race, leadership is crucial. Past research by Cheng and Li (2001) found that is important to identify the critical factors affecting partnering success. This is supported by Cowan, Gray et al. (1992), who suggest that the vision of senior management, which formulates the direction of business, is vital for successful partnering.

Zhang, Lee et al. (2005) carried out qualitative research on a case study of four Chinese organizations which had implemented ERP systems and concluded that a “lack of top management support” was one of the factors affecting the success of an ERP system. It is obvious that the strategies of “ERP” and “Partnering” both require “Leadership”.

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G-Force had already invested over HK$10m into the ERP systems and Partnering strategy when our survey was conducted. Because further investment is required to maintain the ERP system, as well as to enhance the effectiveness of the partnering process, leadership is important in the formulation and implementation of these strategies.

5.3 Pilot Surveys

Three surveys were undertaken as part of the DPM preparatory research work to explore the influences of integrating the partnering strategy into the existing ERP system. The first survey was about using the “ERP system”, the second focused on the “Partnering strategy” and the third concerned “Leadership, power and cultural impact”. These surveys and subsequent interviews/reviews were performed between May 2006 and January 2007. In the following sections, summarized results of the three exploratory surveys are presented details of the data, tables and figures referred to can be found in Appendix D-F.

5.3.1 Survey 1: ERP System

The first survey was about the “ERP system” (see Appendix D) and was divided into nine distinct sections:

- Section 1: Respondents’ Profile, including general demographic questions relating to the respondent’s position, department and working experience in the organization
- Section 2: ERP Solution asking for respondent’s perception and expectation of the ERP system
- Section 3: Factors Considered in Implementing the ERP asking respondents’ opinion factors considered in ERP implementation
- Section 4: Areas of ERP Implementation which asked the respondents to rank the performance of areas of ERP implementation
• Section 5: Consultant/trainer on the ERP Implementation collecting opinions about the reasons for hiring or not hiring ERP system consultants and trainers
• Section 6: Problem Areas on ERP Implementation, which asked questions about problem areas of ERP implementation where improvement may be required
• Section 7: Effects on the ERP Solution which asked respondents to rate the ERP performance
• Section 8: Impact of the ERP Implementation on the Organization’s Productivity, this sought opinions about the impact of the ERP implementation on the organization’s productivity
• Section 9: Other Applications of ERP System which asked for suggestions of further ERP system applications

The following context summarizes the results, and a detailed analysis of the survey can be found in Appendix D.

5.3.1.1 Results and Findings of Survey 1 (ERP System)
The objective of this survey was to determine the factors affecting the difference between the expectations and outcomes of the ERP system and the implementation difficulties experienced at the operation level. More specifically, the research was aimed at determining respondents’ individual expectations of the ERP, to find out what constitutes the difficulty in ERP implementation, including the factors affecting its use as a KM tool.

This survey was conducted with 18 respondents in the roles of quantity surveyors, administrators, accountants and IT engineers. The staff were experienced, with an average of 12 years service with G-Force. Respondents generally believed that the ERP system was an effective tool which provided cost data in real time. This was because information was available which can be accessed on-line by people authorized to perform the tasks. Also, since cost data were provided on-line, they were made available to various departments at the same time and did not come in hard copies.
Hence, the data could be accessed simultaneously and there was increased efficiency on the part of G-Force.

5.3.1.1.1 **ERP Implementation in the Organization**
Respondents perceived that the ERP system, cost analysis reports were generated with more flexibility and in the appropriate format. At any given period, forecast and actual financial data could easily be compared. Cost review and control was more easily managed, and ledgers could be updated with more efficiency. Cost data was integrated into a common platform which in turn made data sharing among departments more systematic. Therefore, the ERP system modernized and standardized the processes among departments within G-Force. It also benefited the business processes, since cost data was monitored and controlled in the most efficient and accurate manner.

Respondents thus agreed that the actual performance of the ERP solution matched their expectations. In general, they believed that the ERP solution did seem to improve control and management of cost data.

Furthermore, they also reported that the workload of various officers in the department who were in-charge of managing and monitoring cost data was reduced. There was a view that authorized individuals gained access information without much extra effort, because there was no need for further documentation.

Information was also found to be delivered accurately and on time. ERP Reports could easily be generated for use by the different departments which allowed quick cost checking and monitoring of cost data. The data were easily updated and efficiently made available to everyone in G-Force. In addition, the Data Filing space was reduced because the on-line retrieval of information was available as part of the system.

5.3.1.1.2 **Factors Affecting ERP Implementation**
Six factors included in the questionnaire were believed to be critical for ERP implementation. As Table 9-1 in Appendix D, respondents ranked that Efficiency, Provide of Better Management Tools and Increase Organization’s Competitiveness were important.
Respondents were also asked to rate the ERP with respect to its performance in various areas of implementation. Utilizing the modal values computed for each area, the respondents reported that the ERP was satisfactory in the areas of *Software Package, Project Control and Budget, Communications, Training Process, Technology Infrastructure and Process Redesign*. However, a few of the respondents could not determine whether the ERP had a good or poor performance in the areas of *Project schedule, Scope and Management, External Consultants or Internal Team Structure*.

The respondents reported that G-Force did provide a consultant or trainer on the ERP implementation. The aim of the consultants/trainers was to provide training, introduce the function of the ERP, help operating the ERP system smoothly, train the internal trainer, standardize the customers’ implementation on ERP and provide a backbone infrastructure platform for ERP.

### 5.3.1.1.3 Problem Areas, Effect and Impact of ERP Implementation

Seventeen problem areas on ERP implementation were identified during previous interviews, and they varied in their responses. Many problems were identified (see Appendix D Tables D-2 to D-4) by those interviewed, and they varied in their responses. Seventeen problem areas on ERP implementation were identified. The respondents agreed that that *Organizational Issues* (i.e. governance issues and process redesign), *Data Issues* (reconciling multiple data sources and ensuring data integrity), *Lack of Financial Resources, Training issues, Lack of Internal Expertise, Lack of Consensus among the Institution’s Senior Management, Quality of the Software, Inadequate Training, Resistance to Change and Alignment between Software and Business process* were hindrances to effective ERP implementation. Others however only partly agreed that *Technical Issues, Lack of Consensus among the Business Owners and Lack of Understanding on the Capability of the Software* were a barrier to ERP implementation. A number of respondents, on the other hand could not determine whether certain areas (*Vendor not Delivering Promised Functionality in a Timely Fashion, Inadequate Communications Strategy, Customizations and Issues in Working with External consultants*) were problems to ERP implementation or not. One respondent added that one possible problem of ERP implementation was that the reports turned out to be inaccurate at times, even with people working longer hours to enter the data.
The survey also rated ten areas where effectiveness has been, and the modal values computed for each factor revealed that the effectiveness of Staff/Personnel on ERP solutions increased slightly. The same result was found for Packaged Software, Internal Applications and Code, Hardware and Infrastructure, Systems Operations and Management and Consulting. On the other hand, G-Force’s Database, Desktop Products and Services, Training as well as Help Desk and User Support were found to have a stronger increased effectiveness through using the ERP system. Two of the respondents also added that the ERP solution increased total costs due to license fee, hardware, training and implementation and organizations spending more time managing data in the ERP system.

However, the implementation of ERP does not appear to have had an entirely beneficial impact on organizations. Less than half of the respondents reported positively, and others even saw some drawbacks. With the implementation of ERP, updated financial information was provided on-line and therefore it was quickly made available to people who might need it, and the data sources became broader. Reporting, planning and decision-making were all made easier because required information was immediately updated. Also, better communication was established among departments, and transparency in G-Force was improved. There was increased efficiency in the work done, and working procedures and processes were able to be redesigned to fit G-Force’s needs. However, some respondents reported that with ERP implementation, the on-site level workload was increased comparatively. There was also increased workload in both data entry and data verification. One respondent even said that the support software always had errors and therefore significantly affected the processes being carried out. Therefore, some of the reports generated eventually became useless to the organization.

5.3.1.1.4 Other Applications of ERP System

Finally, as indicated in Appendix D, respondents advocated the implementation of other ERP applications, which include exporting and importing data from one software package to another as well as the inclusion of a search function. Data analysis, including estimation of costs, could also be performed using the system, as well as stock control and procurement flow. Therefore, this would have improved the value of a centralized database to the company.
5.3.1.2 Discussion and Conclusion of Survey 1 (ERP System)
The results were discussed based upon the objectives of the ERP system and the capability maturity model (CMM) assessment of G-Force.

5.3.1.2.1 ERP System Objectives and KM
According to Davenport and Prusak (1998), KM involves creating, sharing, disseminating, and utilizing knowledge data within organizations. KM, supported by an effective ICT infrastructure, can facilitate competitive advantages in at least two ways — by generating a cost advantage or a differentiation advantage (Walker 2005). First, by better knowing the source and context of costs, an organization can achieve cost advantage, for example, by having superior knowledge of the range and performance of sub-contractors or suppliers. The survey results indicate the respondents generally believed that the ERP system could effectively and accurately manage cost data in real time to allow people to engage in improved project cost control planning, decision making and storage and retrieval of information used for interpreting past actions. Thus the ERP system facilitated better KM. Although the ERP system implementation did not appear to have a positive impact on G-Force, respondents were able to match their expectations of what the ERP solution should offer. The ERP system improved control and management of vast data bases of information that was used to generate knowledge.

The objectives of using the ERP system were to streamline and standardise procedures, to reduce duplication, to facilitate better decision making through better information flows and to improve cost reporting and estimating (Al-Mashari, Al-Mudimigh et al. 2003). The literature review indicates that there has been widespread acceptance that ICT is a key enabler of KM that enhances an organization’s potential for gaining competitive advantage (Peansupap 2004; Walker 2005; Maqsood 2006). As for those factors considered in the ERP implementation, Appendix D Table 9-1 indicates that respondents rated Efficiency as the most critical factor and Provision of Better Management Tools as very important. These were in line with Cleland (1999) who argues that effective project cost management requires access to accurate, current, reliable data and information and stresses the establishment of processes to monitor and control budgets. According to Walker (2005), when KM is supported by an effective
ICT infrastructure, it can facilitate competitive advantage. This argument is compatible with the perception expressed by respondents that the ERP system would increase G-Force’s competitiveness.

An ERP system can ease access to and extraction of information through a common platform within an organization. However, there is a need to create, maintain and manage a relationship with users to ensure that these ERP systems successfully deliver their promised goals (Akkermans, Bogerd et al. 2003; Al-Mashari, Al-Mudimigh et al. 2003; Zhang, Lee et al. 2005). As indicated in Appendix D Table 9-2, respondents agreed that Communications performance was excellent after the ERP system was implemented. However, one-third of the respondents were dissatisfied with the performance of the External Consultants supporting the system. This majority of respondents agreed that training and resistance to change were very important issues that external consultants could not significantly assist with resolving. People were best at transferring and reframing ERP system knowledge through personal interaction in groups which shared trust and passion and which were willing to volunteer this knowledge to each other. This was a community of practice (COP) which can help people share knowledge and skills and help sustain them through their obligation to exchange knowledge and provide access to shared insights about their work practice (Wenger and Snyder 2000).

Other problems identified by the pilot survey related to data issues and alignment between software and business process, which were in turn related to software quality. Respondents also expressed concern about the help desk and user support, desktop products and services and training, and the impact of these factors upon effective use of the ERP system. This was a stakeholder expectation management matter because of the need to create, maintain and manage a relationship with those people and groups with a stake in ensuring the successful implementation of ERP system (Akkermans, Bogerd et al. 2003; Al-Mashari, Al-Mudimigh et al. 2003; Zhang, Lee et al. 2005). This raises KM issues about the way that this ICT tool was deployed in the department studied, and the pilot results indicate concerns consistent with those raised by recent studies (Peansupap 2004; Peansupap and Walker 2005; Peansupap and Walker 2006).
Finally, 16 respondents suggested that further applications of the ERP system should be implemented, e.g. exporting and importing data amongst different software, data analysing for estimation, stock controlling etc. This provides an encouraging and positive sign that people see the ERP system as a useful tool for sharing, disseminating, and utilizing data that can generate knowledge to facilitate sustainable competitive advantage.

5.3.1.2.2 Assessing the CMM of the Studied Organization and Use of SSM

Good application of KM puts any organization into a potentially winning position. ICT tools can assist the management of information and knowledge data. An ERP system is a specific software tool used for cost management to help construction contractors better manage their cost data and make improved cost management decisions. In terms of KM issues two aspects need to be addressed.

First, an ERP tool that is effectively deployed not only provides valuable information processing capability to better control costs, but can also help identify ways to be more effective in dealing with its supply chain partners as well as improving its internal cost knowledge sharing platform to help decision making. The pilot study results, based upon the experience of a leading construction company using an ERP system, demonstrated the potential effectiveness of an ERP system from a cost management business unit’s perspective.

Second, in order to deploy the ERP system, this innovation must be effectively diffused. This ICT diffusion process at the ERP implementation stage itself involves a KM process. A CMM tool was therefore used to indicate the level of effectiveness that this ICT innovation was being deployed which has been discussed in Chapter 4 (Methodology), it offers the CMM model to categorise an organization’s maturity level of the ICT enabling infrastructure that can support a K-Adv.

G-Force has actively invested significant resources for the ERP system implementation. The results of the survey indicated that many respondents in G-Force believed that the ERP system was capable of managing cost data and was able to match their perceptions of what the ERP system would deliver. Their expectations were for the system to improve cost control and data management. G-Force considers efficiency
as its most critical objective and feels that the ERP system can increase G-Force’s competitiveness.

Evidence from G-Force’s internal communication indicates that it believes that communication performance was excellent after the ERP system implementation, and that training issues and resistance to change were very important issues yet to be fully resolved. Therefore, G-Force has actively engaged external consultants to provide staff training. G-Force understands the importance of effective help desk and user support, desktop products and services and training to effectively deploy the ERP system and has endeavoured to deliver this assistance. Adequate resources and feedback, on-line help, network support and training are, however, reactively provided. Some respondents suggest applying further organizational business functions to the ERP system, which demonstrates that G-Force was actively promoting the ERP system as a tool to facilitate sustainable competitive advantage through improved information management leading to KM activities.

| Level 1: | being inactive and only barely aware of a given aspect only |
| Level 2: | being pre-active in terms of initiating plans for becoming active |
| Level 3: | being active in adopting the particular elements |
| Level 4: | being pro-active in accepting and adopting the approach, and then adapting it to suit the context and circumstances |
| Level 5: | being embedded with the adaptation having become routine and infused as the natural way of doing things |

Figure 5-4 – CMM Level of G-Force

The study also indicated that respondents would prefer to operate at a high level. In comparing the survey results to different capability maturity levels for deploying the ERP system, the evidence indicated that G-Force has met the maturity Level 3 (as indicated in Figure 5-4 above). This level was characterised by “almost adequate resources and feedback; well-resourced web and on-line help; passive encouragement to COP; network support and training reactively driven by the business unit’s needs; planned, not necessarily current retrieval system; structured access to archives” (see
Section 4.3.1 in Chapter 4). However, this was not enough for a market leader to be confident that it can retain its competitive position. The goal ahead should be to have a pro-active interaction and approach to technology. As far as the existing ERP system was concerned, it should be synchronised with other business functions e.g. integration with the supply chain system through partnering. To do this, the wider supply chain stakeholders’ needs must be first identified. This would facilitate gap analysis to take place and from that, G-Force could develop a strategy to improve KM practices that would enhance its K-Adv across G-Force.

This provides a deeper understanding of drivers and barriers to ERP adoption and this understanding will be assisted in the next stage of the research. An SSM study was used to identify actions that can be implemented and evaluated. SSM was useful to provide valuable insights into the messy and complex people’s personal experience trying to make use of this ERP system effectively. The SSM study not only unearths paradoxes and hidden problems but also identifies how the KM process of diffusion and adoption of this innovation can be better deployed.

Before undertaking the SSM study, however, more understanding about partnering was required. The forthcoming section investigates the viability and possibility of adopting a partnering strategy and integrating it into the ERP system. This issue was addressed by conducting a survey with various stakeholders.

5.3.2 Survey 2: Partnering Strategy

A large proportion of construction work managed by the case study organization was outsourced to subcontractors, because this provides flexibility and allows the company to adjust the scale and scope of production. Therefore, an effective and efficient subcontracting strategy was important to benefit the construction project in term of costs, time and quality. Adopting a partnering strategy in the supply chain was desirable.

Partnering has been proven to be successful in various projects in different countries (Baker 1990; Lenard, Bowen-James et al. 1996). However the outcome of partnering, whether positive or negative, can greatly affected the decision to partnering with a
supply chain. Cheng, Li et al. (2000) researched a partnering process and suggested that future researches should be focused on partnering criteria and the critical success factors. G-Force’s ERP was also ultimately intended to be adopted with key supplier chain organization members. It was not viable to survey all existing partnered organizations, mainly due to the scale and scope required to do so and time and resource limitations of this researcher. It was therefore worth studying, mainly from G-Force employee’s perspective, the viability of partnering in the supply chain of construction subcontracting procurement prior to implementation the integration with the ERP system to be a KM tool.

An exploratory study, Survey 2, was undertaken as a further part of the DPM research preparation work that related to issues of Partnering and integrated supply chain management. This study was divided into nine distinct sections:

- Section 1: Respondents’ Profile asking general demographic questions relating to the respondents’ position, department and working experience in the organization
- Section 2: Partnering Solution asking the respondent’s understanding and expectations on “Partnering” in the construction industry
- Section 3: Factors Considered in Successfully Implementing the Partnering directly asking respondent’s opinion
- Section 4: Areas of Partnering Implementation asking which particular area that partnering strategy can be adopted in the construction industry
- Section 5: Experience of Partnering directly asking respondent’s own history of partnering
- Section 6: Effects on the Partnering Solution asking respondent’s views on advantages and disadvantage of partnering strategy
- Section 7: Selection Criteria of Partners asking respondent to rate the degree of importance of each factor
- Section 8: Impact of Partnering Implementation in the Organization asking respondent’s views on partnering effects
- Section 9: View of Relationship between Partners asking final comment on partnering
The following section summarizes the findings and results that are presented in more detail in Appendix E.

5.3.2.1 Finding and Results of Survey 2 (Partnering Strategy)

The objective of this phase of the research was to study the viability of adopting partnering in the supply chain of construction subcontracting procurement prior to implementation and integration of it into the ERP system as a KM tool. More specifically, this research was aimed at determining respondents perceptions and expectations of partnering, which factors they believed affected its successful implementation, and the critical selection criteria that they found helpful as a KM tool.

Nineteen respondents were asked to complete the questionnaire, most of whom were male, 30-35 years old, with an average 12 years experience in the construction industry. They included engineers, quantity surveyors, procurement staff and subcontractors.

5.3.2.1.1 Respondents' Understanding and Expectations

As indicated in Appendix E, respondents defined “partnering” as a relationship management strategy which gives a new way for clients, consultants, contractors and subcontractors to work together against the challenges of the project rather than against each other. It was a business relationship for the benefits of all parties involved, which was based on openness, trust and respect. Mutual benefits were achieved by having better communication between parties, and a mutual understanding of all parties' needs, cost build up, the business process and the ultimate goals. Therefore, in partnering, two or more organizations were linked by a long-term commitment, cooperation, and coordination for the purpose of achieving success, satisfaction, and a win-win situation. Any confrontation among different parties can be prevented by establishing a pre-determined mechanism which results in cost-saving, harmonized working environment, and reduction in the construction period.

Ideally, the expected outcome of partnering is a “win-win” situation in which all of the parties involved will benefit. Contractors receive the final product on time, with satisfactory quality and within budget as well as achieving reasonable profit and good publicity on managing the project. On the other hand, consultants/subcontractors
receive reasonable remuneration and good exposure on projects. Ideally, neither party suffers loss due to activities of the other parties.

In addition, it was expected that partnering can replace a contracting process, which was typically adversarial, with a more cooperative and constructive one. It can also improve project communications, profitability, and quality, while reducing costs, conflict, and exposure to litigation. Expected outcomes also include a better communication and understanding between both parties; and a willingness to forgo profit temporarily for the long-term benefit of both parties. The results of Survey 2 suggests that through partnering, there can be an increase in construction work efficiency, through partnering, there can be an increase in the trade work of construction, a reduction in the construction period, a reduction in the number of claims and potential expenditure in dispute resolution, an improvement in the responsiveness to unforeseen problems and an increased likelihood of getting more jobs.

5.3.2.1.2 Advantages and Disadvantages of Implementing “Partnering”

The most visible short-term advantage of partnering was seen to be reducing unnecessary administrative tasks. A good public relation was also exercised by maintaining a good working relationship with other organizations as well as improving communication through the provision of a platform for better dialogue. Through partnering, stakeholders can concentrate on building and/or design instead of identifying liabilities or risks. It ensures quality, timely completion of projects at a relatively low price. At on-site level, partnering also helps to resolve problems quickly without unnecessary arguments.

In the long run, partnering was perceived as establishing trust and maintaining good working relationships amongst contractors, consultancies, subcontractors, and suppliers. It promotes good understanding among organizations which contributes to a smooth implementation of projects and maintains the competitive power in the market. It also encourages a working environment and relationship where all partners contribute equally to the success of a project and gives rise to fewer arbitrations i.e. a win-win situation. The other vital long-term advantage of implementing partnering is that it improves efficiency of business performance in terms of cost, quality, and time, which results in better business performance. It eventually helps in increasing business
profits, reducing losses and getting reasonable and competitive prices for tendering. In addition, it is an effective and efficient problem-solving method because it helps in quick resolution of any disputes, because it makes the adoption of value engineering easier.

On the other hand, the major short-term disadvantage of implementing partnering is possible extra cost due to subcontracting partners’ incapability and asking for funding when they face finance problems. Respondents also viewed lack of competitiveness as the major long-term disadvantage of implementing partnering. This is because the reliance on a single supplier or subcontractor may result in a loss of touch with the open market, and a failure to take advantage of better opportunities. There is also less likelihood of innovation and a reduction in bargaining power since only one source is usually tapped.

5.3.2.1.3 Impact of Implementing “Partnering”
Respondents shared their views on the impact of “partnering” being implemented in G-Force, and a good working relationship between parties was regarded as an important outcome and fewer disputes occurred between parties.

In summary, the positive impacts of partnering included a positive change in company culture and practices from top level to bottom. Better business performance may also be generated through shared experience and knowledge between parties. Improved communication and collaboration with suppliers and subcontractors may also improve performance of projects. Another impact of partnering is the increase in G-Force’s competitiveness in the market, since both parties want to benefit from the collaboration. This results in a higher chance of a lower tender price and increased brand value.

However, there may be negative outcomes. Some respondents suggested that partnering may cause loss of performance by some excellent suppliers or subcontractors who may not be willing to adopt a partnering method and thus remove themselves from working with G-Force. Thus, the selection of a good partner is important.
5.3.2.1.4 Areas of Partnering Implementation and Selection Criteria of Partners

As demonstrated in Appendix E Figure 9-3, six areas were suggested for the implementation of partnering, and 11 respondents (58%) agreed that partnering is very suitable in two of them - “Major Supplier” and “Consultants”. The primary reasons for its suitability were “ensuring most economic supply price”, avoiding major contractual variances leading to disputes, and long term collaboration.

The respondents were also asked to rate twenty factors according to their degree of importance for the selection of partners. As analyzed in Appendix E Figure 9-4, they rated Past Performance, Financial Scope, Commitment to Programme and Previous Working Relationship as the most critical factors in selecting partners.

5.3.2.1.5 Maintenance of Relationship between Partners

Respondents generally agreed that maintaining good relationship is important. Three respondents added that having good communication between partners is crucial in achieving business success. Both parties should be open, honest, reliable, helpful and cooperative. They should have the same vision and interest to promote innovations and high-quality, cost-effective business solutions. However, maintaining a good relationship between parties is very difficult due to cultural differences. Sometimes, a relationship between partners which is good at the beginning of a project gradually becomes shaky as time passes and the budget is tightened. There were also possibilities that partners tend to look for their own benefits and sometimes just want to get the job, without thinking of contributing to the partnering process.

Disputes, arguments, and conflicts are inherent in partnership. This is an obvious result of differences in beliefs and opinions. Thus, overcoming them is a very important factor to be considered by both partners.

5.3.2.2 Discussion and Conclusion of Survey 2 (Partnering Strategy)

Little research has been conducted on partnering between main contractors and subcontractors/suppliers, despite the fact that partnering represents perhaps the most significant development to date as a means of improving project performance, whilst offering direct benefits to the whole supply chain (Dozzi, Hartman et al. 1996). Typical main contractor/ subcontractor relationships were still seen as potentially adversarial,
and the essence of a master - servant relationship remains. The main contractor always perceives himself to have the upper hand and is the provider of work. However, the findings of this investigation suggest otherwise. Respondents reported that the positive impacts of partnering outweighed the negative effects and that a partnering strategy is workable amongst the lower ends of the contractual parties, i.e. between contractors and their subcontractors/consultants/suppliers. They tended to agree with Treleven (1987) who found that manufacturing organizations started partnering with suppliers and improved adversarial relationships and increased competitiveness. As for areas of partnering implementation, “Major Supplier” was deemed to be most suitable, due to long-term collaboration.

The crucial advantage of partnering was that it brought more steady business opportunities (by better communication) to the contractual parties, and allowed them to improve efficiency of business performance in terms of cost, quality, and time, which resulted in better business performance. Therefore, the combination of an ERP system and a partnering strategy forms a better knowledge platform, i.e. the KM tools, and supports a win-win situation. However, there were disadvantages, including possible higher costs due to lack of competition, lack of incentives and increased internal procedures. Therefore, selection is important, so that both the contractor and subcontractor can sustain a longer business relationship.

Beazant (2004) proposed “culture, communication, performance measurement, opportunities, processes and management” as the tools to measure the success of partnering. This view is confirmed by the results of this investigation, in that respondents agreed that Past Performance, Financial Scope, Commitment to Programme and Previous Working Relationship (74%, 58%, 53% and 53% respectively) were the critical factors in selecting partners (see Appendix E Figure 9-4).

That is, the performance, capability, commitment and attitude to the relationship between contractors and subcontractors/consultants/suppliers are the essential ingredients for the success of partnering. Whilst performance, capability and commitment were easily justified by working history, a keenness to maintain the relationship was recognized as the most important element in partnering. In other words, cultivation of the relationship amongst contractor and subcontractors,
consultants and suppliers is most critical when formulating strategy and integrating them into the ERP system as a common platform to share knowledge. To establish this relationship, Pruitt (2005) highlighted the importance of trust, defined as the belief of both parties in each other and their reliability in fulfilling their obligations in an exchange relationship. Gibson (1998) stated that organizations which work with trusted partners do well when venturing into China. Trusted relationships, known in Chinese as “guan xi” are thus very critical in the Chinese business world, just as trust and mutual respect are important values in the wider Chinese community. It is therefore agreed that partnership is hinged on relationship, and fits with the Hong Kong culture.

Trust is built by effective communication, Lendrum’s, (1998) analysis stated that developing trust is the motivation that benefits the partnering relationship. Respondents in the survey agreed that having good communication between partners is important in achieving business success. Both parties should be open, honest, reliable, helpful and cooperative. Maintaining a good relationship between parties is by no means easy. Removing fear and improving communication can certainly help to achieve a good partnering relationship (Smyth 1999). In this stance, the ERP system offers an obvious ICT environment for communication, i.e. a good KM tool.

The respondents also acknowledged that partnering is a relationship management strategy, which offers a new way for client, consultant, contractor and subcontractor to work together against the challenges of the project rather than against each other. To achieve this, KM is important because if knowledge can be shared via a common platform, i.e. an ERP system, the final outcome is a “win-win” situation.

According to Smyth (1999), strategic partnering and project partnering are the focus of the main contractor and subcontractor/suppliers in the supply chain management. Bennett and Jayes (1998) added that strategic partnering is a set of strategic actions which embody the mutual objectives of a number of organizations i.e. different contractual parties in this case. If the combination of an ERP system with partnering is G-Force’s strategy, and is treated as the project of the organization, mutual objectives should be set. The influence of an organization’s leadership plays an important role in setting objectives, and therefore leadership will be studied in the third survey of the stakeholders.
On the other hand, if partnering makes sense, when it is done well, it will offer a win-win solution with measurable and considerable benefits to all involved parties. It is therefore also worthwhile, in the next section, to investigate the impact of leadership, power and culture on the implementation of the ERP system and partnering strategy.

5.3.3 Survey 3: Leadership, Power and Culture

Leadership is a propagated approach of individuals and champions who are able to effectively implement change programs such as ERP and who are not averse to modern ideas, learning and growing the business through innovation and best practices. A review of successful ERP implementations has shown that leadership and top management commitment are the most critical contributors to successful ERP implementations. Effective leadership ensures a smooth change management and system rollout (Bingi, Sharma et al. 1999). This is supported by Cowan, Gray et al. (1992) who argue that senior management’s involvement is crucial because it is leaders who formulate the strategy and direction of business activities.

Partnering strategy also requires strong support from organizational leaders who set objectives and influence strategy formulation and implementation. This strategic decision-making is the responsibility of leaders who act as organizing, coordinating, commanding and controlling agents (Foyal 1949). As evidenced by the literature review, leadership, power and culture are inter-related. Therefore, it is necessary to survey the impact of leadership, power and culture on the implementation of an ERP system and its integration with the partnering strategy.

G-Force had already spent considerable time and money on the ERP system and subcontractor supply chain management systems. However, further efforts were required to maintain the system and to improve the effectiveness of the whole process. Powerful leadership is important in the formulation and implementation of these strategies. Hence, the next step in this investigation was to study leadership, power and culture to determine their impacts and effects. This study is surveyed was divided into six distinct sections:
• Section 1: Respondents’ Profile asking general demographic questions relating to the respondents’ position, department and working experience in the organization
• Section 2: Perception of Leadership, Power and Culture asking respondent’s view the impact on strategies formulation and implementation
• Section 3: Relationship of Leadership and Power investigating the sources of power to a leader
• Section 4: Relationship of Culture and Power ranking the relevance of power to cultural norms when leaders are formulating and deciding strategy
• Section 5: Relationship of Power and Decision-Making asking the respondent’s view of positive and negative impact of power on decision-making
• Section 6: Perception of Empowerment concerning delegation for decision-making

Details of this study can be found in Appendix F. Also findings and data are presented in (Chan et al. 2008).

5.3.3.1 Findings and Results of Survey 3 (Leadership, Power and Culture)
The objective of Survey 3 was to study the impact of leadership, power and culture on the formulation and implementation of strategies. More specifically, this research was aimed at determining the respondents’ perceptions and expectations of the leadership, power and cultural factors which affect the success of the ERP system and partnering strategy for KM.

Respondents to this survey were of different national cultures and working experience, and thus they represented a relevant and prototypic sample within G-Force. Amongst the thirty-two respondents, eight had completed both the first (ERP) and second (Partnering) surveys. They could be categorized as having high levels of technical skill/knowledge, and were well experienced in both the industry and G-Force’s routines. This group should have knowledge of the usefulness of the ERP and of any
potential barriers to its practical and effective deployment within G-Force, including supply chain partners.

With reference to Appendix F, 26 respondents had at least 9-years experience in the industry and all respondents had at least 2 years experience in G-Force.

5.3.3.1 Leadership, Power and Culture
Appendix F Figures F-1 to F3 reveals that respondents considered leadership to be a very important factor in strategy formulation and implementation. Aside from leadership, power was also deemed as necessary in establishing strategies and realizing them. Similarly, much emphasis was placed on the effect of culture on power to a leader who was making the decisions.

As demonstrated in Appendix F Tables F-1 to F-2, respondents generally preferred a democratic style of leadership. However, bureaucratic leadership is the most manifested in G-Force (as indicated in Appendix F Figures F-4). The respondents also ranked an autocratic leadership style as the most reliant on power to maintain the leadership. In general Control of Decision Process, Formal Authority, Ability to Cope with Uncertainty and Interpersonal Alliances and Networks were viewed as the most important sources of power to a leader. Control Boundaries, Management of Gender Relations and Control of Counter-Organizations were considered to be the least important aspects of power to a leader.

5.3.3.2 Culture and Power
Respondents were asked to rank the national cultures which provide more power to the leader in making decisions. Those ten national cultures are Confucian Asia, South Asia, Arab, Eastern Europe, Sub-Sahara, Anglo, Latin America, Germanic Europe, Latin Europe and Nordic Europe. Respondents pointed out that Confucian Asia (Taiwan, Singapore, Hong Kong, South Korea, China, and Japan) is considered as a strong culture and provider of power to leaders in strengthening decision-making. In addition, Performance Orientation was viewed as the most important norm relevant to leadership and organizational practices.
5.3.3.1.3 Use of Power
Respondents believed that their leaders in G-Force have used power positively in making decisions. In summary, leaders can positively use power to make sound decisions, achieve good outcomes, control staff effectively, create unity, and reinforce management direction. Respondents also indicated that if power is not positively displayed in making decisions, chaos can be expected, and the possibilities of resources overspending or staff underutilization are increased.

As such, the use of power in leadership will make or break an organization, and leaders exerting power should be concerned about ethical issues such as equality, solidarity, integrity, knowledge on the limited use of power and moral leadership. A leader should also take extra care in dealing with people of different races, to avoid the impression of discrimination. By doing so, conflicts can be prevented and a unified movement towards successful organization can be achieved.

5.3.3.1.4 Empowerment
As indicated in Appendix F Figure 9-9, the majority of respondents believed that in their organization, empowerment of staff is desired and implemented. Most of the respondents viewed Psychology, Experience, Trustworthiness, Delegation, Ability, and Expertise as necessary in empowerment, but the Situation and System were considered less important. Appendix F Figure 9-10 also shows that over 90% of the respondents believed that empowerment is manifested in the studied organization, and they cited the following advantages of empowerment in an organization:

- Efficiency in work can be increased;
- Resources can be utilized efficiently;
- Decision making becomes more flexible;
- Decisions can be made more quickly and effectively;
- Leaders (those who empower) can be released from too much stress and pressure in working;
- The subordinates (those who are empowered) can become more efficient, confident, knowledgeable, and equipped;
- Unity, sense of belongingness, and job satisfaction can increase among leaders and subordinates.
They also acknowledged that lack of empowerment in an organization can generate the following disadvantages:

- Profit can be forgone due to process change;
- Resources can be wasted and overspent due to inadequate planning;
- Outputs may not be delivered on time as a result of chaotic systems;
- Confidential information can leak out;
- Controlling subordinates can become difficult;
- Decisions can become biased, weak and inconsistent;
- Conflicts can arise among subordinates and leaders;
- It can be difficult to define the level of authority;
- Dictatorship can emerge;
- Standardization and coordination of activities can become complex.

5.3.3.2 Discussion and Conclusion of Survey 3 (Leadership, Power and Culture)

The study generally aimed to determine the impact of leadership, power and culture on the successful integration of an ERP system with the partnering process to render it a useful KM tool. The work by Finkelstein (1992) revealed that leadership style is different for different industries and cultures. According to Liu, Fellows and Fang (2003), Chinese cultural values regarding relationships have a major influence on the leadership style. Although the preferred “Democratic” leadership style, as shown in the survey, and the existing “Autocratic” style, as perceived by the respondents, are different, results showed that individuals in G-Force accepted the leadership and generally believed that leadership and power are important in the formulation and implementation of strategies. These aspects are considered as the fuel that turns schemes into action.

18 This thesis is about the implementation of an ERP system with partnering integration in G-Force, so only those issues that relate to the case studied organization are identified.
Respondents also considered *Performance Orientation*, as derived from the GLOBE study referred to by House, Javidan *et al.* (2002), as the top value that is most relevant to leadership and organizational practices. They placed the highest value on an organization which encourages and rewards group members for excellent performance.

Likewise, there is a clear understanding among individuals in G-Force about the impact of culture on leadership and power. The idea of using GLOBE was to give participants the chance to think about the impact of culture on leadership and to reflect on this in their responses. Respondents ranked the relevance to them of cultural norms as they perceived them to be important to the quality of their leader’s decision making and ability to facilitate the ERP system’s deployment. It is noted that Hong Kong, as part of Confucian Asia, is considered as the culture which provides leaders with high levels of power for their decision-making. The survey result concurs with GLOBE’s proposed by Gupta, Hanges *et al.* (2002).

These results are relevant to the model put forward by Yamazaki (2005) in which the organizational setting is an O-type and the knowledge is highly technical, related to the field of knowledge of ERP and has an impact upon organizational and supply chain processes. Thus the organizational style appears to match the cultural predispositions of the majority of participants. In fact, the predominantly Confucian culture favors high-context because it is very relationally oriented, and people are highly aware of ‘face’ issues. For example it is highly important to be aware of the social context. This can be seen as also linking in with strong uncertainty avoidance in this culture, so that rules (both explicit and implicit), regulations and norms, for example, are seen as important governing factors of behavior. Again this relates to “face” in terms of a culture where shame is an outward orientation of judgment by others, and guilt is an inward orientation of feeling disturbed about having to do things that conflict with an individual’s core ethical values. The situation is also one of dependency on both the leader’s capacity and willingness to provide resources, and the followers’ willingness to respond to the leaders and contribute effectively. Resources include information, knowledge etc, and would be handled by an effective KM platform, i.e. an ERP system plus partnering strategy.
Respondents, as demonstrated in Appendix F, also believed that their leaders have used power positively in making decisions. This suggests that the participants want their senior managers to be actively engaged in leading the way in the development and deployment of the ERP. It also suggests that general staff are attuned to the need for leaders to use appropriate power sources and bases. Further, a leader should ensure that unity in the whole organization is always observed. By doing so, conflicts may be prevented and a unified movement towards successful organization can be achieved. A large group always has the capacity to oust a leader who becomes obnoxious or conceited. Thus, it is valuable for a leader to become the IT/ICT interface who serves as an example to subordinates to seek better KM results by integrating the partnering strategy into the existing ERP system.

Grint (2005) argued that leadership is essentially related to results, and power is the prime mover of people and events; leaders who make the greatest contribution and only use power wisely are able to affect an organization’s performance. Power is a very useful management tool and is very important for the right decision for the ERP and partnering process. However, if power is not positively applied in making decisions, chaos may be expected. The findings of the survey implied that staff are concerned about the possibilities of resource overspending or staff under-utilization. Therefore, if the new KM platform can be formed under appropriate leadership, their worries can then be removed.

Leadership and power are vitally important in strategy formulation and implementation. History repeatedly tells us that the greater the power, the more potential there is for abuse. Power is useful and necessary but may be dangerous if it is not properly employed. The survey demonstrates that there are ethical concerns to be considered by leaders when exerting power, which leads us to the issue of empowerment.

As demonstrated in Appendix F, respondents believed that empowerment is manifested in the studied organization. They were able to equate empowerment with delegation and recognized that it is based upon trust which can encourage and equip staff to climb the ladder to upper management level. This interpretation is in line with the views of Wilkinson (1998) and Forrester (2000). Respondents strongly understood the need for
leaders to empower their subordinates and, most importantly, were acutely aware of the positive and negative impacts of empowerment. It is crucial for the decision-making for the ERP and partnering process that staff are empowered to take action based on it.

However, exactly what subordinates are empowered to do must be matched to cultural expectations. The ideal outcome of robust empowerment would be a workplace where the leader would invite participants to volunteer ideas and criticism of current practices, based upon their knowledge, experience and ability. Clearly, these empowerment behaviors can clash with cultural norms. Therefore, choosing the appropriate leadership style, vis-a-vis the aspirations of subordinates towards empowerment, presents real challenges for all concerned and requires a delicate balance which acknowledges cultural norms and practices.

Cultural values are therefore a real concern and affect leaders’ practices. As demonstrated in Appendix F Figure 9-7, 60% (16% + 44%) of respondents believed that culture has a major impact on how leaders make decisions. Today, leaders live with the increasing pressures of globalization and should therefore strive to build an organization that accommodates cross-cultural management practices. Considering the subtle influence of culture on management behavior, organizations should therefore urge leaders to understand the value of positive use of power and seek to empower both local and expatriate staff. On the other hand, leaders should also strive to build an organization that accommodates inter-cultural management training.

ERP deployment and partnering strategy are by nature a company-wide phenomenon. The survey results and subsequent discussion made it clear that the impact of leadership and power on strategy formulation and implementation is highly significant. In addition, the cultural impact on leadership and power on decision-making was also noteworthy. There are also side issues about empowerment and cross-cultural management that should be addressed. The forthcoming chapters will focus upon how a leader can plan to accommodate all the abovementioned issues and promote the integration of ERP with supply chain partners. The next step of this research project is a descriptive study to map out each of these issues.
5.4 Chapter Summary

The objective of this chapter was to explore the root cause of the problems and management issues in the implementation of an ERP system, integration of the partnering strategy and the impact of leadership on such implementation so that it can be used to inform later part of the thesis study.

After the introduction, the first section summarised the background and perspective of the ERP system used in the studied organization. This includes the reasons for the integration of the partnering strategy into the existing ERP system, i.e. to increase KM effectiveness. This leads to a consideration of the impact of leadership, power and culture on the ERP system and partnering strategy. Finally, the results, findings, discussion and conclusion of three exploratory surveys were presented:

- Survey 1: ERP system
- Survey 2: Partnering strategy
- Survey 3: Leadership, power and culture

Successful project performance reporting lies at the core of any project management process, and the organisation relies on a “Knowledge Platform” which uses and transforms data into information and then into knowledge through people. These exploratory surveys indicated that an ERP system can be a very useful tool in KM, depending, however, on how it is used. They revealed that the ERP system was under-utilized and should be enhanced, particularly in terms of the cost reporting function, to improve the cost knowledge platform. Likewise, adopting a partnering strategy in the supply chain with the subcontractors can also assist to promote the effectiveness of the KM in the organisation. The aim of integrating partnering into the existing ERP system is to share knowledge and improve the knowledge platform.

The findings of the third survey also indicated that the ERP system can be very helpful, but only if the process is appropriately navigated by the leader. Leadership is the driver to ensure that the ERP system and partnering strategy actually improves the knowledge-sharing platform. The essence of successful leadership style includes appropriate power, cultural impact, and empowerment. The power of a leader, and the
different cultures of those he/she is leading, will dictate the style of leadership and consequently affect the “ERP-KM-Partnering” strategy in G-Force.

Three exploratory surveys in this paper describe the research problem by gaining insights into it. They also assist in clarifying concepts, gathering explanations and eliminating impractical ideas. The findings and results of these surveys are the initial step in the overall research design framework, paving the way for the next phase of research by providing a significant insight into a given situation of an ERP system, a partnering strategy and the impact of leadership on such an implementation.

In order to facilitate further Action Research, the next step is using the SSM to map out the findings and results and describe it as an action plan for management improvement of the ERP system and partnering strategy by deployment of the appropriate leadership style.
Chapter 6  Descriptive Study

6.1  Introduction of the Chapter

There is a Chinese idiom “畫龍點睛” (huà lóng diǎn jīng) which refers to a painter bringing the painted dragon to life by putting in the pupils of its eye. The expression relates to the vital touch in writings and artistic compositions, and implies that adding a vital word or two can clinch the point. This is relevant to the descriptive study in this research; the collection and reformatting of the raw research data into a big picture for further actions, is like putting the pupils into the dragon’s eyes, so that the creature can soar away and stir up a whirlwind in the monastery.

As shown in Figure 6-1, this chapter covers Phase 3 of the research project – the descriptive study. The purpose of this chapter is to conclude the findings of the three exploratory surveys, in Phase 2, on the ERP system, the partnering strategy and Leadership. It also transforms those findings into a descriptive statement that forms the basis for Action Research in the next chapter.

Figure 6-1 – Phase 3 Descriptive Study
The structure of this chapter is as follows. It begins with an introduction to the
descriptive research and how it links to the exploratory surveys in Phase 2 of the
research project. Thence, the following conclusions of the three surveys are discussed:

- The ERP system is under-utilized and the cost-reporting function should be
  enhanced to improve the knowledge-sharing platform.

- The Partnering strategy is an important new trend in the supply chain and
  will be integrated into the ERP system in order to share knowledge and
  improve the knowledge-sharing platform.

- Leadership is important to the implementation of company’s strategy, i.e.
  utilization of ERP system and adoption of Partnering strategy to improve
  the knowledge-sharing platform. Appropriate leadership style must take
  account of power, cultural impact, and empowerment.

As mentioned in Chapter 5 (Exploratory Surveys), the ERP system is the “heart” of the
KM process of the studied organisation, and the ultimate “product” of the ERP
system/KM process is the “Knowledge Platforms” which consolidates the data,
information and knowledge about various projects and departments within the
organisation. These knowledge platforms form the fundamental basis for business
decision-making. All the findings point to an enhanced knowledge platform for better
business decisions.

In order to describe the results and findings of those three surveys clearly, the
seven-stage Soft Systems Methodology (SSM) tool is used to unearth the paradoxes
and hidden problems. The chapter closes with a chapter conclusion.

6.2 Descriptive Research

Sekaran (1992) suggests that descriptive research studies’ variables and possible
models that may explain the phenomena being investigated, identify overlapping areas,
and construct paradigms that offer a more complete theoretical picture. Since
exploratory research may only describe the “what” of a situation, not “what caused it”,
descriptive research is used to provide a systematic description that is as factual and accurate as possible. It not only helps to set up and obtain information concerning the current status of the phenomenon but also describes more precisely what needs to be improved. The results of the descriptive research therefore provide deeper understanding of the situation being studied.

In order to facilitate the broader doctoral research project, descriptive research is required to provide a clear picture of the surveys, because this type of research is more rigid than exploratory research and seeks to define the problem of the ERP system, Partnering strategy and Leadership.

In Survey 1, it was concluded that an ERP tool that is effectively deployed not only provides valuable information-processing capability to better control costs, but can also help identify ways in which G-Force can be more effective in dealing with its supply chain partners, as well as improving its internal knowledge basis for decision making.

In order to deploy the ERP system, this innovation must be effectively diffused. This ICT diffusion process at the ERP implementation stage itself involves a KM process. Adequate resources and feedback, on-line help, a help desk and user support and training have been provided by the ERP vendor. In addition, G-Force believes that the ERP’s ability to manage cost data and identify efficiency is their most critical factor to increase organizational competitiveness. However, the capability of the ERP seems to be under-utilized. The survey also indicates that participants would prefer to operate at a high level. It is nevertheless useful to seek valuable insights into people’s messy and complex personal experience trying to make use of this ERP system effectively (see Figure 6-2). As the main theme of the ERP is to improve the knowledge platform, these insights will involve a SSM study to unearth paradoxes and hidden problems and to identify how the KM process of diffusion can be better deployed.

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**Figure 6-2 – Survey 1 (ERP System) Mapping**
In Survey 2, it was concluded that partnering is advisable in the construction industry and the studied organization. When conducted well, it will offer a win-win solution with measurable and considerable benefits to all involved parties. It is a far more dynamic, effective and enjoyable process than the traditional procurement methods. Partnering has been successfully implemented between clients and main contractors (Baker 1990) and (Lenard, Bowen-James et al. 1996). However, it has not been successfully implemented between main contractors and subcontractors/suppliers. The survey supports the argument for the implementation of partnering in lower tiers of the supply chain. It does require the involvement of parties capable of embracing a comprehensive partnering culture by information and knowledge sharing and diffusion. If the involved parties seek to protect themselves by mountains of procedural documentation, partnering will remain an illusory goal. These insights will help to involve a SSM study to reveal undefined and buried parts of the problems and to integrate partnering into the ERP system so as to improve the knowledge platform, as shown in Figure 6-3.

![Figure 6-3 – Survey 2 (Partnering) Mapping](image)

In Survey 3, the main objective was to assess the impact of leadership and power in the formulation and implementation of strategies i.e. ERP and partnering. The impact of culture on leadership and power in decision-making was also studied. A leader’s decision is always a determinant. Survey respondents recognized what power can positively bring into an organization when used appropriately in decision making. The survey also revealed that employees perceived leadership and power as important factors both in formulating strategies and implementing them. A majority of the respondents preferred a democratic leadership style over the bureaucratic style which is practised in G-Force, and they preferred a leader who treats his /her subordinates equally and respects their opinion. Further, respondents identified control of
decision-making processes, formal authority, ability to cope with uncertainty and interpersonal alliances and networks as the most important sources of power for a leader. It was also concluded that cultural values have a significant effect on leaders’ practices. Respondents believed that culture has an impact on how leaders make decisions. Leaders from different national cultures have different ways of addressing issues, often influenced by their own personal beliefs. Respondents were keenly aware that different national cultures bestowed different powers to their leaders for generating sound decisions. As the pressures of globalization grow, this is increasingly significant. Today, leaders must strive to build an organization that accommodates cross-cultural management practices. Moreover, considering the subtle influence of culture on management behavior, organizations should significantly increase the level of inter-cultural management training, and explore the benefits of empowering both local and expatriate staff.

Empowerment is not a zero-sum-game but a way of giving others the capacity to do things for themselves. Aside from leadership and power, empowerment was also seen as valuable in G-Force. It can help both leaders and subordinates to develop new passions for excellence in their craft, and it can make the entire organization more unified, skilled, and successful. Therefore, how leadership affects the ERP system and partnering in terms of knowledge sharing will involve a SSM study to expose the appropriate leadership style including power, cultural impact, and empowerment. The influence of power, cultural impact, and empowerment on leadership style is illustrated in Figure 6-4.

![Figure 6-4 – Survey 3 (Leadership) Mapping](image)
Descriptive research helps to see the “as-is situation” and can be undertaken with many kinds of tools. Mapping is one common tool to map the relationships between the phenomena of ERP, partnering and leadership, as is shown in Figure 6-5. A system map or a pictorial and text description is created of what was gathered from interviews. Descriptive research is therefore conducted by using SSM in conjunction with a series of interviews.

![Figure 6-5 – Mapping of Relationships between ERP System, Partnering and Leadership](image)

### 6.3 Use of Soft Systems Methodology (SSM)

In the late 1980's and early 1990's, attempts to build knowledge-based expert systems encountered several difficulties. The main difficulty was for the knowledge engineer and the knowledge domain expert to find a suitable language and conceptual basis for understanding the subtle and contextual data that were vital for making sense out of highly confusing situations where tacit knowledge is such a vital asset. Fortunately, the Soft Systems Methodology (SSM) approach provides an ideal way to unearth the context of confusing knowledge situations through its use of rich pictures and model
development to provide “thick” rather than “thin” knowledge (Walker, Finegan et al. 2003).

In Chapter 3, there is a basic description of SSM, which concludes that SSM helps:

- To achieve the systems and holistic view of the situation under consideration
- To obtain the overviews of various participants involved in the situation
- To address the span of control over the situation
- To identify the problematic areas within the system
- To understand the inhibitors of improvement
- To involve those participants who are looking for the solution to the problems
- To brainstorm actions for improvement
- To invite all participants into the action learning cycle
- To reinstate the existing system into a proper system

The above-mentioned characteristics of SSM share similarities with basic knowledge management process components: knowledge elicitation and capture, creation, sharing, dissemination, etc. This forms the basis of a reasonable argument for adopting SSM as the most suitable tool.

6.3.1 Improvement Needs of Knowledge Platform by SSM

The notion of a “Knowledge Platform” is undoubtedly a serious management trend within organizational management and business circles. The process of forming a “Knowledge Platform” is indeed an important process, and crucial for business decision-making. However, the selection and inclusion of data, information and knowledge relies heavily on the experience of the people involved, despite the use of an ERP system, especially if a partnering strategy will be implemented. In the studied organization, this was not well-structured and was a complex, informal process. Improvement was required to enable G-Force to make various important business decisions, on matters such as key financial indicators; project claims directions, formulating pricing strategies of tenders, manpower planning and tendering decisions. Using corresponding integrity reports can trace the causes of issues. For instance, when G-Force is deciding what the tender margin for a project is; this management report is
strategically and operationally important for the profitability and sustainability of the organization. Any improvement in the deployment of knowledge in this process may make a significant difference in winning tenders at acceptable profit margins. It also could conserve management energy to concentrate on the most “profitable” or strategic projects, thus enabling G-Force to make the most of the opportunity cost of its skilled staff engaged in this business process. The knowledge platform format is hardly documented in an explicit structure. In addition, the content, data, information and knowledge feeding into the report depend on the different team’s modes of gathering sufficient data and information about the projects. All these represent a process that is embedded in the organization’s customary routines.

The typical process flow for the formation of the knowledge platform is illustrated in Figure 6-6.
6.3.2 The Seven Stages of SSM for the Knowledge Platform

The deployment of SSM in the process of forming the common knowledge platform comprises the following seven-stages: conducting unstructured interviews, developing rich picture, developing root definition and CATWOE, developing conceptual model, comparing model and reality, developing list of actions and leading to Action Research.
6.3.2.1 **Stage 1: Conducting Unstructured Interviews**

The first stage of SSM requires unstructured interviews with people involved in the knowledge platform formation process. Two group interviews were conducted, one with a team in a major civil engineering project (HK$2.2 billion) comprising eight participants. Five of these participants were involved in all three exploratory surveys, one took part in one survey and two were new to this research. The other team was engaged on a mega building project (HK$2.1 billion) and also comprised eight participants. Of these eight participants, two were involved in all three surveys, two took part in two surveys, two were in one survey and two were new participants. The main reason for holding two interviews was to conclude and consolidate the different practices in the knowledge platform formation process. These interviewees were able not only to maintain consistency to the research program, but also to inject fresh ideas.

![Figure 6-7 – Research Interviews Seen as “Inter Views” (Kvale 1996)](image)

The ambiguous drawing in Figure 6-7 was introduced by the Danish psychologist Rubin as an example of the figure/ground phenomenon in visual Gestalt perception – it can be seen alternatively as two faces or as a vase, but not as both at the same time. Kvale (1996) used the figure to illustrate the present perspective on the interview conversation as “*inter views*”.
Page and Meyer (2000) noted that interviews are common in descriptive studies, as they provide the ability to identify the issues of relevance in circumstances where little is known about the topic under investigation. Interviews can also be used to create a first definition of the issues of importance in the research (i.e. they are often employed as an initial qualitative data-collection procedure). Interviews are more flexible than a set of structured questions in a questionnaire. They are conducted in either a structured or a semi-structured format. In essence, the interview procedure is intended to be directed somewhat by the flow of responses, rather than by specific items set by the research context. In a semi-structured interview, some structured items are asked of all participants, and there are also some completely open-ended questions with no limitations on how the participant can respond. Care needs to be taken when using completely open-ended questions, as the concern will be how to analyze those responses in a meaningful (systematic and objective) manner.

Kvale (1996) listed seven stages of an interview investigation:

- **Thematizing** - Formulating the purpose of an investigation and describing the concept of the topic to be investigated before the interviews start. The why and what of the investigation should be clarified before the question of “how – method” is posed.

- **Designing** - Planning the design of the study, taking into consideration all seven stages of the investigation, before the interviewing starts. Designing the study is undertaken with regard to obtaining the intended knowledge and taking into account the moral implications of the study.

- **Interviewing** - Conducting the interviews based on an interview guide and with a reflective approach to the knowledge sought and the interpersonal relation of the interview situation.

- **Transcribing** - Preparing the interview material for analysis, which commonly includes a transcription from oral speech to written text.
• Analyzing - Deciding, on the basis of the purpose and topic of the investigation, and on the nature of the interview material, which methods of analysis are appropriate for the interviews.

• Verifying - Ascertaining the generalizability, reliability, and validity of the interview findings. Reliability refers to how consistent the results are, and validity is a measure of how much an interview study investigates what is intended to be investigated.

• Reporting - Communicating the findings of the study and the methods applied in a form that lives up to scientific criteria, takes the ethical aspects of the investigation into consideration, and results in a readable product.

The research interview proceeds rather like a normal conversation but has a specific purpose and structure and is characterized by a systematic form of questioning. The interviewer’s questions should be brief and simple. Therefore, the interviewees were asked informal, unstructured questions about their involvement in the reporting process, based upon their experience and expectations. They were asked to talk about their roles and the important tasks they had performed in the past. It was observed that some participants found it difficult to focus on the answers. This difficulty is normal and can occur when people try to present their tacit thoughts verbally. Therefore an important task of the interviewer was to keep the discussion within the topic and context of the study.

Table 6-1 summarized the roles of interviewees, the current processes and procedures, beliefs, expectations and perceptions, as well as the values and goals in the knowledge platform.
Table 6-1 – Role, Process & Procedure, Belief, Expectation & Perception, and Value & Goal in Knowledge Platform

<table>
<thead>
<tr>
<th>Role:</th>
<th>Current Process &amp; Procedure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input data ad front-line users.</td>
<td>Report in manual and or system format to present the status.</td>
</tr>
<tr>
<td>Ensure fulfilling system requirement and company procedures.</td>
<td>Work with many different types of report:</td>
</tr>
<tr>
<td>Input different types of data to the system:</td>
<td>- Cash flow report</td>
</tr>
<tr>
<td>- Site progress details</td>
<td>- Contractual financial performance report</td>
</tr>
<tr>
<td>- Material wastages</td>
<td>- Staff, labour and plant cost report</td>
</tr>
<tr>
<td>- Subcontractor cost and provision</td>
<td>- Subcontractor payment certificate and provision</td>
</tr>
<tr>
<td>- Final account status</td>
<td>- Contract receivable report</td>
</tr>
<tr>
<td>- Staff cost</td>
<td>- Material expenditure report</td>
</tr>
<tr>
<td>- Labour cost</td>
<td>- Cost journals</td>
</tr>
<tr>
<td>- Internal plant hire</td>
<td>- Safety performance report</td>
</tr>
<tr>
<td>- External plant rental charge</td>
<td>- Monthly Cost report</td>
</tr>
<tr>
<td>- Supplier payment</td>
<td>- Buying Gain report</td>
</tr>
<tr>
<td>- Project consumables</td>
<td>- Concrete delivery record</td>
</tr>
<tr>
<td>- Project overhead</td>
<td>- Rolling forecast report</td>
</tr>
<tr>
<td>Review accuracy and consistency of data.</td>
<td>- Any other cost expenditure record etc</td>
</tr>
<tr>
<td>Ensure timely data input.</td>
<td>Work in detail outside system for all cost data into different cost code and categories.</td>
</tr>
<tr>
<td></td>
<td>Input data for various reports.</td>
</tr>
<tr>
<td></td>
<td>Consolidate data using ERP system.</td>
</tr>
<tr>
<td></td>
<td>Generate ERP reports for review and analysis.</td>
</tr>
<tr>
<td></td>
<td>Correct and/or adjust, if error found or required.</td>
</tr>
<tr>
<td></td>
<td>Re-generate the consolidated reports.</td>
</tr>
<tr>
<td></td>
<td>Review and analysis by exception.</td>
</tr>
<tr>
<td></td>
<td>Feedback to management the findings and result.</td>
</tr>
<tr>
<td></td>
<td>Implements various measures in monitoring by top management.</td>
</tr>
<tr>
<td></td>
<td>Control versus budget.</td>
</tr>
<tr>
<td></td>
<td>Form a basis for forecast.</td>
</tr>
<tr>
<td></td>
<td>Consolidate with status report.</td>
</tr>
<tr>
<td></td>
<td>Produce management report.</td>
</tr>
</tbody>
</table>
6.3.2.2  **Stage 2: Developing Rich Picture**

Kvale (1996) outlined five main approaches to interview analysis: categorization of meaning, condensation of meaning, structuring of meaning through narratives, interpretation of meaning, and ad hoc methods for generating meaning. Developing a rich picture in this second stage requires giving a structure to the problematic situation. The objective of this was to learn about the structures, processes, perceptions and beliefs associated with the studied situation of the knowledge platform. Iterations are very common in the development of a rich picture, where the author draws the rich picture and reviews it with the participants for amendments. This process is repeated sequentially until the participants achieve a consensus on the true representation of the situation portrayed in the rich picture. The notes are based on the roles of interviewees, current processes and procedures, beliefs, expectations and perceptions, as well as the values and goals in the common knowledge platform, all as shown in Table 6-1. This categorization helps the development of the rich picture, whose purpose is to portray all the key players involved in the process and present a structured view by putting the factors affecting the process into context.

After both soft and hard data were collected (the former by direct observation and informal interviews, and the latter by the examination of written records in Stage 1) the findings are then summarized in the form of a rich picture, developed using MS...
drawing clipart. Drawing rich pictures is a creative skill which represents the narration of a story as told by interviewed participants from their perspective and worldview. It is a cartoon-style representation of the problem situation, and includes a collection of vivid symbols. Flows of dialogue, expectations and perceptions, as obtained from the interview notes, are also represented, with key issues highlighted, in this case the “Knowledge Platform”. Relationships between key elements and perceived sub-systems are also indicated, together with arrow-links. This rich picture therefore allows for the representation of myths and meanings, in addition to facts.

After the initial version of the rich picture was developed; it was then presented to, and reviewed with, the participants. Their opinions on the accuracy of the situation depicted in the rich picture were obtained and another version was then developed after taking into account all their feedback. This iterative process was repeated four times, until all participants had reached consensus on the final version, which subsequently served as a basis for further study.

In the SSM investigation undertaken upon the process for the formation of a knowledge platform, the generation of this rich picture provided a structure for an informal process. This made it possible to target information and knowledge assets involved in the process. Participants involved in the study expressed a high regard for the use of rich pictures, which allowed them to make more explicit sense of a process about which previously only tacit knowledge had existed in their heads. This demonstrates the power of rich pictures in making implicit knowledge explicit and in codifying and socializing it. The resultant rich picture is shown in Figure 6-8.
Knowledge Management (KM) Using Enterprise Resource Planning (ERP) System

Figure 6-8 – Rich Picture of Formation of Knowledge Platform
6.3.2.3 **Stage 3: Developing Root Definition and CATWOE**

Root Definition is the ideal view of what a knowledge platform should do. The third stage of SSM is going to build on the broad understanding established previously by developing the definition. The ideal solution to the problem of the knowledge platform under study is formulated and expressed in statements, which clearly define the purpose of the common knowledge platform by establishing a precise wording for the system as the Root Definition. High perceptive skills were called upon to take the rich picture and convert it into a more systemic and formulaic summary. It is a transformation process: input > transformation > output. The third element of the CATWOE mnemonic relates to the need to define the “Transformation” and includes the essential logic of the knowledge platform. The fourth element, “Weltanschauung”, makes the Root Definition of the knowledge platform meaningful. Therefore, a well formulated Root Definition should make explicit reference to, and then be tested against, each of the six CATWOE elements (Customer, Actors, Transformation, Weltanschauung, Owner, and Environment).

6.3.2.4 **Stage 4: Developing Conceptual Model**

In this stage, the conceptual model is proposed. It is illustrated by the activity model and uses the eclectic approach. When the Root Definition is complete, precise and concise, the understanding gained from the definition of the situation in this form is used to build the conceptual model that details an ideal situation. A well constructed model incorporates all the activities which are necessary to fulfill the requirements of the Root Definition.

By comparing what is perceived to be the way things happen, including subtext and the full picture, with the conceptual model, it can then be revealed in the next step. Figure 6-9 illustrates the Root Definition, CATWOE and Conceptual Model.
ROOT DEFINITION - Knowledge Platform

A system owned by the Project Costing Team, who together with the IMS staff, Project Manager and QS Manager, are responsible various project cost and status information and data inputting into ERP system to update common knowledge platform for the use by the Directors, ... 

This is used to assist the top management and Project Manager in making future tender decision and project claims direction. This platform must be adapted from time to time and with expert assistance from other parties as appropriate. Task is taking place in a very demanding environment where the accuracy and consistency are very important because it will affect the tender, budget, corporate goals, profitability and sustainability of the organization.

CATWOE -

Customer: Directors, Contracts Manager
Actors: Project Manager, Q.S. Manager, Project Engineer, Site Q.S., Cost Clerk and IMS staff
Transformation: Project cost and status information and data are input into ERP system and convert to useful knowledge by consolidating together with details in the form of common knowledge platform which helps to make business decision.

Weltanschauung: Project information and knowledge are useful for future tender bidding and project claims direction - affect the profitability and sustainability of the organisation.
Owner: Project Costing Team
Environment: To meet quality, cost and time requirement; cope with project budget and corporate goals

CONCEPTUAL MODEL - Knowledge Platform

Figure 6-9 – Root Definition, CATWOE and Conceptual Model of Knowledge Platform
6.3.2.5  **Stage 5: Comparing “Conceptual Model” and “Rich Pictures”**

In Stage 5, the purpose is to stimulate debate by comparing the conceptual models of Stage 4 to the perceived reality outlined in Stage 2. In essence, this comparison stage provides the framework for a structured debate about improving a problem situation. Interviewees were asked the structured questions that emerged from the key actions and activities described in the conceptual model in Figure 6-9, considered against the rich picture in Figure 6-8. This step not only provides a reality check but also throws forth a challenge to the owners of the situation, to rethink and re-analyse underlying assumptions in order that a more creative and fulfilling outcome can be reached.

The comparison started initially at the level of the root definition, which acts to highlight important differences in perceptions amongst the interviewees. Particular attention was then given to any obvious differences between the conceptual model and the rich picture of the knowledge platform; thereby allowing a direct comparison with the relevant part of the conceptual model. The expected result is to indicate important areas where changes can be made to improve the performance of the knowledge platform.

In addition to simply posting model/real world differences, in the structured-interview setting, specific, stimulating questions were also asked of all interviewees, and responses were restricted to the range imposed by the researcher, often with the opportunity to qualify responses.

Interviewees were asked the following questions for each action and activity highlighted in the conceptual model:

- What actions and activities could be undertaken in relation to the knowledge platform?
- How could these actions be accomplished?
- How could the performance of these actions and activities be measured?
- Are there any improvements that could be made to the way the corresponding activities are undertaken?
- How are these actions and activities likely to be undertaken in the future?
- How would you prioritize these actions and activities?
The result of the discussion that was generated in this stage formed the basis for further actions in next stage.

6.3.2.6 **Stage 6: Developing List of Actions for Improvement**

The discussions in Stage 5 provide the starting point of this sixth stage: the development of a list of actions for the improvement of the knowledge platform. This may trigger changes to existing systems and procedures, and to the organizational culture. Therefore, the purpose of Stage 6 is to confirm which actions are both systemically and culturally viable and desirable; it implies that strategies for communicating the need for change should be an important part of any set of recommendations. Interviewees’ opinions on the first action list were obtained and reviewed against the existing knowledge platform process. Revised action lists were developed, with the subsidiary aim of reducing resistance to change. The iteration process was repeated four times, until all interviewees were satisfied with the recommendations.

The set of proposed actions and required activities compiled below (Table 6-2) is considered to be an appropriate and effective means of improving the knowledge platform formation process.
Table 6-2 – Actions and Activities to Improve Knowledge Platform

<table>
<thead>
<tr>
<th>Proposed Actions</th>
<th>Corresponding Required Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Implement good leadership to ensure the correct data is inputted for those report</td>
<td>1. Empower frontline staff: delegation of authority</td>
</tr>
<tr>
<td>2. Work closely with other stakeholder</td>
<td>2. Improve work flow procedure: multi inputting method</td>
</tr>
<tr>
<td>3. Share experience with other colleagues</td>
<td>3. Encourage experience sharing: lesson learning portal</td>
</tr>
<tr>
<td>4. Participate in the enhancement and development of the ERP system.</td>
<td>4. Integrate different system: 3D modeling</td>
</tr>
<tr>
<td>5. Streamline data input method</td>
<td>5. Streamline and improve reports: crystal report function</td>
</tr>
<tr>
<td>7. Train up data input staff</td>
<td>7. Involve top management: league table</td>
</tr>
<tr>
<td>8. Improve system user-friendliness</td>
<td>8. Upgrade system: resources requirement planning</td>
</tr>
<tr>
<td>10. Use bar coding system and universal coding system</td>
<td>10. Promote creativity; innovation competition</td>
</tr>
<tr>
<td>11. Set different security levels (internal users and external parties)</td>
<td>1. Empower frontline staff: delegation of authority</td>
</tr>
<tr>
<td>12. Make subcontractors to use our system</td>
<td>9. Integrate partnering: preferred subcontractors scheme</td>
</tr>
<tr>
<td>13. Allow user define report</td>
<td>5. Streamline and improve reports: crystal report function</td>
</tr>
<tr>
<td>14. Provide on-line interactive help context</td>
<td>11. Upgrade software and hardware</td>
</tr>
<tr>
<td>15. Report printing flexibility</td>
<td>11. Upgrade software and hardware</td>
</tr>
<tr>
<td>16. Upgrade software and hardware</td>
<td>11. Upgrade software and hardware</td>
</tr>
<tr>
<td>17. Select suitable partners: ERP knowledge, affordability of ERP system, willingness to use ERP system</td>
<td>12. Integrate with other organizational strategy</td>
</tr>
<tr>
<td>18. Take the viewpoints from the frontline users</td>
<td>1. Empower frontline staff: delegation of authority</td>
</tr>
<tr>
<td>19. Integrate with other system/software</td>
<td>11. Upgrade software and hardware</td>
</tr>
<tr>
<td>20. Reduce double-handling</td>
<td>13. Deploy gatekeeper to monitor process</td>
</tr>
</tbody>
</table>

**6.3.2.7 Stage 7: Leading to Action Research**

The final stage of SMM concerns the desirable and feasible actions to be taken to make changes and improve the process of forming the knowledge platform. SSM is the basis for reflective action learning, and the actions in Table 6-2 (above) will be discussed in detail in “Action Research” in the next chapter, which is perceived as a continuation of SSM. Particular attention will be paid to how effective leadership, impacted by national culture and organizational culture, will positively affect the course of proposed actions and required activities.

**6.4 Chapter Summary**

This is a very important chapter, linking the explored problems to a set of recommended actions. It summarizes the findings of the exploratory surveys in Chapter
5 and reformats them as a descriptive statement which forms the basis for Action Research in Chapter 7.

This chapter first discusses the purpose of using a descriptive study in this research project to present the findings and results of three exploratory surveys. Those surveys (of the ERP system, partnering strategy and leadership style) indicated their significance to the common knowledge platform, which is the theme of the ERP system. As shown in Figure 6-3, integration of the partnering strategy into the ERP system will enhance the power of the knowledge platform, with leadership style playing an important role.

As the knowledge platform in the ERP system has been determined to be the major business tool for decision-making that must be improved, SSM, as the descriptive tool, is used to unearth the inherent difficulties in doing this.

Then, to the discussion introduces the normal, existing process for the formation of the knowledge platform and details the seven stages of SSM to improve it. The first stage was to conduct interviews with two target groups and thereby consolidate the different practices in the knowledge platform formation process. Then, a rich picture was developed to present the problematic areas, including difficulties in inputting data and report generation. The next stage developed a root definition, CATWOE and conceptual model. By comparing the model with reality, interviewees were asked a set of structured questions to identify 20 actions and 10 activities that could be undertaken to improve the knowledge platform, including a prioritized list of recommendations for further action.

One of the major limitations of this descriptive research using SSM is that it may not be very useful to make inferences about the opinions and viewpoints of those staff who were not included in the interview sample, although every endeavour was tried to make the sampling comprehensive. Therefore, the continuation of this descriptive study is a more accurate interpretation and utilization of the actions proposed by the SSM.

The outcomes of SSM, although only descriptive in nature, can provide some fascinating insights and spark the curiosity for more in-depth action learning.
Therefore, further research might often be required; one possibility is action learning, which is discussed in the forthcoming chapter.
Chapter 7  Action Research

7.1  Introduction of the Chapter

There is a Chinese idiom “纸上谈兵” (zhǐ shàng tán bīng) – warfare on paper – which suggests that high-sounding words cannot solve practical problems. A general must do more than fight on paper and engage in idle theorizing; he should also translate theory into practical actions. This aphorism has particular application to the action learning which the theme of this chapter is.

As seen in Chapter 4, there are four phases in this research project. The diagnostic phase was the literature review (Phase 1) which explored matters related to the ERP system, supply chain arrangement and leadership style. Phase 2 comprised the three exploratory surveys, which sought to evaluate the facilitators and inhibitors of the ERP system by the CMM framework, to explore the conditions for a supply chain strategy and to identify an appropriate leadership style for the implementation. The descriptive study of Phase 3 concluded with “Action Planning” in the form of statements to describe a course of actions. The problems of ERP, partnering and leadership were clearly defined and the planning of actions for improvement by the SSM was completed. It was concluded that reporting is one of the major elements of the ERP system that is vital to assist management in making appropriate business decisions. This chapter will now discuss Phase 4 of the research project (see Figure 7-1), which is based on an “Action leaning cycle”. It will outline the actions that have been taken place and been observed in the case studied organization which were aimed at improving the ERP system and supply chain strategy by using an appropriate leadership style.
The structure of this chapter is as follows. For ease of presentation, the actions were divided into three parts, namely the ERP system, supply chain strategy and leadership style. These actions were taken to improve the effectiveness and efficiency of information and knowledge management system in ERP reporting, so as to assist decision-making and subsequently sharpen the competitive advantage of G-Force. These actions are summarized as:

- enhancement features of the ERP systems aimed at improving the knowledge platform;
- partnering strategy by using preferred subcontractor scheme; and
- safety leadership and innovation campaign to illustrate proper leadership style.

Interim results of the actions taken are also presented and discussed, and the chapter concludes with the implications of actions.

### 7.2 ERP – Enhancement Features

Action research is essentially collaborative, involving interaction with others (Coghlan and Brannick 2005), and is generally considered as research carried out, with a view to
improve a certain situation or process, by a team of professional action researchers and the members of organization or community seeking that improvement (Greenwood and Levin 1998). Therefore, the course of actions in this study focuses on improving the user-friendliness of the ERP systems by making it easier to use and making the reports which it produces more effective.

As identified in the last chapter on the descriptive study, the actions to improve the knowledge platform aim to generate an “effective and efficient information flow internally and externally”. G-Force has therefore introduced the following enhancements within the ERP system:

- Improved method of inputting data for reporting
- Deployed a gatekeeper to ensure that the ERP system is working consistently
- Improved transition bottleneck
- Use of “Crystal Report” to improve reporting
- Delegated limits of authority to subordinates
- Published a “League Table” to show time spent on the ERP system process
- Adopted the Resources Requirement Planning (RRP) to help resource planning
- Integrated with other software - the 3D Model
- Captured knowledge in the updating lesson learning portal

### 7.2.1 Inputting Data for Reporting

This activity was a response to items 2, 5, 7 and 14 as shown in Table 6-2. According to Yukl (1994), leaders should obtain and provide necessary resources and support. In this inputting task, staff were not supported and were unable to adequately fulfill their role. Bass and Stogdill (1990) confirmed that a transformational leader does not have to be a knowledge expert in a field to be competent, and McCauley and Van Velsor (2004) said that a good leader should be collective activity of organizational members to accomplish the tasks of setting direction, creating alignment, and gaining commitment. Bass (1990) added to that transformational leaders make the difference between
success and failure. If the top management does not want to see the ERP system rendered ineffective by this minor problem, they should align the system.

According to Liaquant, Jon et al. (2002), an ERP system can be rendered ineffective by being too “time-consuming” or by having excessive “features and complexity” which was long criticized and complained by some of the surveyed and interviewed participants. The top management would prefer on-line reports to know the financial status of every project in G-Force, however, in many case the inputting of a simple items of data requires staff to follow complex procedures which are difficult to learn and memorize. In addition, staff also required input large amounts data to the system to enable reports to be meaningful. For example data needs to be input by staff from a range of different departments, including Q.S., site clerk, Shenzhen finance department, concrete plant, and HR. Sometimes, however, staff are not allowed to input different kinds of data of the same category onto the same screen. A good deal of working time is therefore wasted in data inputting. Sometimes, provisional data cannot be reversed if the final figure is changed, in which case a new line has to be generated for such an adjustment and the database becomes larger and larger. Besides, inputting the same information to create this adjustment line is time-consuming and increases the workload. Every result and report in the ERP system involves “considerable effort”. Therefore, more user-friendliness is required for the system so that inputting data is no longer a burden.

The initial ERP system requires the staff to input the data for the monthly “Work Done by Resource” which is the lowest level of detail of the bills of quantities (BQ) and includes thousands of lines of data. One of the inputting staff said that there are 10,000 BQ items which break down to 70,000 resource lines. When staff assign cumulative work done, they can assign the data in terms of either percentage or quantity of the resources of the selected BQ item. The purpose of inputting work done by resources is to report the actual value of work done on a “resource basis”, without affecting other resources under the same BQ item. This function is beneficial to the sequencing of events or resources under the same BQ item, but staff often spend many hours inputting data line by line.
In order to reduce the time spent inputting data, the features of “Input Work Done Group” and “Input Work Done by BQ item” were introduced. “Work Done Group” is a group of BQ items that are likely to have the same cumulative work done as a percentage of work done in the interim valuation process. The Work done group number shall be created first and assigned to different BQ group working trades such as preliminaries, structures, etc. Staff must create the “Work Done Group” first before inputting the work done. When staff assign the cumulative work done by a percentage of a group of BQ items, the system will immediately apply it to the BQ items within the group, which saves a lot of data inputting time.

“Work Done Group”, staff can input “Work Done by BQ item”. When assigning cumulative work done by a BQ item, staff can assign the cumulative work done as a percentage or a quantity to a BQ item with or without work done group. If staff are doing that to a BQ item with work done group, the original data from work done group will be overridden.

These three features are run at the same time in the ERP system and staff are free to choose whichever feature or combination of features will best suit the project.

7.2.2 Deploying Gatekeeper to Monitor Consistent ERP Work

This activity, aimed at reducing double-handling in ERP was offered as a response to item 20, as proposed in Table 6-2.

According to Liaquant, Jon et al. (2002), the advantages of an ERP system include “avoiding data and operations redundancy”. Along the lines of Walker (2004) K-Adv concept requiring “People infrastructure”, G-Force is very keen on spreading KM through the ERP system. The examples of (Soliman and Youssef 1998; Scott and Kaindl 2000) reflected the success of an ERP improving productivity through the effective management of data and information. However, it is crucial to keep close monitoring and continuous improvement of production input, processes and output. A position of “Knowledge Manager” to perform the gate-keeping and monitoring function was required.
Since there are different training programs for users tutored by different trainers, each trainer had different perceptions of “best practice”, and the consequence is that different practices and methods are adopted by the users. For example, when the quantity surveyors sublet the package and require the work to be split. They can either form a new package from the existing packages or add a new variation package. Sometimes, a quantity surveyor forgets to attach the necessary information for the management review for an approval. Moreover, there are some practical problems amongst different users. The duty of the gatekeeper is to maintain standards and monitor the consistent operation of the ERP.

An interview was conducted with the key gatekeeper of the ERP system, who is Assistant Commercial Manager. Not only has he been working for G-Force for over 10 years, but he was also one of the members of the steering group that introduced of ERP system. In the interview, his main role was revealed as the auditing of the electronic submissions within ERP for compliance of company procedures and good commercial practice.

It is worth mentioning that only those subcontract-related submissions will pass through the gatekeeper. Such submissions fall into eight distinct groups:

- **Subcontractor Approval** - check for documentation in support of approval request of a new subcontractor so that an award may proceed with the selected subcontractor.

- **Subcontractor Work Scope Approval** - Check for documentation in support of the subcontractor's ability to perform the particular trade works.

- **Subcontractor Packaging and Award** - Check for support in respect of tender analysis, qualifications, varied terms and conditions and any pre-approvals in compliance with company procedures.

- **Subcontractor Payments** - Check for relevant support of payment recommendations including reasons for advance payment or non-payment.
Subcontractor Addenda - Check for support to change orders to original awarded subcontractor package.

Subcontractor Split Package - Check for support as to why the awarded package is being reduced and whether the subcontractor agrees to such change.

Subcontractor Termination - Check reasons for termination and proceed in the ERP system.

Subcontractor Final Account - Check for internal agreement to the final account, the subcontractor's signoff in full and final settlement, clearance of all provisions and that revised subcontract sum reconciles with the agreed final account.

Any non-conformances are reported back to the relevant quantity surveying team daily for appropriate action. When the quantity surveyors re-work and endorse the gatekeeper’s report, the submissions will be cleared. All re-submissions must pass through the gatekeeper.

This feature eliminates the time for re-doing of a submission process should there be any missing information as requested by the final approver (i.e. Senior Managers or Directors), and a new submission is no longer required (as the gatekeeper has already checked and satisfied that the essential information is attached in any submission for approval). The gatekeeper role also helps to reflect collective views and difficulties to top management on whether the ERP system should be modified or upgraded to suit operational needs. Observation reporting will also be summarized and issued monthly, with appropriate actions highlighted as required.
7.2.3 Improving Transition Bottleneck

This activity, aimed at improving the transition bottlenecks in ERP the improvement, was offered as a response to item 6, as proposed in Table 6-2.

Although Snowden (2006) pointed out that one of the major reasons for KM is to facilitate effective decision making, speedy knowledge transfer is also required. According to Liaquant, Jon et al. (2002), ERP systems which require continuous review and development are too time-consuming. As for knowledge transfer, Snowden (2006) proposed that the conception of knowledge as a manageable flow, not simply as an asset, presents exciting theoretical and practical opportunities. Therefore, any bottlenecks in the flow of information must be eliminated.

The cost code is used to organize the cost code structure to accommodate different people, reporting purposes, and business needs. The purpose of the tendering cost codes is simply to serve the tendering process and they are not structured for reporting purposes. However, the cost code structure for the project costing system resides within the organizational general accounting system and is commonly referred to as the chart of accounts or accounts in the general accounting system. The ERP system therefore links the project cost with the general accounting systems. Both systems share common database tables related to account information, and the account structure and account levels of detail for a project are directly related in each system.

Owing to the different coding systems, some time was spent to verify the codes during the transition, thus delaying reporting. Some projects required over a month to complete the transition, which not only affected payments to suppliers and subcontractors, but also delayed monthly costing and management reports. The IT department led a team comprising representatives from Estimating, Operations, Quantity Surveying, Finance and IT, which developed standard templates for each business that mapped the tendering cost codes to the simplified ERP system cost code structure. The standard templates come in two levels of detail - Basic and Expanded - which allows Directors to decide on the level of costing detail required on their projects.
Such templates enable staff to define a specific ledger for each project. What makes the coding structure effective for G-Force is that the project cost code has a direct relationship with those codes provided by the Estimating System. IT also incorporated these templates into the ERP transition program to speed up the transiting process. The system was tested and implemented in August 2006.

After a project is awarded, the estimating data is to be updated for all post tender final pricing adjustments. This data should also be adjusted to reflect any changes in the construction phase. Project staff will do this collectively, and the transited data is to be signed off by estimators and project staff. Only after sign-off is it transited into the ERP. The key performance indicator is the completion of the whole transit process within 4 weeks to enable project reporting. If the project has not been transited by the end of the 5th week after award, the project staff and estimator must report the exception and determine whether adjustment is required. This enhancement feature aims at relieving bottlenecks during transition.

7.2.4 Using “Crystal Report” Function

This activity, aimed at using better reports as a response to items 5, 13, 16 and 19, as proposed in Table 6-2.

According to Walker (2004), the ideal KM software should include compatible software applications to allow data and information to pass seamlessly across and to minimize multiple data entry. The concept of “Crystal reporting” fits, as it allows the data entered into the ERP system to be readily transferred to other systems.

Although the ERP system can already produce many different kinds of reports, staff are still required to prepare many supplementary reports manually to suit the specific financial situation of individual projects. Preparing some of those supplementary reports are extremely time-consuming. Many reports overlap and are a waste of time to prepare, because suitable reports already exist in ERP and, with simple format changes, would adequately meet the needs of different managers.
Crystal Reports were introduced into the ERP System as a supplementary reporting tool. Although the ERP system incorporates a standard reporting tool, it is a primitive one and cannot fulfill all the organization’s reporting requirements. For example, it is impossible to produce many the required management reports in suitable formats. Thus, a more sophisticated reporting tool was necessary. After evaluating a few reporting tools on the market, the ERP team selected Crystal Reports.

Crystal Reports is a world standard for desktop and web reporting. It easily creates simple reports and also has comprehensive tools to produce complex or specialized reports. Reports can be published in formats such as Adobe Acrobat (PDF), Excel and Word. This reporting function may be extended to a web-based platform for reporting, analysis and information delivery, which allows staff to view the report through a web browser. That is, everybody who can access the organization’s intranet can view Crystal Reports anywhere and at any time.

The Crystal Reports user manual is also posted on the intranet. This document shows staff how to access Crystal Reports via the Intranet, how to access and run reports, what to do with a report, and how to improve efficiency by setting preferences. Furthermore, it mentions the policies and restrictions on scheduling and user account. To improve the reporting efficiency and provide a better user experience, the ERP team has from time to time updated Crystal Reports to the latest version, with the newer features and different formats that people require. Correspondingly, a revised manual is also posted.

This change was skipped to minimize and reduce unnecessary steps, and to introduce new features that are helpful to users, including:

- Selection and sorting when looking for history report instances
- Rescheduling of reports making use of prior parameters
- Having the user manuals together with the reports
- Better screen layout with clearer options
7.2.5 Revising the “Delegation and Limits of Authority”

This activity is to revise the level of delegation as a response to items 1, 11 and 18, as proposed in Table 6-2.

According to Turner and Muller (2005), transformational leadership emphasizes Barnard’s cathetic roles and Aristotle’s pathos and ethos. It has also been linked to employee commitment to the organization (Barling, Weber et al. 1996). Goleman, Boyatzis et al. (2002) further believed that primal leadership operates through emotionally intelligent leaders, who can create a resonance within their followers. However, leadership has an inextricable link with power, as followers must be empowered to perform required duties. Wilkinson (1998) therefore suggested that empowerment is regarded as providing solutions to workplace problems, while Forrester (2000) argued that empowerment focuses on delegation and on passing power from higher organizational levels to lower ones. Empowerment also gives employees the independence to make decisions and commitments, instead of just suggesting them.

An organization’s most valuable resource is its people. It is impractical for any supervisor to handle all of the work of the department directly. In order to meet the organization's goals, focus on objectives, and ensure that all work is accomplished, supervisors must delegate authority. Delegation is the downward transfer of formal authority from superior to subordinate, where the latter is empowered to act for his/her supervisor, while the supervisor remains accountable for the outcome. Delegation of authority is a person-to-person relationship requiring trust, commitment, and contracting between the supervisor and the employee. By empowering employees who perform delegated jobs with the authority to manage those jobs, supervisors free themselves to manage more effectively.

One of the problems of the ERP system is the security gateway, which affects the clear flow of information and knowledge in the process. The delegation and limits of authority largely dictate the parameters of the security gateway. In order to speed up the communication flow, a team consisting of Procurement, Finance and IT addressed the need to provide consistent and adequate control of all procurement activities, using the ERP for approval instead of the mixed mode of manual paper and electronic approvals.
Another team consisting of Operations, Commercials, Finance and IMS has reviewed the bottlenecks and delays inherent in ERP approval routes and came up with a series of sensible suggestions including, delegating a significant number of relatively low value transaction approvals to project staff.

Eventually, consensus from the top management was obtained to revise the delegation and limits of authority to deal with low-level, high-frequency, and day-to-day transactions. The revised delegation and limits of authority are agreed, and posted on the intranet. For example, miscellaneous off-site purchase orders can be approved by project staff. However, higher-value orders must still be approved by fellow Directors and above in the ERP system at the same time.

Successfully training future supervisors means delegating authority. This gives employees the skills, experience, and confidence to develop themselves for higher positions. Delegation provides better managers and a higher degree of efficiency. Thus, collective effort, resulting in the organization's growth, is dependent on delegation of authority.

7.2.6 Publishing the “League Table”

This activity was offered as a response to item 7, as proposed in Table 6-2.

In the ERP system, the information flow and approval are done electronically, but delays in data and information flow are still experienced. One of the crucial reasons for this is the prolonged time spent by different approvers in the process. In order to encourage all of the users to improve the flow and approval process, an “Approvals League Table” was established. From the business perspective, it is also needed. For example, the organization is obliged to pay creditors within a specified timeframe, based upon the subcontract and purchase agreement. The purpose of league tables was to help the ERP system to excel.

League tables include procurement approval, subcontract approval, payment approval etc. and are maintained daily by IT staff checking the approval process in the ERP system. These tables represent key performance indicators (KPI) which help the
organization to streamline its work processes, and are updated, analyzed and posted on the intranet monthly. The statistics of all approvals, including, where completed, at which management level and over time, are checked. Every day, the time which each approver takes to complete his approval is recorded, distributed to the approvers and posted on the intranet. The monthly approval statistics are also analyzed annually. Also, to encourage the staff to approve in a timely fashion, a daily reminder is sent by email at 08:00 on every working day to approvers with outstanding approval requests.

For example, as part of the “One Team One Objective” initiative, the subcontractors’ approval process was monitored in October 2006. There were 1,438 approvals, 93% of which were approved within 3 days; and 51% on the same day. Previously, the average approval time had been 7-9 days. However, there were still 103 approvals which required 3 days or more. Later, in February 2007, the KPI showed that the elapsed times for approval had shortened by 46% to 48%, but disappointingly slow rates were still recorded for Subcontract Submissions and Approvals. For the month of April 2007, when compared with February 2007, it was taking 67% or 37 hours longer for subcontractor’s submissions, and 62% or 9.6 hours longer for subcontractor’s approvals. At this point it seemed that the introduction of the League Tables, was not improving approval times.

Dent and Montague (2004) considered the cultural barriers of the industry which combine to hinder any general implementation of improved KM. As demonstrated by Hofstede’s (1994) study and House, Javidan et al.’s (2002) GLOBE research based upon Hofstede’s work, Chinese culture tends to be collective. However, the ERP system of the studied organization is designed to improve accountability for speedy and streamlined procedures and to save time. The introduction of the “League Table” was in conflict with cultural mores.

This enhancement feature intends to help eliminating the bottlenecks in the approval process by delegating a significant number of relatively low-level transaction approvals to project staff. However, it is questionable that this feature can deliver perceived expectations. This is the result of an organizational cultural issue because project managers in order to satisfy the required timeline, they just simply reject/disapprove the submission for approval at the last minute and deny that additional information is
required. This intervention action can satisfy the “time” need, but create a lot of unnecessary resubmission. “League Table” does not assist improvement and requires further change / enhancement measures.

7.2.7 Adopting the Resources Requirement Planning (RRP)

This activity, aimed at adopting the Resources Requirement Planning (RRP) in ERP was offered as a response to items 9, 16 and 19, as proposed in Table 6-2.

One major concern, according to Liaquant, Jon et al. (2002), is the capability of extension and integration with the other “add-on” facilities. The RRP is also one of the features requested by the participants in Survey 1. This action was introduced to enhance the human resources planning capabilities, and it was intended that project and Human Resources Department (HR) will use the same codes for job types under the RRP.

The RRP will be done three times each year, usually in January, April and July. This RRP module will use the forecast data to analyze the future staff demand, which should be very useful not only for staff planning, but also as one of the criteria in making a tendering decision. Therefore, in order to have a full and accurate information of each project, the data and information input into the RRP forecasting program by each project must be correct. The existing ERP system is very capable in this matter, as it helps to check and validate the input forecast data and information of staff by comparing it with the existing data and information on current monthly cost reporting.

What this means for site staff is that in preparing the staffing forecast, the existing HR staff codes should be used. By utilizing common codes for Forecast and HR planning, management and ERP users can generate resources planning for different positions.

The RRP data is collected from rolling forecasts for each project. The steps required to complete the RRP are as follows:
• Forecast Staff for the project by individual position. This must include the job type code. To find out the job type codes, run the Staff Allocation List Report.
• Enter the staff (and code) in the rolling forecast. (Forecast).
• Run the RRP Staff Forecast Program to transfer the data from forecast to RRP.
• Run RRP Validation Report to verify if any staffing arrangement should be addressed.

With the completion of the quarterly manpower forecast, staff is then able to consolidate all the organization’s demand for staff by discipline and by job. The forecasts are compared with the supply of resources from HR and payroll records, and the reports are filed by discipline for easy reference.

If deeper report analysis is desired, this enhancement feature compares the demands for staff in the current quarterly forecast with previous quarterly forecasts.

7.2.8 Integrating the Three Dimensional (3D) Model

This activity, aimed at integrating the Three Dimensional (3D) model in ERP was offered as a response to item 4, as proposed in Table 6-2.

According to CIRC (2001), the construction industry is information-intensive. In view of the participation of multiple parties during the project delivery process, effective communication within the project team is crucial for successful project implementation. According to Smith and Betts (1999), the construction industry should strategically plan ICT innovation which can improve service and reduce cost (Bjornsson and Lundegard 1993). Froese, Rankin et al. (1997) also indicated that computer-assisted construction planning can improve information flow and KM. ICT’s support of information integration can also help to reduce errors (Anumba, Egbu et al. 2005). Recently, Aouad, Abbott et al. (2008) have also developed the “nD modelling” tool to help improve the decision-making process and construction performance. These arguments are also supported by the CIRC (2001), for example using CAD.
According to Duyshart, Walker, Mohamed and Hampson (2003), the success of National Museum of Australia Project demonstrates the use of a 3D modelling design tool which was critical to effective project delivery. This innovative idea allowed the architectural team to construct an internal and external full three-dimensional surface model of the building beyond normal means of construction documentation. The model communicated the three-dimensional intentions of design directly and precisely, eliminating the need to go through the two dimensional process time and time again. The process resulted in fewer errors and fewer abortive work by either designers or builders. This innovative approach allowed 3D design and construction information to be transferred throughout the construction project. To the best of the designer’s knowledge, the degree of integration throughout the team and in particular the use of accurate surface modelling, and the surface unfolding are both pioneering advances in Australia (Dent and Montague 2004).

G-Force is the leader in using a 3D modelling design tool in the Hong Kong building construction industry. In one of its pilot projects, all the consultants used 3D modelling software for their design work to achieve well-coordinated drawings that eliminated all clashes. This software aids design and construction processes and, using the 3D model, G-Force takes full advantage of the technology by adding time elements to generate a four dimensional model that is designed to improve project management efficiency and ensure the selection of optimal construction methods and sequences.

In the construction phase of that pilot project, the E&M team used the 3D model to facilitate the coordination of different work, as well as to prepare Combined Services Drawings (CSD), Combined Builder’s Work Drawings (CBWD), specialist sub-contractors’ shop drawings, fabrication drawings, etc. The key advantages of this model are in the areas of design coordination, identifying clashes prior to construction in order to minimize unnecessary work and waste, improving site management and reducing paperwork. The software also allows the design team to “construct the building many times” on the computer. All sorts of scenarios can be previewed and potential problems identified in advance in this simulation process, which performs such tasks as the production, transportation, handling and assembly of different construction components, including all the associated operational processes. All the variables affecting the construction processes, such as site layout, plant locations, rate
of machinery operation, quantities of resources, etc., can be considered in order to evaluate the feasibility of the proposed construction methods and sequences, and explore possible solutions and improvements to the methodology prior to actual work beginning. A perspective view of the pilot project prepared by the 3D model is illustrated in Figure 7-2.

![Figure 7-2 – 3D Perspective View of a Pilot Project](image)

The 3D model can also be used to monitor actual progress. By linking the master program to the 3D model, the planned construction sequence can be viewed easily. As the project progresses, the actual percentage of progress can be updated at regular intervals. If the project is on time, nothing will be highlighted, but if certain activities are ahead of or behind the planned schedule, they can be easily spotted. This can improve site communication, while helping to visualize and monitor work progress.

This 3D model can also generate quantities and save time on taking-off quantities from drawings. These measurements can be integrated into the bills of quantities of the ERP systems for reporting.

### 7.2.9 Updating the Lesson-Learning Portal

This activity was offered as a response to item 3, as proposed in Table 6-2.
Dent and Montague (2004) argued that the knowledge-sharing environment has significant implications for staff competencies. The purpose of the lesson-learning portal is to provide a platform for participants on various projects to share lessons learnt and knowledge gained. According to Zack (1999), knowledge can be characterized in many ways, but codified (explicit) knowledge can be effectively transferred with the support of an efficient ICT system. Some of the project and construction knowledge is regarded as difficult to transfer and lesson learnt should also be contextualized before being absorbed by future projects.

From the “Lesson-Learning Portal”, one of the lessons learnt, by the project manager, on a civil project is “Subcontractor Management”. As mentioned by the project manager, there were two major subcontractors employed on his project: one Europe-based and the other a big PRC subcontractor. He learnt that there were many differences in practice and culture including; variance of statutory requirements between different countries, different understanding and compliance of safety awareness, and that these issues must be closely monitored and contained. Since he had overlooked these factors at the early stage of the project, and time was lost in clarifying issues to avoid any misunderstanding.

The other team learnt through running a building project in Macau19. When operating a project in another region, success depends on in the capability of local skills and productivity, working hours, quality requirements and assurance, resources planning and work sequences.

19 Macau is a city located 60km from Hong Kong and has an area of 28.2 sq. It has been a Special Administrative Region (SAR) of the People's Republic of China since 20 December 1999, benefiting from the principle of "one country, two systems". The tiny SAR is growing in size, with many buildings on reclaimed land. Its biggest attraction is its gambling industry and casinos. In 2006, gambling revenues from Macau's casinos were for the first time greater than those of Las Vegas, making Macau the highest-volume gambling centre in the world. As a result, many casinos and hotels have been built since 2003, attracting many construction companies to tender for, and work in, Macau.
The major lesson learnt by a refurbishment project in an operating shopping mall was to not underestimate the complexity of addition and alternation (A&A) works. Project managers should liaise with all stakeholders, including property management team, shop tenants, consultants, subcontractors, suppliers and client. They all have their own agendas and effective communication with all of them is essential. Proper contingency plans must allow for sudden changes in any A&A works.

The fourth project is a mega infrastructural project where project teams learnt to combine innovative alternative construction methods with a suitable contractual arrangement, which initially pulled the project time forward. However, lengthy political approval procedures pushed the project times backward resulting in the project running late.

Ultimately, an ERP system should be capable of capturing everything that is learned from such experiences and transforming such useful information into knowledge which can be incorporated into management reporting. KM, supported by an effective ICT infrastructure, can facilitate competitive advantage in at least two ways - by generating a cost advantage or a differentiation advantage (Gupta, Surie et al. 2002). However, tacit knowledge is difficult to transfer and to codify, and it tends to remain in people’s minds. Making such knowledge more explicit is a major goal for the future.

7.3 Partnering – the SCM Process for Preferred Subcontractors

Gupta, Surie et al. (2002) distinguished South Asian cultures, including Hong Kong’s, as team-oriented, with an emphasis on societal relationships, which fits with a partnering strategy. According to Chan, Chan et al. (2003) extensive research in Hong Kong, partnering has many perceived benefits for the construction industry.

As concluded in Chapter 3: Literature Review, the partnering strategy is highly relevant in Hong Kong, and its construction industry. It was subsequently explored and analyzed in the second exploratory survey and descriptive study. The introduction of
this Preferred Subcontractors (PS) scheme was therefore offered as a response to item 12 and 17, as proposed in Table 6-2.

In the past, “Procurement” tended to be a backroom function that simply took orders from departments and placed them with suppliers, but now organizations are putting much greater emphasis on supply chain management (SCM). Subcontracting is common in the construction industry of Hong Kong. Effective and efficient subcontracting strategies are important to benefit the iron triangle of construction projects - costs, time and quality - which ultimately leads to success of any company. The studied organization understands that the success level of any construction project depends significantly on the basic philosophy of “the right contractor for the right project”. The selection of the most appropriate subcontractors and suppliers for a project is a crucial challenge faced by G-Force to derive the best value for money.

As world markets have increasingly experienced competition, organizations have discovered that traditional, adversarial relationships with suppliers have not allowed them to remain competitive (Treleven 1987). In response to this, the studied organization understands that they must form close partnerships with important subcontractors and suppliers, an approach which has produced significant managerial, technological and financial benefits.

Partnering is a two-way process, and should be viewed as providing mural benefits if it is to achieve its greatest value. Nonetheless, there are potential disadvantages with partnerships or single-source relationships, as in the case of a strike or production disruption at the single-sourced vendor facility. The biggest problem with partnerships occurs when both parties fail to distinguish the arrangement from simple time-quantity agreements; in such situations the partnership is invariably badly implemented and often results in a deterioration of the relationship between the parties (Presutti 1992). Therefore, the studied organization has carefully studied and considered its approach, prior to the implementation of a partnering strategy and its integration with the ERP systems.
7.3.1 Background

In too many cases, the work is not performed in the most cost-effective manner; the studied organization believes that in order to strengthen its competitive position, it must strive to improve its procedures, working relationships, cost-effectiveness, and performance. Contractors must learn to respond to the needs of the marketplace by providing the environments for, and capitalizing on, the synergies that will result from contractors, subcontractors and suppliers working together. Outsourcing is the act of transferring some of an organization’s internal activities to outside providers. The studied organization has a total annual turnover in the range of HK$2.5 billion, approximately 60% of which is outsourced to subcontractors, and represents the major part of the company’s business. These subcontractors and suppliers are obviously integral components of the organization’s business model. If the organization can successfully implement the partnering strategy in the SCM, it must benefit the organization’s competitiveness. G-Force therefore introduced the PS in January 2007.

However, not all the staff believe in this Preferred Subcontractor (PS) concept. In November 2006 and May 2007, two separate interviews were conducted with a Contracts Manager, who has been working in G-Force for 28 years. In the first interview, he suggested that partnering was not suitable in the construction industry, because partnering most suits high-tech and high-risk businesses that require much innovation and close relationships between partners to resolve complicated problems. He considered that the construction industry is relatively low-tech and does not require so much innovation and technology. The initiative of projects is simply based on clients’ requirements. Also, the workload fluctuates and it is so competitive that clients, contractors, subcontractors and suppliers cannot build up trusting relationships and accept a “low but competitive price”. He strongly believed that it was not viable to implement PS within the studied organization. In the second interview, after the review of the PS scheme has been undertaken for six months, he still maintained that view. However, he accepted that partnering will be the trend in the construction industry and in the company’s business strategy. The future challenge is to implement it swiftly, effectively and efficiently.
In another interview in February 2007, the Director of a traditional subcontractor for reinforcement fixing works expressed different concerns. He has been working for the studied organization for over 10 years, and for 20 years in the industry. He agreed to implement the PS scheme in the studied organization and promote the partnering strategy in the construction industry, because it can reduce “loss” in the competitive tendering process. However, he worried that his innovative ideas will be imitated and adopted, but his “low and competitive price” will not be accepted.

G-Force management hears the voices of concern and the following steps have been taken to address the issues:

- Review the past failure of partnering
- Point out the differences between partners and non-partners
- Enlighten the identified PS and staff so as to remove unnecessary resistance
- Encourage knowledge sharing – new technology, advanced construction methods, environmental friendliness, safe working procedures, innovation, etc.
- Integrate and synchronise ICT with the ERP systems to ease the import and export of data
- Introduce extranet platform for the PS, so that, for example partner can view subcontractors’ performance report and payment certification status online

Young engineers and relationship managers are deployed to share knowledge and skills and help to provide access to shared insights about their work practice (Wenger, McDermott et al. 2002). This is the concept of communities of practice (COP) as “groups of people informally bound together by shared expertise and passion for a joint enterprise” (Wenger and Snyder 2000, p139). The objectives for PS include:

- Improving existing systems and meeting increasing demands
- Attaining better cost-effectiveness and efficiency
- Increasing flexibility to respond to fluctuating demands
- Gaining access to new skills and technology in the marketplace
The overall strategy will be outlined in the next section.

7.3.2 Overall Strategy

The overall strategy is to bring in subcontractors and suppliers of the major trades within G-Force during the pre-construction estimating and tendering stage. This is expected to not only improve the project quality by better communication and project execution, but also to save time and money, especially in “design and build” (D&B) contract which suits the recent trend.

The pre-construction estimating and tendering stage is an important process and crucial for the organization’s business. Pre-construction tendering is the process by which this organization makes an early decision to further pursue an interest in a specific project. Its success depends on the team doing what needs to be done to gather sufficient knowledge about the project, most of which is from subcontractors and suppliers, in order to make the appropriate proceed-to-tender decision. The knowledge upon which such a decision is based, resides mainly in a tacit form in the heads of the subcontractors and suppliers. It involves making a decision whether or not to make a large financial commitment to tender for major projects, especially the D&B tender, that could vary from several tens of $millions to $1 billion plus in project value. With typical tender competition of 3-5 bidders for such projects, this process is strategically and operationally important for the profitability and sustainability of the organization. Any improvement in deployment of subcontractors’ and suppliers’ knowledge in this process will make a significant difference in winning tenders at an attractive profit margin. It also could conserve management energy to concentrate on the most “winnable” or strategic projects.

Those identified subcontractors and suppliers are named as “Preferred Subcontractors” (PS). They not only provide a steady low price which assists the organization’s competitiveness in pre-construction estimating and tendering, but also contribute expertise and professional advice of various trades in the tender.
7.3.3 Action Plan

In order to select the PS, an action plan is developed. The first step is to agree those trades and list of Subcontractors on whom the organization should focus for developing and assessing status / level of Supply Chain Partnering.

- Review the active subcontractors for the selected trades within the last three years
- Identify at preconstruction tender stage the preferred subcontractors or strategic subcontractors if the bid is successful
- Propose any new subcontractors active in the market

The second action is to collect all price data currently in the ERP system for current projects, recent tenders and previous projects and prepare a cost breakdown to build up a “Price Database” of the specific trade. In this stage, the powerful knowledge database generated by “Crystal Report Function” within the ERP system performs an important role. Then, “Intelligence and Innovative Ideas” from existing projects relating to the Subcontractors’ Supply Chains are collected, including those from Sub Sub-contractors that are being adopted, and the benefits they bring to the projects are recorded. In this stage, the successful stories in the “Lesson Learning Portal” provide a lot of useful information.

All the above data of “Price Database” and “Intelligence and Innovative Ideas” are analyzed by the committee comprising representatives from Pre-construction, Estimating, Tendering, Operations, Commercial and Safety Department, such that G-Force can begin to understand base unit rates, their build-ups, percentage spreads, cost drivers and sensitivities.

The following step is to conduct a Strategic/Preferred Subcontractor Assessment Interview, focusing on:

- Price
- Financial and Credit Checking
- Safety record
- Intelligence
• Environmental friendliness
• Innovation
• Integration into ERP system

It is then concluded with a recommendation of preferred status of Strategic / Preferred / Ordinary Subcontractor and approval and “Sign-Off” is sought from the top management on Supply Chain Status.

Subcontractors and suppliers with the PS status do not cut across the tendering process and subcontracting but this approach ensures that they are invited to tender for projects within their capability. For specific tenders, the identified PS in liaison with Pre-construction, Estimating and Tendering Managers will work together on the tender. They will help to analyze tender quotation for review of committed costing approach, value engineering etc.

In the beginning, the first PS appointed, was the petrol and diesel supplier. Fuel is the top consumable within G-Force, and the enormous increase is detrimental. However, by taking these actions so far, the PS fuel supplier is identified and not only a steady price is agreed. They will also provide first hand information on price trends of petroleum products, which assists the tendering decision.

The action for the SCM process for PS is not ended at this juncture but proceeds with continuous improvement and benchmarking exercises:

• Quarterly review meetings with Operation / Pre-construction / Commercial Department on performance of the Preferred Subcontractor.
• At the same time, workshop with preferred subcontractors to enhance communication, understanding and sharing of latest market information.
• Half-yearly Subcontractor Performance Appraisal will also be conducted and provide feedback to Operation on related areas like HSEQ, Financial & Commercial Department etc.
• Performance Appraisal Review Meeting with Preferred Subcontractor will be conducted, benchmarking with specific areas of performance and the trade performance.
• Management Audit on SCM process will be held to review Supply Chain Status.
• PS will be benchmarked with market rates to confirm competitiveness.

As far as knowledge management aspects, and IT and ICT issues for the ERP system, are concerned, the direct access to the ERP system by PS can shorten the data inputting time and facilitate reporting. It also promotes the knowledge-sharing environment in the bigger ICT platform. In a broad view, when the ERP system and partnering strategy are introduced to stakeholders, data can be shared amongst all parties with appropriate security control, and then all stakeholders can enjoy data-mining without a multiple data-handling process.

The ERP system and partnering strategy integration are concerned with implementing actions and improving business systems. As partnering is a sensible business strategy, it is worth while implementing. When it is done well, it will offer a win-win solution with sustainable benefits to G-Force and the PS. However, it requires a considerable amount of time to see its success and is beyond the horizon of this doctoral study.

7.4 Leadership – Steps Change

This activity was offered as a response to item 10 as proposed in Table 6-2.

There is another Chinese proverb “成也蕭何，敗也蕭何” (cheng ye xiao he, bai ye xiao he) which suggests that the success or failure of an undertaking is always due to one person. A leader’s decision is always a determinant. From the literature review, ERP systems help knowledge management (Zhang, Lee et al. 2005) and leadership is one of the most essential elements of success and the pre-requisite for successful and effective ERP implementation. Cowan, Gray et al. (1992) regard senior managers’ involvement in partnering strategy as crucial because they are the ones who formulate the strategy and direction of business activities, and their full support and commitment are vital for partnering success. Surveys 2 and 3 within the studied organization of the research also confirmed that the ERP system and partnering strategy are seen by respondents to be beneficial to G-Force. However, both strategies require the
promotion and support of an effective and efficient leadership. Leadership style is thus a key requirement for success.

According to Turner (1999), different cultural styles lead to different performance. Different cultures generally prefer different leadership styles, cultural values are primary influence on leaders’ practices, and culture has an impact on how leaders make decisions. The studied organization employs both local staff and expatriates from South Africa, the Middle East, France, Canada, Australia, and United Kingdom etc. Leaders of the organization live with the increasing pressures of globalization and should therefore strive to accommodate cross-cultural management practices. At the same time, different followers may prefer different leadership styles, either more democratic or more bureaucratic.

Delegation is also important in every business context, because leaders cannot make every decision and must rely on their subordinates. Empowerment is therefore seen as valuable in G-Force. Leaders and subordinates have to be empowered to develop new passions for excellence in their craft.

Using the ERP system is a change promoted by the leaders. In order to streamline the business process, the ERP system was introduced in 2002, because the leaders heard the voice of their followers. The efficiency of this ERP project relates to the structure and operation of the costing control systems within the boundaries of defined cost-efficiency and flexibility. Through automation the project was able to provide important project information to all stakeholders online, which included project status and financial information. With the aid of the new system, management has the tools available to closely monitor and control project performance, costs and revenues, labour hours another resources, provided that the project teams utilize the tools. Reflection of the use of tools is paramount to the success of any project The ERP system impacts on the customer by giving stakeholders within different department’s access to the above information in a timely manner and allowing for updates. To ascertain the status of an order, a user can log in to the ERP system and track it down. Staff and management benefit from the streamlined process by having access to specific information that affects the manner in which they operate within the boundaries of G-Force. The standardization of processes and the implementation of a
single, integrated computer system facilitate effective reporting. Deployment of standard business models facilitated by tools and process can save time, increase productivity and reduce headcount. Better use of ICT in knowledge management practices means that G-Force gains a competitive advantage over the other players in their industry. The principle enabler is the fact that in the new era, traditional means of gaining competitive advantages - cutting expenditures and driving revenue through reengineering - are not desirable. Management of knowledge to improve service delivery or decision-making may be the last source of competitive advantage; use of an ICT tool for better knowledge management and the ERP project is an obvious solution.

The leaders of G-Force understand that they must improve their response to the needs of the marketplace by providing the environments for, and capitalizing on the synergies that will result from, contractors, subcontractors and suppliers working together. Partnering calls for a relationship “guan xi (關係)”, which fits the culture of Chinese Hong Kong. Adopting a partnering strategy in the supply chain is the right direction to go. The SCM process for PS is therefore planned and implemented.

G-Force top management also recognises the importance of the knowledge platform for business decision making, so specific actions have been taken to improve it as per the above context:

- Improving data inputting to enable ERP reporting
- Deploying an ERP gatekeeper
- Improving the ERP transition bottleneck
- Using “Crystal Report” function
- Revising the level of delegation and limits of authority
- Publishing the “League table”
- Adopting the RRP
- Integrating the 3D Model into the ERP system
- Updating the “Lesson Learning Portal”
- Implementing the SCM process for PS

It is important that the leadership style will affect the interactions between the leaders and the followers, i.e. the power on the decisions and followers to execute. It also
impacts on the followers and the teams i.e. requiring trust and commitment from both of them. G-Force can achieve its goals (time, budget, quality, stakeholder satisfaction, and organizational success) both today and also in the future. Leadership can increase the successful rate of project delivery in G-Force.

From these actions, the leadership style can be viewed as “transformational leadership” which incorporates effective knowledge management as well as emotional intelligence. Individuals often need to move from being leaders to being followers, and back to being leaders. As projects change and different knowledge sets are needed, followers become leaders and leaders become followers. Transformational leadership is a concept that has come to prominence in the last two decades, and is also associated with terms such as ‘visionary’ and ‘charismatic’ leadership. It is associated with strong personal identification with the leader, the creation of a shared vision of the future, and a relationship between leaders and followers based on far more than just the simple exchange of rewards for compliance. According to Keegan and Den Hartog (2004), a transformational leader is also associated with higher levels of trust in the leader, on the part of subordinates, which in turn leads them to show so-called “organizational citizenship behaviors”. This is exemplified by the revised delegation limit of authority in the studied organization. Transformational leaders define the need for change, create new visions, mobilize commitment to these visions and transform individual followers and even whole organizations.

The following activities in G-Force are examples of improved currently promoted and mandated good leadership that are that fit proposed actions stemming from the SSM research outcomes:

- Safety Leadership
- Innovation Campaign

### 7.4.1 Safety Leadership

The studied organization shows its concern for its staff and believes a good leader always protects his/her followers. The most telling message from the work G-Force is doing in leadership is that those who take safety leadership seriously and excel in this area make good leaders in all aspects of their work. G-Force believes that quality,
technical excellence, progress and attractive financial returns are all outcomes of good safety management. Leadership is a key element in its drive for continuous safety improvement.

The organization developed a series of “Step Change in Safety” actions and key performance indicators for good changing progress is set and reviewed by top management periodically. This “Step Change” challenged the project teams and required them for a steady improvement. The top management believes that it will never be enough for the operating teams to rely on the Directors and Senior Manager of the projects to drive safety. The commitment must be shared by the project middle management and supervisory staff right through to the frontline. Project managers lead the charge in engaging middle management and promoting a bottom-up implementation of the safety culture. Construction projects are by nature high-risk activities; workers operate in dangerous working environments in which all participants, whether at senior leadership level, project operational level or front-line working level, need to place safety at the very top of their agendas. Workers’ lives depend upon the implementation of safe working practices and processes.

This organization remains absolutely committed to striving for an accident-free working environment. It has put much effort into safety and the “Step Change” program by promoting “see and act”, which the top management is convinced is the right track to success. Therefore, staff should always maintain their focus on fully implementing, at all levels within the projects, those actions arising from the “Step Change” commitment.

All staff members must therefore offer maximum effort and assistance to one another, constantly stressing the importance of safety and that it is everyone’s responsibility. Moreover, providing a safer workplace can generate many financial benefits, including savings in direct and indirect costs, fewer penalty fines and litigation claims, lower insurance premiums, and reduced medical expenses, and subcontractor’s costs, resulting from fewer accidents.

In order to share the mission of safety leadership, Safety Workshops were held in November 2006 and December 2007 respectively. Business partners, representatives
from major clients, the HKSAR Government Legislation Council, Works Bureau and academics from United Kingdom and Singapore, were invited to attend. Different practices and procedures were shared in the workshop, including formulation of statutory legislation, incorporation into tender documents, preparation for tender bids implementation of safety policies on-site and education of workers during construction works. Participants all agreed that safety is a mandatory concern. Messages of safety should be passed to each individual involved in the construction projects, from the project director down to every worker in the office or on-site.

Under such positive safety leadership, the company has produced a number of successes including a project in Singapore which has, as at May 2007, a record of over 2.5 million man-hours without a reportable accident and another hotel project in Macau with also 2.2 million man-hours recorded without an accident. All this confirms that exemplary levels of safety improvement can be achieved in the construction industry by appropriate “Safety Leadership”.

7.4.2 Innovation Campaign

Leaders must become innovation connoisseurs who can recognize good ideas. Marquardt and Berger (2000) suggested that leaders in the twenty-first century will need to be systems thinkers, or people who have the ability to see connections between issues, data, and the wider environment. In the practice of project management, more often than not companies are seeking people who demonstrate innovation ability. The authors introduce the notion of ‘servant leadership’, and a later work by Spears (1995) set forth the characteristics of a ‘servant leader’, which include listening, empathy, healing, awareness of self and others, persuasion, conceptualization, foresight, stewardship, commitment to the growth of people, and building community.

The studied organization’s innovation campaign has encouraged a lot of top-notch ideas, demonstrating that its staff possesses a wealth of talent and creativity. The other example to illustrate the transformational leadership is the promotion of the innovation campaign. In order to search out innovation, encourage commercially and technically excellent solutions, and tap into a broad range of staff knowledge and capability, G-Force has launched its innovation campaign inviting all staff to enter their bright
ideas. The entries are to be judged on their achievement of benefits in any or all of the following areas:

- **Profitability and Cost Saving** – the costs and savings involved in the innovation can be quantified so as to demonstrate a net positive impact on profit
- **Performance** – there are benefits to organizational resources e.g. staffing, materials, plant or investment
- **Efficiency and Productivity** – the innovative idea enables work to be completed quicker
- **Quality** – there is improvement to the final products that are sold, which has tangible benefits for clients
- **Safety** – the safety performance can be improved by adopting the idea
- **Environment** – the innovative idea assists the organization in complying with current environmental legislation, or produces other environmental benefits

The campaign is open to all staff of G-Force, subcontractors and suppliers, sponsored university students and scholarship holders in Mainland China. Entrants are expected to outline the areas and amount of benefit that they would hope to achieve by adoption of their ideas. These innovative ideas integrate and disseminate organizational and worldwide industrial innovation and knowledge. It is recognized that not all of the ideas will necessarily bring benefits in all categories.

Project managers should be sensitive to the needs of others, because it can improve outcomes. The more sensitive the leader is, the broader his/her perception will become, which can help to create a vision for people to follow, build the organization and improve performance. These leadership aspirational and planned improvements link to and could be intensified by leadership action plan changes identified by the SSM outcomes.
7.5 Interim Results of Actions Taken

The final results are well beyond the time limit available for completing the doctoral study. It is also beyond the scope of this research project to measure the ultimate performance after actions are taken to improve the ERP system and adopt partnering strategy, and it may not be feasible to quantify the results in financial terms. However, the following significantly positive outcomes have been observed up to June 2008:

- Winning the landmark project
- Being invited to an international safety conference

7.5.1 Winning the Landmark Project

In February 2008, G-Force allied with another contractor and G-Force is the head of the joint venture (JV) leading the tendering process for a large project in Hong Kong. This JV won a $5 billion design and build project for the government headquarters. The marking scheme for that tender weighted 60% of the scores to bidders’ “Quality Aspects”, this includes design and aesthetics; planning, sustainability and environmental aspects; function, quality assurance, safety and technical factors etc. Price accounted for the other 40% of the weighting.

Tenders were subjected to two stages of assessment to select the winning bidder. At Stage 1, the tenders were vetted against the mandatory requirements. At Stage 2, the tenders were assessed based on a pre-determined marking scheme. This assessment was carried out by a special selection board, with technical advice and support from a technical committee.

In allocating a score for the “Quality Aspects”, one of the foci was “Quality Assurance and Safety”. Tenderers were asked to prepare a specific quality plan, including quality policy and quality system. The organization’s knowledge management capability showed its strength in this area. The marking scheme also required tenderers to provide a specific safety plan including a policy statement, risk assessment procedures and proposals to address the risks identified. The organization’s outstanding record in safety leadership and performance was certainly an advantage.
The tendering process also called for the online Project Data Base System (PDMS) which was intended to be integrated with the HKSAR electronic filing system. The organization’s use of IT/ICT to manage its projects was definitely another advantage in this regard, because its knowledge platform has similar characteristics to the PDMS.

Tactically, the organization has a horizontally integrated partnership with another leading contractor which has current D&B experience. This relationship can not only assist in securing the tender qualification, but also enhance the chance of winning the job. Vertically, the JV also lined up with major E&M specialists, structural subcontractors and suppliers. The expertise and advice contributed by all of them absolutely contributed to the award of the tender.

As a whole, the ERP system assists knowledge management and procurement, and the Partnering strategy provides innovative ideas, so both the ERP system and partnering strategy of the company contributed positively to its final score.

7.5.2 Being Invited to the International Safety Conference

The organization’s commitment to, and continual development of, safety issues is reflected by its holding of Safety Workshops and Safety Conferences since 2005. These ongoing efforts have not only been enthusiastically supported by the local profession and experts, but also recognized by safety associations in other cities.

The Chief Executive and safety representatives of G-Force were invited to Singapore’s National Workplace Health and Safety Conference to present a keynote address and paper presentation in May 2007, which was a great honor for the company. At the conference, many successful examples of safety leadership efforts in Hong Kong and Singapore were illustrated. The presentation, titled “Designing for Construction Safety – a Contractor’s Perspective”, drew positive feedback from Singaporean and overseas delegates. This represented an acknowledgement of the company’s leading position in the importance of design work in safe construction and links to partnering and leadership desired outcomes highlighted by the SSM study part of this research. This linkage can be illustrated by the following incidents:
• G-Force top management stressed the selection criteria of the PS scheme in “Safety record”.
• The Chief Executive of G-Force has not only asked its employees, but also invited the subcontractors and suppliers to attend various safety workshops and conferences since 2005 and spread their safety mission.
• The leaders of G-Force also encouraged its project managers to share their safety experience by posting the best safety practices in the “Lesson Learning Portal” as indicated in item 7.2.9 above.

7.6 Chapter Summary
This chapter presents the author’s observations of the intervention actions taken by the studied organization to improve the ERP system in knowledge platform, the implementation of partnering strategy and exhibition of the transformational leadership style. The following Table 7-1 indicates what the intervention addressed and the final outcome was.
Table 7-1 – Summary of Intervention Actions and Outcomes

<table>
<thead>
<tr>
<th>Intervention Actions</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved method of inputting data for reporting</td>
<td>Successfully save the time consumed in inputting data</td>
</tr>
<tr>
<td>Deployed a gatekeeper</td>
<td>Successfully eliminate resubmission as works are much consistent</td>
</tr>
<tr>
<td>Improved transition bottleneck</td>
<td>Successfully relieve the transition bottleneck</td>
</tr>
<tr>
<td>Used “Crystal Report” to improve reporting</td>
<td>Successfully produce better reports</td>
</tr>
<tr>
<td>Delegated limits of authority to subordinates</td>
<td>Efficiently empower good staff</td>
</tr>
</tbody>
</table>
| Published a “League Table” to show time spent on ERP system process | a. Only speed up approval and satisfy the “time” need, but create much unnecessary resubmission  
|                                                           | b. Another intervention in a further cycle of the action research may be required but is beyond the scope of this research |
| Adopted the RRP to help resource planning                 | Efficiently provide better staff planning arrangement                     |
| Integrated with the 3D Modeling                           | Successfully integrate ERP with other system                              |
| Captured knowledge in the updating lesson learning portal | Successfully create a knowledge sharing platform                          |
| Introduced the Preferred Subcontractors scheme            | a. Successfully integrate ERP with PS (further/full advantages of this integration are out of the horizon of this research)  
|                                                           | b. PS have been adopted in the recent tendering and a $5 billion project was awarded |
| Undertook series of leadership step change activities     | Successfully build up a good transformational leadership image which is well recognized by the local industry and other countries |

The first section discussed the enhancement of ERP features which included improving data inputting to facilitate ERP reporting; improving the ERP transition bottleneck; using the “Crystal Report” function; revising the organization’s “Delegation and Limits of Authority”; publishing a “League Table”; adopting the RRP; integrating the 3D model into the ERP system; and updating the “Lesson Learning Portal”.

The second section introduced the background, overall partnering strategy and actions implemented by G-Force in the form of SCM process for PS.

The last section described how the leadership style of G-Force is transformational, which fits both the national and the organizational culture. This is illustrated by the example of the safety leadership and innovation campaign.

Most of the intervention actions successfully addressed the problems identified by the descriptive study in Chapter 6. The “Leagues Table” did not actually improve
performance, because it was the result of an organizational cultural issue that has now been identified, and could be addressed by another intervention, in a further cycle of the action research. However, the next round of action research is beyond the scope of this research.

An assessment of the ultimate performance of these actions is also beyond the time limit of this research project, improvement was recorded by good interim results, including the success of the tender for government headquarters and the invitation to, and subsequent performance at the international safety conference.
Chapter 8 Conclusion

8.1 Introduction of the Chapter

There is a famous Chinese proverb from Analects of Confucius 20 that “為政：「詩三百，一言以蔽之」” (wéi zhèng, shī sān bǎi, yī yán yī bì zhī); it translates as “the 300 verses of the Book of Odes can be summed up in a single phrase”. It is relevant to the requirement of a conclusion for a thesis and, accordingly, all the matters in this thesis are concluded in this chapter.

As well as summarizing the research project as such, there will be a brief discussion of the contribution of the research, to project management in general, and to the construction industry in particular. I also point out the inherent limitations of this research and suggest some further research opportunities. The chapter closes with a chapter summary.

8.2 Research Summary

As discussed in Chapter 1, the DPM programme is a combination of coursework and research. The research idea was generated from the study of the four core courses: Knowledge Management (KM), Project Management Leadership (PML) and Project Procurement and Ethics (PP&E). The initial objective of the research is to explore drivers and inhibitors that determine successful adoption and use of an ERP system at the actual implementation stage. Secondly, it aims to identify the successful factors of

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20 The Analects of Confucius (Chinese: 論語 “lún yǔ”), also known as the Analects, are a record of the words and acts of the central Chinese thinker and philosopher Confucius and his disciples, as well as the discussions they held. The Chinese title literally means “discussion over Confucius’ words.” This was written during the Spring and Autumn Period through the Warring States Period (ca. 479 BCE - 221 BCE). The Analects are the representative work of Confucianism and continue to have a tremendous influence on Chinese and East Asian thought and values today.
partnering strategy and its integration into the existing ERP system. The third objective is to investigate the appropriate leadership style that can influence the ERP system and partnering strategy, and to identify the impact of culture on the leadership style. The research was conducted within a Hong Kong construction organization.

The research topics are shown in Figure 1-2 of Chapter 1, which served as the basic structure for this thesis, and the proposition and questions are set forth in Section 1.3.1 as well. The mission of this thesis is to answer all these questions.

Before reviewing the literature, the macro-economic environment, construction industry and different management aspects are discussed in Chapter 2. In order to meet the research goal the next step was then to explore the existing literature, which is done in Chapter 3. Firstly, the review includes an introduction to the construction industry, especially how culture impacts on communication and increases the productivity of the construction industry. Next, there is a section reviewing the management aspects which affect knowledge management, including project management, construction management and information management systems. The review then concentrates on knowledge and management. Particular concern is placed on ways in which knowledge diffusion can overcome knowledge stickiness and on the importance of knowledge management systems in the enhancement of K-Adv. It then leads to the utilization of ICT tool – the ERP system to improve KM. Finally, the review turns to the importance of subcontracting and partnering in supply chain management in the Hong Kong construction industry. Clearly, leadership and culture also have an impact on a partnering strategy, so the last section of the literature review focuses on that impact.

The methodology is discussed in Chapter 4 of this thesis. It includes an assessment of different research options and the rationale for the final research design, which includes three exploratory surveys, a descriptive study and an actions observation. There is an introduction to the CMM approach and SSM tool used in the exploratory and descriptive phase of the research and, finally, a discussion of research ethics.

Chapter 5 reports the findings of three surveys on the ERP system, partnering strategy, and leadership and culture, exploring drivers and inhibitors of the implementation of the knowledge management system. The capability level is determined by using the
CMM approach which this gap analysis forms the basis for the suggested improvements.

The descriptive study, using the SSM tool, is presented in Chapter 6 and focuses on how the ERP system assists the formation of the knowledge platform. The findings of unstructured interviews with two target teams for improvement actions are presented, and actions are finally identified.

The actions taken are observed and presented in Chapter 7. They include a series of ERP enhancement features to improve the quality of knowledge flow and the formation of knowledge platform; adopting the SCM process for preferred subcontractors to improve knowledge diffusion; and showing a transformational leadership style by using the “Safety Step Change” and “Innovation Campaign”.

The goal of this thesis was to develop a successful model for using ERP in KM. The thesis concludes that although national culture impacts on organizational culture and affects leadership style, a partnering strategy integrated in the ERP system worked successfully to improve knowledge management. K-Adv was then sharpened and competitive advantage was enhanced. However, proper transformational leadership should be exercised, and is the ultimate determinant of the success of the ERP system and ensuring that a partnering strategy will function positively in a win-win way.

8.3 Contribution of this Thesis

A DPM thesis is expected to generate work of a publishable standard. The work of this thesis has resulted in the publication of 4 journal papers (2 in noted management journals and 2 for professional institutes); 2 papers have been presented in conferences and one paper is presently being reviewed by a professional institute. The papers have been published or presented in Australia, the United Kingdom, Malaysia and Hong Kong.

When I undertook the literature review for this thesis, I found numerous works, and theories, on the use of ICT, the adoption of KM and the leadership of different cultures in the PM. The difficulty, described by many authors, is in knowing the
inter-connections and relationships between all these theories by a detailed research back to a useful model. It is my hope that this thesis provides such a model for the benefit of others.

The contribution of this thesis can be summarized in two spheres:

- Implications for Project Management
- Implications for the Construction Industry

8.3.1 Implications for Project Management

There has been considerable research on the use of ICT to facilitate PM, and the increasing deployment of KM in PM. There is also no shortage of leadership and cultural theories in PM, or of reviews on the effect of partnering strategies on PM. However, there are few studies of the use of ERP systems in KM. Primarily, this thesis has attempted, from the PM perspective, to provide evidence, based upon a case study in a construction organization, which can be used for evaluating and improving KM, resulting in improved performance. Secondly, given the trend of globalization, there is a need for partnering in PM so as to address the needs of the various multi-cultural stakeholders. The secondary goal of this thesis is to discuss how national culture affects organizational culture in leadership and subsequently impacts on partnering strategy in PM.

8.3.1.1 The Ladder of ICT > ERP > KM > PM

KM is able to deliver improved efficiency, higher productivity and increased revenues in practically every business function by focusing on the organization’s core proprietary capabilities, processes and resources. ICT can help obtain, incorporate and diffuse knowledge within the organization, rather than it being held only by individuals. In the long term, KM provides competitive advantage over others.

The contribution of the thesis to project management theory rests therefore on its illustration of how knowledge has been managed within a construction organization. It is focused on explaining the role of ICT, in the form of the ERP system, which supports KM diffusion within a construction organization. There is a growing tendency to use ICT in PM and to use KM in PM e.g., use of the electronic document management
system (EDMS) in document control and communication. This thesis reinforces the successful use of one ICT tool – the ERP system - not only in information management, but also as a means of better project control. The studied case results indicate that the ERP system is especially good at reporting, which is very important in assisting business decision-making. An ERP system is not a KM system but a tool that reduces management effort in gathering, storing and using data or information so that more effort and creative energy can be devoted to analyzing and contextualizing project information and refining it into knowledge. So the significance of an ERP system being used is not indicative of a KM application being used, rather that the unburdening of administrative effort through effective ERP tools allows management energy to be directed towards knowledge-based activities of creating meaning out of information, transferring the significance of that meaning to others and using the refined knowledge to practically solve problems. This provides an encouraging and positive sign that people see the ERP system as a useful tool for sharing, disseminating, and utilizing data that can generate knowledge to facilitate sustainable knowledge advantage. In summary, the implication of this thesis to project management, in terms of ICT, is illustrated by the ladder of ICT > ERP > KM > PM (Figure 8-1).

![Figure 8-1 – The Ladder of ICT > ERP > KM > PM](image)

### 8.3.1.2 The Ladder of National Culture > Organizational Culture > Leadership > Partnering Strategy > PM

The art and science of PM includes the ability to manage different types of stakeholders and to determine how their needs might be best addressed. These needs are stakeholders’ interests and rights that may affect the organization’s decisions. It is widely accepted that the management and maintenance of harmonious relationships is
an essential part of successful PM. At the same time, partnering strategy also stresses the management and maintenance of relationship with stakeholders in the project. The different agendas of partners may include cost, time and quality. Therefore, a partnering strategy suits PM.

There are significant differences between Eastern and Western cultures. Eastern cultures are collectivistic in general, whilst Western cultures are more individualistic. These national cultures subsequently affect organizational cultures, and the differences have significant impact on leadership style. However leaders’ demonstration of effective PM skills can make partnering strategies succeed in any multi-cultural organizational setting. Based upon the case studied, my conclusion is that that partnering strategy, when supported by an appropriate transformational leadership style, can be implemented successfully in a multi-cultural organization. The construction industry, which has been a pioneer in project management practice, has been successfully adopting this sort of strategy for over 10 years at upper tiers of projects (i.e. between clients, consultants and main contractors). This case study further illustrates that it is also viable at lower tiers (i.e. between main contractors, subcontractors and suppliers). This thesis correspondingly paves the way for the use of such partnering strategies in other industries where PM practice applies, e.g. the IT industry. There is no reason why a partnering strategy cannot be adopted between designers and manufacturers in the management of IT projects.

In summary, the implication of this thesis to project management, in respect of partnering strategy, is illustrated by the ladder of National Culture > Organizational Culture > Leadership > Partnering Strategy > PM (Figure 8-2).
8.3.2 Implications for the Construction Industry

Little research has been carried out in the construction industry, let alone from the contractor’s perspective. KM research is relatively new in the construction industry and is not significant in Hong Kong. This research has considered the distinct culture of Hong Kong Chinese as it affects leadership and integrates partnering with the body of knowledge in the domain of ERP systems by effectively linking KM with reporting. This provides a strong case for employing KM in order to improve the K-Adv within the construction industry. This research was developed through an extensive cross-disciplinary literature review and the formation of a detailed and validated model that exhibits the effect of KM on developing organizational learning in order to transform an organization into a learning organization. This model provides a useful means of communicating and explaining to construction personnel how KM can be of service to their organization. During the research this effect was confirmed by research participants who indicated, on numerous occasions, that the model was extremely useful to them in enhancing their understanding of what KM could offer them.

The research has demonstrated in a practical way how SSM can be used for capturing, sharing and creating knowledge. Only one process was investigated in this thesis, but organizations can make use of the same method for other crucial processes. This could result in the development of knowledge repositories that could be used to train new staff and to make them familiar with existing practices within the organization.
The research has supported the view that people should be effectively integrated with the processes they use and the technology they employ to complete their job, and that KM is a way to facilitate this integration. This integration can be obtained through cultural change, resulting from the implementation of KM initiatives. The research has endeavored to bridge an identified gap between research and practice (academia and industry) by arguing that organizations need to work effectively in collaboration with knowledge sources (academia). It has also demonstrated how to further develop knowledge creation using SSM, and how this collaboration should provide stronger effective feedback from industry partners relating to the new knowledge they utilize or the problems they face. The resulting collaborative effort could, and should, lead to the development of new knowledge that industry requires.

8.3.2.1 KM in Construction Industry

Construction organizations should adopt KM in order to become more innovative and improve their productivity levels. The successful implementation of an ERP system in the leading construction organization studied in this thesis should provide a sufficient rationale for construction organizations to start adopting KM practices.

The construction industry needs to understand the drivers and inhibitors of KM, so that knowledge can become a dynamic resource and an asset that can bring business benefits to organizations. The more KM-based approach in the project, to gaining K-Adv, will form a sound basis for a successful leap towards a knowledge economy. It is absolutely better than just cutting corners (compromise quality, cut cost and compress program) blindly in the construction project.

8.3.2.2 ERP Systems in the Construction Industry

An organization’s knowledge assets can represent its defining and unique competitive advantage. It is important for construction organizations to improve the development and maintenance of their internal knowledge banks. This knowledge should be appropriately indexed and stored for employees to quickly retrieve and put to use. At the same time, a mechanism needs to be put in place using KM tools and techniques to capture knowledge from previous and existing projects. The development of a lesson-learnt portal in the ERP system becomes a major part of the internal knowledge
bank and assists management decision-making. It is also recognized as an important and valuable knowledge asset, produced as a by-product of solving problems, interacting with project participants and experimenting with innovation or adaptations of well-understood processes.

8.3.2.3 Partnering Strategies in the Construction Industry

Construction organizations should leverage the impact of their collaboration with external knowledge sources from partners – subcontractors and suppliers – to work together for innovation and to explore better construction methods to resolve the practical problems they face. This partnering strategy pulls the construction industry forward and it is therefore very important for organizations to interact with their partners about the knowledge they obtain, use and re-use through the ERP portal. An ERP system will help knowledge diffusion and help both parties to further refine and fine-tune the developed tools and techniques. The main point is that KM needs to be at the heart of this endeavour, so that practitioners and researchers will collaboratively work together forming a communities of practice COP (as suggested by (Wenger, McDermott et al. 2002)) and feedback from practitioners would become instant.

8.3.2.4 Cultural Impact in the Construction Industry

Construction organizations need to realize that strong integration of people with the processes they work with and the technology they use is important to ensure optimum utilization of the knowledge available in the organization. This integration could then create a further quest for knowledge that triggers organizations to procure knowledge from outside sources. Organizations need to develop a supporting culture which enables this.

Chinese culture is always viewed as collectivist, relying heavily on relationships and “Low-Context” communication. Traditionally, the construction industry is even more relational. In stark contrast, using ERP systems in knowledge management requires “High Context” Communication if knowledge diffusion is to proceed. These cultural differences influence KM, but if KM is the right direction to go and will benefit the K-Adv of the whole construction industry, the players in the industry must undergo considerable organizational cultural change. Leaders of construction organizations can
use the positive findings of this research to plan for the ICT, KM, ERP and partnering strategy.

8.4 Limitations of this Research

I must firstly accept here that the results from this research cannot be widely generalized. Data gathered in the surveys record the perceptions of participants about issues raised in questions and so they remain relevant to the context within which they are placed but that context will vary elsewhere. It is a fact that many other organizations use different ICT and KM backbone tools to the ERP system, therefore, this result cannot be automatically applied to the practices of those organizations. Also, it was not feasible to interview all employees of the studied organization (or any employees of the partnered supply chain organizations). Thus, the study sought to investigate only known relevant participants and the choice of respondents depended upon their availability and willingness to participate. Every effort was made to ensure that representative groups and individuals were chosen.

The research was undertaken between May 2006 and February 2008, during the DPM programme. Due to the limited of time-frame of this research, the author could only observe the actions taken and was not able to investigate further action cycles. The scope of the research study was limited to exploring, describing and taking action relating to the financing feature of the ERP system, and does not cover the other features of this system, e.g. estimating and tendering. Such features could also influence the impact of partnering and leadership, but would need to be addressed separately.

However, the results in this research revealed some other interesting issues that are worthy of further investigation.

8.4.1 Leadership, Power and KM

Within the context of this study, leadership and power are two sides of the same coin, and they are the subject of many studies. The Hong Kong construction industry is very traditional, and this study supports the view that management relies very much on
power. Clients use reward power to influence the contractors to comply in order to obtain rewards from them. Architects exercise expert power to make contractors comply because they believe that architects have special knowledge about the best way to complete a project. Subcontractors comply because they know that main contractors have the right to make a request and they have the obligation to comply. According to Rowlinson et al. (1993), Chinese culture has a major influence on the leadership style adopted by construction project managers and the preferred power exerted over their subordinates. Clearly, leadership style and power are viewed as relational. Hall and Hall (1990) describe how different cultures communicate effectively in different ways. “High context” cultures, like the Japanese, rely heavily upon relationships, compared with “Low context” cultures, like the Americans, who rely upon contracts. On the other hand, KM stresses communication through collaboration, which seems intuitively different from communication via power and influence. Research is also warranted on the impact of transformational leadership on the health and well-being of employees, beyond organizational satisfaction and commitment. Transformational leaders are crucial as motivators in organizations. Some studies have indicated the importance of transformational leadership in other cultures. Further research on the impact of cultural differences on leadership/power influencing KM would be valuable.

8.4.2 Integration with Other Systems

The Hong Kong construction industry, in particular, is experiencing an increasing demand for ICT and IT, and an emerging project procurement paradigm shift from operating as a stand-alone group of organizations, towards a more closely-knit supply chain. After the CIRC report (2001), the public sector is actively promoting this approach and using smart-card site access control and e-tendering. This promises better recording and control of worker attendance, and improved coordination and integration of activity flow between project participants (designers and tenderers).

Smart-card access has formed the basis of payroll recording for construction workers employed in public works in Hong Kong. Contractors in Hong Kong provide and operate an attendance recording system comprising smart-card cum biometric authentication to record and verify the information of all site personnel entering and leaving the site. Once the system is in operation, no persons are allowed to work on the
site without a smart-card. Contractors compile daily records of the personnel working on the site, based on the data collected by the smart-card system, and are required to prepare the respective schedules of wages of the site personnel employed based on the verified data from the smart-card system.

An Electronic Tendering System (ETS) has been used by the HKSAR and it provides a secure electronic means, with the use of Internet technologies, for handling tender and related matters. The ETS provides services 24 hours a day, 7 days a week, and is an electronic means for delivering the following services:

- Notification of tenders
- Downloading of tender documents
- Receiving and responding to enquiries
- Submission of tender offers
- Contract award notices

With the ETS, the purchasing process is swifter and more responsive. The HKSAR can reach a much wider range of potential bidders so that more competitive bids may be obtained. Companies will be able to submit their tender offers electronically through a system that will receive their information securely and authenticate their identity. Their bids will be kept encrypted until the tender opening time. This is a cost-efficient method of obtaining tender documentation and submitting tender offers. Tenderers will gain real-time access to information and more time to prepare their bids, as transmission will be instantaneous.

In the private sector of Hong Kong, 3D modelling is now being used to assist coordination and measurements. It benefits those participating in project alliances and others critical to project delivery. This useful tool allows the architectural team to construct an internal and external full 3D surface model of the building beyond normal means of construction documentation. The model communicates the 3D intentions of design directly and precisely and does not need to go through the two-dimensional process repeatedly. The process has resulted in fewer errors and abortive works, on the part of both designers and builders. This innovative approach is also used to measure
the quantities of the work, which not only eliminates tedious measurement exercises, but also provides an accurate bill of quantities for tendering purposes.

ICT innovation can support communication, management information and document exchanges within and among project members. The e-tendering, smart card, ETS and 3D modelling will be very powerful if these can be integrated into the pipeline, but have not been successfully incorporated at this stage. ERP has proved in this research to be a useful tool in the construction industry, further study of how a stand-alone system (e.g. ERP) integrating with other ICT/IT systems/tools proves viable.

8.4.3 Application of ERP as KM Tool in Other Industries

ERP systems are one of the most widely accepted choices to obtain competitive advantage for manufacturing companies. According to a report by CCID (2004), ERP sales in Mainland China reached US$226.9 million in 2003, and will reach US$652.8 million in 2008, at an estimated growth rate of 23.5% over the next 5 years. Significant benefits such as improved customer service, better production scheduling, and reduced manufacturing costs can accrue from successful implementation of ERP systems (Ang, Sum et al. 1995). However, they have not been used successfully as a KM tool.

Not only are construction companies operating in changing environments, but the industry is experiencing an emerging project procurement paradigm shift from operating as a stand-alone group of organizations, towards a more closely-knit supply chain. An effective use of an ERP system is one of the most helpful tools that can be deployed because it is able to assist in handling a lot of data and information, which can obviously improve communication at each project phase. This thesis concluded that the impact of leadership and power on the formulation and implementation of strategies is significant. The cultural impact on leadership and power in decision-making is also noteworthy.

It is therefore worthwhile to investigate the possibility of applying ERP as a KM tool in other industries.
8.5 Further Research

This study has its limitations that have been disclosed and discussed. These potential gaps in producing a study of how the ERP system has been deployed within G-Force and its partners forms the basis of suggested further study. This thesis and the study undertaken were necessarily limited in scope by it being undertaken by one individual within one organization in one location. Further work could replicate this study’s approach across G-Force to see how results and conclusions may be modified with a broader set of main offices being investigated. Results from offices within mainland China, Singapore and other parts of Asia could be compared, similarly comparisons could be made with other offices outside of the dominant Confucian culture. The degree of cross-office learning could be investigated. Further, the integration of G-Force’s ERP with its major participating supply chain partners, with a focus on these organization’s perspectives, could be a valuable research project. Alternatively, a more general ERP deployment study across a larger sample of contractors could be undertaken by adapting the research design developed through this thesis.

8.6 Chapter Summary

This chapter has provided a summary of research findings and put them together to answer the research questions identified in Chapter 1. The chapter has also discussed the implications of the research from an academic and practical point of view. These implications are summarized in relation to project management, and to the construction industry. As far as project management is concerned, this research proves that an effective ICT tool – the ERP system – assists KM and benefits PM. Although national cultures affect organizational cultures and therefore have an influence on leadership and the partnering strategy in PM, this research proves that a partnering strategy is successful in PM (in the construction industry) and can be applied in other industries adopting PM (e.g. IT) as well.

From the construction industry perspective, this research helps to prove the success of adopting KM by using an ERP system which can be integrated with the partnering strategy in the construction industry. It is important to reduce time and maintain low costs, without compromising quality, by better harnessing the K-Adv. of the
organization. It also raises the importance of cultural elements of the traditionally collectivistic construction industry, which senior management should take into account when planning and formulating business strategies.

Finally, this chapter has pointed out the study’s inherent limitation, presented a number of recommendations that have arisen from this thesis and also indicated several potential future directions of research emanating from this research.
Chapter 9  Bibliography and Appendix

9.1  Introduction of the Chapter

There is a Chinese idiom “引經據典” (yǐn jīng jù diǎn) which emphasizes the importance of the quotation and citation of useful references in the research work. Therefore, references used and cited in this thesis are presented hereunder.

In addition, the following relevant information for this thesis is also appended in this chapter:

- Introduction of professional bodies that the author attached to (Appendix A)
- Background information of the case study organization (Appendix B)
- Ethics approval of this research work by the RMIT University (Appendix C)
- Survey questionnaires and analysis for three pilot surveys: ERP System (Appendix D), Partnering (Appendix E) and Leadership (Appendix F)
9.2 References


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9.3 Appendix A - Professional Bodies

Royal Institution of Chartered Surveyors (RICS)
RICS is one of the most respected and high profile global ‘standards and membership’ organizations for professionals involved in land, property, construction and environmental issues. In 2009, RICS have:

- Over 140 years history and been chartered in 1881;
- 136 years of representing property professionalism;
- 120,000 members across 146 countries worldwide;
- 400 degree-level courses approved worldwide;
- 500 research and policy papers published per year;
- 50 national associations, linked groups and societies and
- 160 diverse ‘specialisms’ – represented across 16 ‘faculties’.

RICS members are called property professionals, and services are diverse. Not only are they experts in all matters relating to real estate and construction, but they can also offer strategic advice in the economics, valuation, finance, investment and management of all the world’s physical assets: from the construction of major public buildings to surveying the seabed, from managing large property portfolios to auctioning antiques.
Chartered Institute of Building (CIOB)

With over 42,000 members, the CIOB is the international voice of the building professional, representing an unequalled body of knowledge concerning the management of the total building process. CIOB members are skilled managers and professionals with a common commitment to achieving and maintaining the highest possible standards. Chartered Member status is recognized internationally as the mark of a true professional in the construction industry. With its increasing international membership and growing profile in the United Kingdom, the CIOB is making a hugely influential contribution to one of the world's most important industries.

Chartered members are amongst the most highly regarded professionals working throughout the international construction industry. They represent the wide diversity of roles within the construction industry and promote the delivery of high work standards and values. From a wide range of professional disciplines working within building and construction supply chains, the membership includes clients, consultants and contractors as well specialists in regulation, research and education. This provides a pool of specialist knowledge which informs the way in which the industry develops.
**Australian Institute of Quantity Surveyors (AIQS)**

The AIQS is the regulatory body of the profession. As the latest annual report in 2006, there were 3,675 members of which 1,086 members were from overseas. Through its leadership, standards and code of ethics, it ensures that practising Quantity Surveyors are dedicated to maintaining the highest standards of professional excellence. Membership of the Institute is restricted to those with appropriate educational qualifications and who have demonstrated the required level of professional competence after a statutory work experience period. Corporate membership is open to Quantity Surveyors, Building or Construction Economists, Cost Engineers, Cost Estimators and others with appropriate degree qualifications. The Institute is a national organization with Chapters and Divisions in all States and Territories. As the Quantity Surveyor is an important member of the building and construction team, AIQS is an active participant in all the industry major forums and lobby groups, e.g. The Australian Council of Building Design Professions, the Australian Construction Industry Forum and the Australian Council of Professions.

The Institute plays an important role in industry research through the collection of cost data and the publishing of the Current Construction Costs. It also publishes, “The Australian Standard Method of Measurement of Building Works (5th Edition)” and cooperates with tertiary institutions on research programs.
**Hong Kong Institute of Surveyors (HKIS)**

The Hong Kong Institute of Surveyors is established in 1984, is the only professional organization representing the surveying profession in Hong Kong. As of 27 November 2008, the number of members reached 7,300, of which 4,600 were corporate members, about 310 were students; over 2,000 were Technical Associates, probationers, and technical trainees. The Institute's work includes setting standards for professional services and performance, establishing codes of ethics, determining requirements for admission as professional surveyors, and encouraging members to upgrade skills through continuing professional development.

HKIS has an important consultative role in government policy making and on issues affecting the profession. These include advising the HKSAR Government on issues such as unauthorized building works, building safety campaign, problems of property management, town planning and development strategies, construction quality and housing problems. The Institute also works on amendments to standard forms of building contract and has issued guidance notes on floor area measurement methods.

The Institute has an established presence in the international arenas, have overseas connections, and have entered into reciprocal agreements with professional surveying and valuation institutes in the United Kingdom, Australia and Singapore recognizing the counterpart's member's qualifications.
9.4 Appendix B - Organizational Background

According to Coghlan and Brannick (2000), pre-understanding of the studied organization is important to action research. Gummesson referred pre-understanding of such things as people’s knowledge, insights and experience before engaging into the research programme. These things are about the understanding of organizational dynamics, and also is the lived experience of the organization.

The organization studied is one of the Group C approved contractors for public works of HKSAR and eligible for all five public work categories. By the late 1970s, it was a local expertise in piling, foundations, substructures, tunneling, bridges, building, marine works and water storage schemes and has gradually established itself as a leading contractor in Hong Kong. Today, the organization maintains approximately 11% of the market share out of the total HK$24 billion.

In 2007, the organization celebrates its 50 years anniversary. As one of the leading construction companies in Asia, the organization’s activities span the entire spectrum of building, civil engineering, foundation work, electrical and mechanical works as well as construction services. This organization employs approximately 2,000 full-time staff, more than 50% of which have a diploma or higher academic qualification,

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21 Companies in the List of Approved Contractors for Public Works (HKSAR) may tender for public works contracts only in the works categories and groups for which they are approved, where ‘A’ denotes Group A for contracts of value up to HK$20 million, ‘B’ denotes Group B for contracts of value up to HK$50 million and ‘C’ denotes Group C for contracts of any values exceeding HK$50 million. The five work categories are: Buildings, Port Works, Roads and Drainage, Site Formation and Waterworks. Totally, 265 companies were in those three groups and 107 appear in the Group C on 31st May 2007. Only six contractors were in the entire Group ‘C’ list and eligible for those five work categories. The studied organization was one amongst the six.

22 As of 2004, the total construction industry GDP was HK$40 billion including various foundation, civil, building construction, building services, retrofitting and maintenance work. The organization’s business relates to 60% of it i.e. HK$24 billion annually.
including 450 professional engineers and builders. This is one of most experienced technical teams in Asia. The organization studied has built a wide range of construction projects in Asia and is Hong Kong leading construction contractor.

The organization’s headquarters is in Hong Kong and it operates throughout Mainland China and Southeast Asia. It began to expand business outside Hong Kong in 1980, establishing offices in Singapore and Malaysia. This overseas business has grown significantly, particularly in China and Singapore. There are regional offices in the following cities:

- The organization studied has been operating in the PRC since 1981 and has supporting offices in Shanghai, Beijing and Shenzhen.
- The Singapore office was set up in 1984 and the organization has been active in the Association of Southeast Asian Nations (ASEAN) region since 1980 when it established offices in Malaysia, Thailand, Vietnam, the Philippines, Taiwan and Indonesia. Now there are subsidiaries in Singapore, Bangkok (Thailand), Hanoi (Vietnam) and Pesaka (Malaysia).

A detailed studied organizational structure chart of the studied organization, as at 2006, is shown as Figure 9-1:
The organization’s studied has a total annual turnover was in the range of HK$2.5 billion in 2005. The organization’s culture indicates that it appreciates the importance of KM. The company’s ethos reinforces an attitude that it is unwise to compete with others by purely cutting costs and compromising quality, rather, it is more effective to sharpen its own knowledge advantage to derive a differentiate itself based upon a service quality and effectiveness (rather than cost-efficiency) competitive advantage. The studied organization is the first known construction organization using the ERP system.
### 9.5 Appendix C - Ethics Approval

#### 2005 Application for ethics approval of research involving human participants

1. This form is to be used by Masters, PhD and academic staff undertaking research in the ‘Risk level 1’ and ‘Risk level 2’ categories as described in the accompanying guidelines. All applications must be completed by filling out this form in its electronic version and printing it out. ‘Risk level 3’ applications must be completed on the RMIT Human Research Ethics Committee form available at [http://www.rmit.edu.au/council/hrec](http://www.rmit.edu.au/council/hrec).

2. This form is available through research administrative staff in your school or on your school web page. Please insert the version number and date in the footer of the document.

#### Section A: Approvals and declarations

1. **Project Title:** Organisational culture and Project Management (PM) issues when attempting to use an Enterprise Resource Planning (ERP) System in a project supply chain

<table>
<thead>
<tr>
<th>Research Degree</th>
<th>Staff Research Project</th>
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<tr>
<td>Complete this column if you are undertaking research for a research degree at RMIT or another university (Masten/PhD)</td>
<td>Complete this column if your research is not for any degree.</td>
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</table>

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Principal investigator</th>
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<tbody>
<tr>
<td>Name: Eric Chan</td>
<td>Name:</td>
</tr>
<tr>
<td>Student No: 3121356</td>
<td>Qualifications:</td>
</tr>
<tr>
<td>Qualifications: MRICS, MCIOB, MHKIS, AAIQS, MBA</td>
<td>School:</td>
</tr>
<tr>
<td>School: School of Property, Construction and Project Management</td>
<td>Phone:</td>
</tr>
<tr>
<td>Address: 2/25, Bales Street, Mount Waverley, VIC 3149, Melbourne, Australia</td>
<td>Email:</td>
</tr>
<tr>
<td>Phone: 61-3-9807-6975</td>
<td><a href="mailto:eric_wl_chan@yahoo.com.hk">eric_wl_chan@yahoo.com.hk</a></td>
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</tbody>
</table>

Degree for which Research is undertaken: Doctor of Project Management

<table>
<thead>
<tr>
<th>Senior Supervisor</th>
<th>Other Investigator/s</th>
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<tbody>
<tr>
<td>Name: Professor Derek Walker</td>
<td>Name/s: Dr Anthony Mills</td>
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<tr>
<td>Qualifications: PhD</td>
<td>Qualifications: PhD</td>
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<td>School: School of Property, Construction and Project Management</td>
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<td>Phone: 61 – 3-9925-3908</td>
<td>Phone: 61 – 3-9925-2238</td>
</tr>
<tr>
<td>Email: <a href="mailto:Derek.walker@rmit.edu.au">Derek.walker@rmit.edu.au</a></td>
<td>Email: <a href="mailto:Anthony.mills@rmit.edu.au">Anthony.mills@rmit.edu.au</a></td>
</tr>
</tbody>
</table>
2. Declaration by the investigator(s)

I/We, the undersigned, accept responsibility for the ethical conduct of the research detailed below.

Signed: Eric Chan                     Date: 28 March, 2006
(Signature of investigator)

Signed:                                      Date:                        
(Signature of senior supervisor if applicable)

3. Declaration by the Head of School/Centre

The research project set out in the attached application, including the adequacy of its research design and compliance with recognised ethical standards, has the approval of the School/Portfolio. I certify that I am prepared to have this project undertaken in my School/Centre/Unit.

Signed:                                      Date:
(Signature of Head of School or approved delegate)

Comments:

School/Centre: ___________________________ Extn: ___________________________

Section B: Project particulars

NB: The numbered bolded headings in this form must remain in your completed application for ethics approval. Please leave these headings and delete the detailed guidelines as you go through and complete the form. If a heading is not relevant write 'Not applicable' underneath it.

1. Title of Project

Organisational culture and Project Management (PM) issues when attempting to use an Enterprise Resource Planning (ERP) System performance in a project supply chain.

2. Project description: for HREC assessment of ethical issues

The aim of the research is to identify factors affecting the differences between high-level expectations and actual outcomes of an ERP system used for the costing control function. Differences may be due to implementation difficulties at both the operation level within the major HK construction contractor studied and across its supply chain.

Research questions will be formulated and finalized as part of the research preparation. These questions would be open-ended developed from the specific theoretical areas of Project Management Leadership and Knowledge Management.

The theoretical and general information components are to be undertaken by a literature research in those relevant areas of study. Works of experts in those areas will be reviewed, compared, and contrasted to provide the foundations of knowledge within those areas.

Qualitative methods using several (2 or more) surveys will be used with follow up interviews. The form of these is consistent with the questionnaire provided in Appendix 4. A survey questionnaire will be used to gather data, initially on perceptions of ERP use. Subsequent survey instrument will be developed with specific question for supply chain partnering perceptions and for leadership style perceptions. Each of these will remain consistent with questions presented in Appendix 4.

At least ten of the 100 potential respondents will be asked to complete the questionnaire in survey 1 and 3 and about 50 in the supply chain member survey. Survey work is expected to reveal broad indicative issues that will prompt rich and deep exploratory questions to be undertaken with colleagues in the face-to-face interviews that follow each survey. Open-ended question interviews are to be conducted, as necessary, in areas where multiple perspectives on a topic are essential for drawing valid conclusions on matters. During the survey research stage, questionnaires will be sent through email to the selected sample. The researcher will maintain in constant communication and follow-up with the respondents to prevent any delay in the response and to validate any ambiguous results. The attached Appendix 4 provides an indication of the first pilot test survey study. The study will involve: small scale surveys as described above; follow up interviews to unearth more specific detailed issues; then an action learning study will follow where several improvements to the use of the ERP system for supply chain members will take place to investigate the effectiveness of the interventions. The figure below illustrates the flow line of the research project.

3. Research timetable

Research activities will be undertaken intermittently in between April 2006 to April 2008.
Knowledge Management (KM) Using Enterprise Resource Planning (ERP) System

4. **Research funding**

Research will be funded mostly by the student/investigator.

**Section C: Details of participants**

NB: The numbered bolded headings in this form must remain in your completed application for ethics approval. Please leave these headings and delete the detailed guidelines as you go through and complete the form. If a heading is not relevant write ‘Not applicable’.

1. **Number, type, age range, and any special characteristics of participants**

   Number of participants will be determined based on: willingness to participate in the research and also special characteristics of participants to make sure perspectives gathered from the research will be as comprehensive as possible. However, at least ten of the respondents from the selected sample of about 100, will be asked to accomplish the questionnaire. The age of participants will range from around 25 to 50 years old. The number of interviews will be dependent upon the number of surveys. At present it is envisaged that there will be 3 surveys undertaken.

2. **Source of participants (attach written permission where appropriate)**

   Most of these participants will be team members of past and current projects being researched as employees of the main organization, Gammon Construction Limited, where the principal research currently works.

3. **Means by which participants are to be recruited**

   Participants will be personally contacted individually, initially by email or phone, and asked whether they are willing to participate in the research. Confidentiality will be maintained in any write up of data gathered through using pseudonyms or position and not referring to them by name i.e. Manager ‘A’ etc.

4. **Are any of the participants ‘vulnerable’ or in a dependent relationship with any of the investigators, particularly those involved in recruiting for or conducting the project?**

   None. They are colleagues of the principal investigator and not a direct report of any of these. Any supply chain participants for the research phase on how supply chain members perceive the use of the company’s ERP system, will be given an opportunity to participate in the study and while these individuals may work for firms engaged by Gammon Construction Limited, these participants are not directly accountable to the principal investigator.

**Section D: Estimation of potential risk to participants & project classification**

NB: The numbered bolded headings in this form must remain in your completed application for ethics approval. Please leave these headings and delete the detailed guidelines as you go through and complete the form. If a heading is not relevant write ‘Not applicable’ underneath it.


1. **Please identify the project classification by assessing the level of risk to participants**

   Risk level 2
2. If you believe the project should be classified category ‘Risk level 1’ or category ‘Risk level 2’ please explain why you believe there are no risks or minimal to the participants.

Research for this project could be assessed as risk level 2 because the individual identity of the participants will not be disclosed in the final paper/dissertations. Responds from research will be described as representative of special characteristic at a group level and not on individual level.

3. Please detail any other ethical issues which may be particularly associated with this project.

N/A

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<th>Yes</th>
<th>No</th>
</tr>
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<tbody>
<tr>
<td>a)</td>
<td>Does the data collection process involve access to confidential data without the prior consent of participants?</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Will participants have pictures taken of them eg, photographs or videos?</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this:</td>
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</table>
| c) | If interviews are to be conducted will they be tape-recorded?  
NB if interviews are being conducted please attach a list of proposed interview questions/themes to this application. | X |
|   | If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this: |   | |
| d) | Are the participants in a dependent relationship with the investigator/s? | X |
|   | If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this: |   | |
| e) | Is deception to be used? | X |
|   | If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this: |   | |
| f) | Do you plan to use an interpreter? | X |
|   | If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this: |   | |
| g) | Does the research involve any tasks or processes which participants may experience as stressful or unpleasant during or after the data collection? | X |
|   | If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this: |   | |
| h) | Does your research involve the participation from anyone from an ATSI (Aboriginal and Torres Strait Islander) community?  
|   | If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this: |   | |
| i) | Are there in your opinion any other ethical issues involved in the research eg is it possible that you will be collecting/disclosing information about a third party not involved in the research? | X |
|   | If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this: |   | |
Section E: Informed consent

NB: The numbered bolded headings in this form must remain in your completed application for ethics approval. Please leave these headings and delete the detailed guidelines as you go through and complete the form. If a heading is not relevant write ‘Not applicable’ underneath it.

1. Attach to your application

   (a) a copy of the letter to participants providing plain language information about the research. This will often be the letter inviting people’s participation. This should normally be on RMIT letterhead. (see attached guideline for the Plain Language Statement (PLS) at Appendix 3)

   (b) a copy of the Consent form (see Appendix 1) for research participants. If you are not obtaining consent in writing please explain why.

2. Dissemination of results

   Participants should be informed that results from the study may appear in publications. This information is to be included in the information given in the Plain Language Statement prior to obtaining informed consent.

Section F: Research Involving Collection, Use Or Disclosure Of Information

Please note that if you propose to collect information about an individual from a source other than the individual, or to use or disclose information without the consent of the individual whose information it is, you will also have to complete the Special Privacy Module (download from the Web from URL) as well as the questions below.

Under statutory guidelines a HREC may approve some research where the public interest outweighs considerations of privacy, however a researcher must make a special case for such approval. The Special Privacy Module is the starting point for preparing such a case.

For a more detailed guidance and definitions for each of the question below, see Notes to assist in completing the form, Section F.

1 Does this Section have to be completed?

Does the project involve the collection, use or disclosure of personal information (includes names & contact details), health information including genetic information, or sensitive information,? (see Notes to assist in completing the form, Section F from http://www.rmit.edu.au/council/hrec)

☐ No – you do not have to answer any questions in this section. Go to Section G.

☐ Yes – you must answer questions in this section. Go to Question F2.

Only Name position and Department information, and other general information is sought for initial analysis to ascertain any obvious age or gender or department-home biases in group perceptions. The people involved in the initial survey will be referred to in any findings and consolidation of raw data by an alias or number so that their identity cannot be revealed. Survey forms will be maintained securely and in confidence at the principal’s home office under lock and key.

2 Type of activity proposed

Are you seeking approval from this HREC for:

(a) collection of information?

☐ Yes – start at Question F3

(b) use of information?
3 Collection of Information

(a) Does the project involve collection of information directly from individuals about themselves?

☐ No – (ie -collected from a third party/existing records) You must fill out the Special Privacy Form (download from the Web from URL) as well as this form.

☐ Yes – answer the following questions:

(b) What type of information will be collected? (Tick as many as apply)

☐ personal information (eg name, contact details etc)

☐ sensitive information (eg affiliations, income values, attitudes etc)

☐ health information

(c) Does the plain language statement explain the following:

☐ The identity of the organisation collecting the information and how to contact it?

☐ Yes ☐ No

☐ The purposes for which the information is being collected?

☐ Yes ☐ No

☐ The period for which the records relating to the participant will be kept?

☐ Yes ☐ No

☐ The steps taken to ensure confidentiality and secure storage of data?

☐ Yes ☐ No

☐ How privacy will be protected in any publication of the information (ie how is anonymity of participants is guaranteed)?

☐ Yes ☐ No

☐ The fact that the individual may access that information?

☐ Yes ☐ No

If you answered “No” to any of these questions, give the reasons why this information has not been included in the plain language statement:

4 Use or Disclosure of Information About Individuals

(a) Does the project involve the use or disclosure of identified or potentially identifiable information?

☐ No – go to Question F5.

☐ Yes, answer the following questions.

(b) Does the project involve use or disclosure of information without the consent of the individual whose information it is?

☐ No - go to Question F5.

☐ Yes, You must fill out the Special Privacy Form, as well as this form. (download from the Web from URL)

5 General Issues

(a) How many records will be collected, used or disclosed? Specify the information that will be collected, used or disclosed (e.g. date of birth, medical history, number of convictions, etc)
Knowledge Management (KM) Using Enterprise Resource Planning (ERP) System

Number of records: For the survey expected it is expected that only 10 records will be gathered and perhaps another 10 if the study is replicated in another office in Mainland China. For the follow up interviews and engaging in ad hoc discussions during the action learning cycle, many (perhaps hundreds) of file notes and summaries of salient topics will be recorded and verified with respondents.

Type of information: See above

(a) For what period of time will the information be retained? How will the information be disposed of at the end of this period? For the statutory 5 years

(b) Describe the security arrangements for storage of the information. Where will the information be stored? Who will have access to the information? The information will be stored securely in a locked cabinet in the principal investigator’s home office. Only the principal investigator will have direct access.

(d) How will the privacy of individuals be respected in any publication arising from this project? Respondents will not be named or directly identified

(e) Does the project involve trans-border (i.e. interstate or overseas) data flow?

☐ Yes ☐ No

If Yes, give details of how this will be carried out in accordance with relevant Privacy Principles (e.g. HPP 9, VIPP 9 or NPP 9).

Only non sensitive data will be likely to involve trans-border data flow. Raw data that identifies respondents in original survey forms and or file notes will remain in HK

(f) Does the project involve the adoption of unique identifiers assigned to individuals by other agencies or organisations?

☐ Yes ☐ No

If yes, give details of how this will be carried out in accordance with relevant Privacy Principles (e.g. HPP 7, VIPP 7 or NPP 7).

6 Adverse Events

Are procedures in place to manage, monitor and report adverse and/or unforeseen events relating to the collection, use or disclosure of information?

☐ Yes ☐ No

Give details.

Any such eventuality will be immediately brought to the attention of the Senior supervisor to deal with according to RMIT procedures prevailing at that time.

7 Other Ethical Issues

Discuss any other ethical issues relevant to the collection, use or disclosure of information proposed in this project. Explain how these issues have been addressed.

Section G: Other issues

NB: The numbered bolded headings in this form must remain in your completed application for ethics approval. Please leave these headings and delete the detailed guidelines as you go through and complete the form. If a heading is not relevant write ‘Not applicable’ underneath it.

1. Do you propose to pay participants? If so, how much and for what purpose?

No.

2. Where will the project be conducted? In HK and possible in one of the Mainland China offices.

The project will be conducted in the investigator’s own workplace.

3. Is this project being submitted to another human research ethics committee, or has it been previously submitted to a human research ethics committee?

No.
Appendix 1

RMIT HUMAN RESEARCH ETHICS COMMITTEE
Prescribed Consent Form For Persons Participating In Research Projects Involving Interviews, Questionnaires, Focus Groups or Disclosure of Personal Information

PORTFOLIO OF SCHOOL/CENTRE OF School of Property, Construction and Project Management
Name of participant: Project Title:

Name(s) of investigators: (1) Mr. Eric Chan Phone: 61-3-9807-6975 (2) Prof. Derek Walker Phone: 61-3-9925-3908

1. I have received a statement explaining the interview/questionnaire involved in this project.
2. I consent to participate in the above project, the particulars of which - including details of the interviews or questionnaires - have been explained to me.
3. I authorise the investigator or his or her assistant to interview me or administer a questionnaire.
4. I give my permission to be audio taped □ Yes □ No
5. I give my permission for my name or identity to be used □ Yes □ No
6. I acknowledge that:
   (a) Having read the Plain Language Statement, I agree to the general purpose, methods and demands of the study.
   (b) I have been informed that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied.
   (c) The project is for the purpose of research and/or teaching. It may not be of direct benefit to me.
   (d) The privacy of the information I provide will be safeguarded. However should information of a private nature need to be disclosed for moral, clinical or legal reasons, I will be given an opportunity to negotiate the terms of this disclosure.
   (e) The security of the research data is assured during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to _______ (researcher to specify). Any information which may be used to identify me will not be used unless I have given my permission (see point 5).

Participant’s Consent
Name: ___________________________ Date: ___________________________
    (Participant)

Name: ___________________________ Date: ___________________________
    (Witness to signature)

Where participant is under 18 years of age:
I consent to the participation of ___________________________ in the above project.

Signature: (1) ___________________________ (2) ___________________________ Date: ___________________________
    (Signatures of parents or guardians)

Name: ___________________________ Date: ___________________________
    (Witness to signature)

Participants should be given a photocopy of this consent form after it has been signed.

Any complaints about your participation in this project may be directed to the Secretary, RMIT Human Research Ethics Committee, University Secretariat, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 1745.
Details of the complaints procedure are available from: www.rmit.edu.au/council/hrec
Appendix 2

RMIT HUMAN RESEARCH ETHICS COMMITTEE

Prescribed Consent form for persons participating in research projects involving tests administered to human subjects

PORTFOLIO OF SCHOOL/CENTRE

Name of participant: ________________________________

Project Title: ________________________________

Name(s) of investigators: (1) ___________________________ Phone: ___________________________

(2) ___________________________ Phone: ___________________________

Name of participant: ________________________________

Project Title: ________________________________

1. I have received a statement explaining the tests involved in this project and I consent to participate in the above project.

2. I authorise the investigator or his or her assistant to use with me the tests referred to in 1 above.

3. I acknowledge that:

(a) The possible effects of the tests have been explained to me to my satisfaction.

(b) I have been informed that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied (unless follow-up is needed for safety).

(c) The project is for the purpose of research and/or teaching. It may not be of direct benefit to me.

(d) The privacy of the information I provide will be safeguarded. However should information of a private nature need to be disclosed for moral, clinical or legal reasons, I will be given an opportunity to negotiate the terms of this disclosure.

(e) The security of the research data is assured during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to ……………….. (researcher to specify). Any information which will identify me will not be used.

Participant’s Consent

Name: ___________________________ Date: ___________________________

(Participant)

Name: ___________________________ Date: ___________________________

(Witness to signature)

Where participant is under 18 years of age:

I consent to the participation of ___________________________ in the above project.

Signature: (1) ___________________________ (2) ___________________________ Date: ___________________________

(Signatures of parents or guardians)

Name: ___________________________ Date: ___________________________

(Witness to signature)

Participants should be given a photocopy of this consent form after it has been signed.

Any complaints about your participation in this project may be directed to the Secretary, RMIT Human Research Ethics Committee, University Secretariat, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 1745. Details of the complaints procedure are available from: www.rmit.edu.au/council/hrec
Dear …………………

My name is Eric Chan. I am undertaking a Doctor of Project Management at RMIT University. The title of my research is Organisational culture and Project Management (PM) issues when attempting to use an Enterprise Resource Planning (ERP) System in a project supply chain.

ABOUT THE RESEARCH

Project managers find it extremely difficult to reduce expenditure and increase revenue by means other than reengineering project business models. Knowledge is becoming critically important in this reengineering process. Those organisations that can better harness their knowledge will yield better competitive advantage. Knowledge cannot be transferred without the support of an efficient Information Communication Technology (ICT) system. Effective Knowledge Management (KM) depends upon sound use of ICT infrastructure facilities and supportive leadership.

Enterprise Resource Planning (ERP) systems are useful ICT tools for KM. However, if the successful implementation rate of ERP is low then organisations might not achieve their intended goals. In order to obtain ERP implementation success, organisations should consider cultural factors in deciding how to develop and implement an ERP system.

One of the features of a good ERP system is that it makes it easier to access and extract information through a common platform within the organisation. This function highly depends on operational staff updating required data to enable the ERP system to work. However, some frontline staff find it difficult to input data in a timely manner, and this results in the goal not being achieved as expected. The purpose of this research is to identify factors affecting differences between high level expectation and actual outcome of ERP performance (for the cost control function).

WHY ARE WE ASKING YOU?

Since this research is about organisational culture, we would like to have your input. We want you to give opinion on the effectiveness of the ERP systems implementation from your perspective.

WHAT THE STUDY INVOLVES?

In the initial part of the study you will answer a questionnaire. This will only take about 30 minutes. You may be interviewed for further clarification of incomplete, unclear or ambiguous responses to questions asked in the survey. The researcher will not tape record the interview.

Participating in the research is voluntary. You do not have to take part in the research project if you do not want to.
YOUR SAFEGUARDS
To protect your confidentiality, all information in all forms will not be shared with anyone other than my professor. The data from the questionnaire will have no identifying information. At no time will the name of any individual be revealed or attributed to a specific part of the data.

At anytime during this process, if you are uncomfortable with a question being asked, you can skip the question. You are also welcome to talk about your concerns with me or my professor. If either one of us could not adequately address your concerns, you are free to withdraw your consent and discontinue your participation at anytime without any prejudice.

WHAT HAPPENS TO THE RESULTS?
We will write a report based on what people in the research respond. There may be some conference and journal publications flowing from this work, where the identity of the participants and organisation will be kept confidential. A copy of the research report will be given to:

- the RMIT University.
- you, upon request.

No written report will contain the name of anyone who participates in the research or the name of any company involved in the research.

ABOUT THE RESEARCH – WHO TO CONTACT
If you have any queries, complaints, and concerns or would like more information about this research project, you can contact the research supervisor at the School of Property, Construction and Project Management Professor Derek Walker 61-3-9925-3908 Email: Derek.walker@rmit.edu.au.

Sincerely Yours,

Mr. Eric Chan DPM Student

Professor Derek Walker, Supervisor
Dear …………………

My name is Eric Chan. I am undertaking a Doctor of Project Management at RMIT University. The title of my research is Culture, Organisational Culture and Knowledge Management (KM) using Enterprise Resource Planning (ERP) System.

ABOUT THE RESEARCH

In this new era, project managers become extremely difficult to cut expenditure and increase revenue only by reengineering the business model of their projects, while knowledge is becoming the last weapon in the business battlefield. Those organisations can better harness their knowledge will yield better competitive advantage. However, knowledge cannot transfer through vacuum without the support of an efficient Information Communication Technology (ICT) system. The trend of using ICT tools depends on the degree of leadership support and right decision of developing appropriate infrastructure facilities for Knowledge Management (KM) in organisations and for specific types of projects.

One of the useful ICT tools for KM is the Enterprise Resource Planning (ERP) system and is a widely accepted choice to obtain competitive advantage. However, the successful implementation rate of ERP is low and organisations might not achieve their intended goals. In order to obtain ERP systems implementation success, organisation should take their organisational culture into account for an ERP decision.

One of the features of the ERP system is easier to access and extract information through a common platform within the organisation. This function highly depends on the operation staff updating required data to enable the ERP system works. However, some frontline staff find it difficult to input data on time leading to the goal is not achieved as expected. The purpose of the research is to identify the factors affecting difference between the high level expectation and outcome of ERP for the cost control function due to implementation difficulties by the operation level.

WHY ARE WE ASKING YOU?

Since this research is about organisational culture, we would like to have your input. We would like you to participate in an action learning study in which you and I and others will experiment with improved ways of using the current ERP system.
WHAT THE STUDY INVOLVES?
This will involve participating in small initiatives as part of our day-to-day job using the ERP system that improves our use of it. This participation involves unstructured and frequent short discussions about what is going on, how it working out and any suggested improvements. These discussions will take place in a normal business-like way that is consistent with our working relationships so it will not impose any additional burden on you. The study is aimed to improve the way that the ERP system is used as a helpful tool for you. I will clarify any issues with you so that anything you say will not be misrepresented.

Participating in the research is voluntary. You do not have to take part in the research project if you do not want to.

YOUR SAFEGUARDS
To protect your confidentiality, all information in all forms will not be shared with anyone other than my professor. The data from the questionnaire will have no identifying information. At no time will the name of any individual be revealed or attributed to a specific part of the data.

At anytime during this process, if you are comfortable with a question being asked, you can skip the question. You are also welcome to talk about your concerns with me or my professor. If either one of us could not adequately address your concerns, you are free to withdraw your consent and discontinue your participation at anytime without any prejudice.

WHAT HAPPENS TO THE RESULTS?
We will write a report based on what people in the research respond. There may be some conference and journal publications flowing from this work, where the identity of the participants and organisation will be kept confidential. A copy of the research report will be given to:

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No written report will contain the name of anyone who participates in the research or the name of any company involved in the research.

ABOUT THE RESEARCH – WHO TO CONTACT
If you have any queries, complaints, and concerns or would like more information about this research project, you can contact any of these people.

Sincerely Yours,

Mr. Eric Chan  Professor Derek Walker,
DPM Student  Supervisor

Any complaints about your participation in this project may be directed to the Secretary, RMIT Human Research Ethics Committee, University Secretariat, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 1745.
Details of the complaints procedure are available from: www.rmit.edu.au/council/hrec
23 May 2006

Mr Eric Chan
2/25 Bales Street
MOUNT WAVERLEY. 3149

Dear Mr Chan,

Re: Human Research Ethics Application – Register Number HRES A-786-03/06

The Design and Social Context Human Research Ethics Sub-Committee, at its meeting on 19 May 2006 considered your amended ethics application entitled “Organisational Culture and Project Management (PM) issues when attempting to use an Enterprise Planning (ERP) System in a project supply chain”.

I am pleased to advise that your application has been approved as Risk Level 2 classification by the committee. This approval will now be reported to the University Human Research Ethics Committee for noting.

This now completes the Ethics procedures. Your ethics approval expires in July 2008.

You are reminded that an Annual /Final report is mandatory and should be forwarded to the Portfolio Ethics Subcommittee Secretary by mid-December 2006. This report is available from:

URL: http://www.rmit.edu.au/rd/hree_apply

Should you have any queries regarding your application please seek advice from the Chair of the sub-committee Dr Desmond McDonnell on (03) 9925 3291, desmond.mcdonnell@rmit.edu.au or contact Cheryl de Leon on (03) 9925 2974 or email cheryl.deleon@rmit.edu.au

I wish you well in your research.

Yours sincerely

CHERYL C. DE LEON
Secretary
Human Research Ethics Sub-Committee
Design and Social Context

cc: Prof Derek Walker
### 9.6 Appendix D - Exploratory Survey for ERP System (Survey 1)

#### 9.6.1 Questionnaire of Survey 1

**RESEARCH QUESTIONNAIRE**

<table>
<thead>
<tr>
<th>Name: (optional)</th>
<th>Age:</th>
<th>Gender:</th>
<th>Position:</th>
<th>Department:</th>
<th>Years in the Organisation</th>
</tr>
</thead>
</table>

#### The Enterprise Resource Planning (ERP) System

**Objective:** The study aim is to determine the ERP high level expectation and outcome for costing control function.

**To the Respondent:** All information that will be obtained in this study will be kept confidential.

**A. ERP Solution:**

**A1.** What are your perceptions on the ERP solution for cost control function? (i.e. interpretation and effect or product of the ERP)

- 
- 
- 
- 

**A2.** What are your expectations on the ERP solution for cost function? (i.e. eager anticipation of the ERP, especially of success or gain)

- 
- 
- 
- 

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### B. Factors Considered in Implementing the ERP:

*Rate according to importance (1=Very important, 2=Moderately important, 3=Less important, 4=Not important, 5=Not relevant)*

<table>
<thead>
<tr>
<th>Factor</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modernize the IT environment</td>
<td></td>
</tr>
<tr>
<td>Replace obsolete systems</td>
<td></td>
</tr>
<tr>
<td>Efficiency (reduces cost, improve speed of process)</td>
<td></td>
</tr>
<tr>
<td>Provide better management tools in decision-making and planning</td>
<td></td>
</tr>
<tr>
<td>Increase customer satisfaction</td>
<td></td>
</tr>
<tr>
<td>Increase organisation's competitiveness</td>
<td></td>
</tr>
<tr>
<td>Others, please specify:</td>
<td></td>
</tr>
</tbody>
</table>

### C. Areas of ERP Implementation:

*Rate according to performance (1=Excellent, 2=Satisfactory, 3=Cannot Determine, 4=Fair, 5=Poor)*

<table>
<thead>
<tr>
<th>Area</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Package</td>
<td></td>
</tr>
<tr>
<td>External Consultants</td>
<td></td>
</tr>
<tr>
<td>Project Control</td>
<td></td>
</tr>
<tr>
<td>Internal Team Structure</td>
<td></td>
</tr>
<tr>
<td>Project Budget</td>
<td></td>
</tr>
<tr>
<td>Training Process</td>
<td></td>
</tr>
<tr>
<td>Project Schedule</td>
<td></td>
</tr>
<tr>
<td>Technology Infrastructure</td>
<td></td>
</tr>
<tr>
<td>Project Scope</td>
<td></td>
</tr>
<tr>
<td>Process Redesign</td>
<td></td>
</tr>
<tr>
<td>Project Management</td>
<td></td>
</tr>
<tr>
<td>Software Customization</td>
<td></td>
</tr>
<tr>
<td>Communications</td>
<td></td>
</tr>
<tr>
<td>Others, please specify:</td>
<td></td>
</tr>
</tbody>
</table>

### D. Has the organisation provided a consultant/trainer on the ERP implementation?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Why: Why:

<table>
<thead>
<tr>
<th>Why</th>
<th>Why</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
E. What are your opinions about the reasons for hiring or not hiring consultants/trainers of the ERP?


F. Problem Areas on ERP Implementation:
Rate according to agreement (1=Agree, 2=Partly agree, 3=Cannot Determine, 4=Partly disagree, 5=Disagree)

- Technical issues (hardware/database issues, scalability, systems integration)
- Organizational Issues (governance issues, process redesign)
- Data Issues (reconciling multiple data sources, ensuring data integrity)
- Vendor not delivering promised functionality in a timely fashion
- Lack of financial resources
- Training Issues
- Lack of internal expertise
- Lack of consensus among the business owners
- Lack of consensus among the institution/senior management
- Quality of the software
- Lack of understanding on the capability of the software
- Inadequate training
- Inadequate communications strategy
- Resistance to change
- Alignment between software and business process
- Customizations
- Issues in working with external consultants
- Others, please specify:


G. **Effects on the ERP Solution**

Rate according to the degree affecting ERP performance (1=Increased, 2=Partly increased, 3=Constant, 4=Partly decreased, 5=Decreased)

<table>
<thead>
<tr>
<th>Component</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff/personnel</td>
<td></td>
</tr>
<tr>
<td>Packaged software (purchased products)</td>
<td></td>
</tr>
<tr>
<td>Database</td>
<td></td>
</tr>
<tr>
<td>Internal applications and code</td>
<td></td>
</tr>
<tr>
<td>Hardware and infrastructure</td>
<td></td>
</tr>
<tr>
<td>Desktop products and services</td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td></td>
</tr>
<tr>
<td>Help desk and user support</td>
<td></td>
</tr>
<tr>
<td>Systems operations and management</td>
<td></td>
</tr>
<tr>
<td>Consulting</td>
<td></td>
</tr>
<tr>
<td>Others, please specify:</td>
<td></td>
</tr>
</tbody>
</table>

H. **What is the impact of the ERP implementation on the organisation?**

What is the impact of the ERP implementation on the organisation? productivity?

Rate according to the degree affecting ERP performance (1=Increased, 2=Partly increased, 3=Constant, 4=Partly decreased, 5=Decreased)

I. **What are the other applications of ERP you think useful?**

What are the other applications of ERP you think useful?

Rate according to the degree affecting ERP performance (1=Increased, 2=Partly increased, 3=Constant, 4=Partly decreased, 5=Decreased)
9.6.2 Analysis of Survey 1 – ERP System

The result is analyzed under the following headings:

- Respondents’ profile;
- Respondents’ perceptions of what an ERP system theoretically delivers;
- Respondents’ expectations of what the ERP system will deliver;
- Factors considered in the ERP system implementation;
- Implementation performance areas;
- ERP system implementation problem areas;
- ERP system effectiveness;
- Impact of ERP system implementation on the organization’s productivity; and
- Suggestions for incorporating other ERP system applications.

Respondents’ Profile

The special characteristics of the sample selected could be categorised as: having high levels of technical skill/knowledge; being involvement in the ERP; and being well experienced in both the industry and the organisation’s ERP routines. The following descriptive statistics provide general demographic characteristics of the sample group:

- Three people were below 30 years old, twelve between 30 to 40 years old and three over forty years old – most workers were in their earlier careers with extensive exposure to using IT in their education and work experience
- Thirteen males and five females
- Eleven respondents have been working in the organization for over ten years and seven less than ten years
- Most of the respondents are Quantity Surveyors (including Managing Quantity Surveyor, Senior Quantity Surveyor, Senior Project Quantity Surveyor, Project Quantity Surveyor and Quantity Surveyor) while Senior Accounts Clerk and Accounting Supervisors are fewer in numbers, six are operational staff, eight are senior officers or officers, and four are managers
- Eleven respondents work in the commercial department, five from finance and two from IT
Respondents’ Perceptions of What an ERP System Theoretically Delivers

The majority of respondents saw the ERP system as an effective and accurate tool that should provide authorized people with real-time online cost data information. Also, since cost data are provided online, then it is made available to various departments who need it concurrently and could also be made available in hard copy format. Hence, there is perceived increased organizational efficiency.

ERP cost analysis reports were generated in the desired format with more flexibility. At any given period, forecast and actual financial data can easily be compared. Cost review and control is moreover easily managed and ledgers can be more efficiently updated. Cost data are integrated into a common platform, which in turn makes data sharing among departments more systematic.

The ERP system therefore modernizes and standardizes business processes among departments in the organization since cost data is monitored and controlled in the most efficient and accurate manner.

Respondents’ Expectations of What the ERP System Will Deliver

The respondents were able to compare their perceptions of the ERP system actual delivery with their own expectations of the system. In general, respondents’ perceptions were that the ERP system will improve cost data control and management. Their expectations are summarised as follows.

First, respondents expected that the workload of various officers in the department who are in-charge of managing and monitoring cost data would be reduced. Since data is supposed to be available online, then it should also be possible for authorized individuals to access databases without difficulty of having to translate data into the ERP system standard format. Information was also expected to be delivered accurately and on time. Reports should be easily generated by different departments and that this should enable quick cost checking and cost data monitoring. Data should be easily updated and provide procedural transparency since data should be made available to
authorised people in the organization. Filing space should be reduced—on-line information retrieval should create a paper-less office.

With much of the routine information and data processing being handled electronically by the ERP system, this should release people to engage more fully in KM activities such as anticipating and proactively problem-solving and more effectively contextualising information and transferring knowledge and using knowledge to improve the way that work is undertaken.

Factors Considered in the ERP System Implementation

A literature review revealed six key factors considered as relevant to the organization that were believed to affect ERP implementation and these were included in the questionnaire. Respondents were asked to rate each of these factors according to the degree of importance (with 1 as very important, 2 as moderately important, 3 as less important, 4 as not important and 5 as not relevant).

Table 9-1 – Factors Considered in Implementing ERP

<table>
<thead>
<tr>
<th>Factors</th>
<th>Scale 1</th>
<th>Scale 2</th>
<th>Scale 3</th>
<th>Scale 4</th>
<th>Scale 5</th>
<th>Total</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modernize the IT environment</td>
<td>3 10</td>
<td>4 1</td>
<td>0</td>
<td>18</td>
<td>2.17</td>
<td>0.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace obsolete systems</td>
<td>5 10</td>
<td>1 2</td>
<td>0</td>
<td>18</td>
<td>2.00</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>14 4</td>
<td>0 0</td>
<td>0</td>
<td>18</td>
<td>1.22</td>
<td>0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide better management tools</td>
<td>10 8</td>
<td>0 0</td>
<td>0</td>
<td>18</td>
<td>1.44</td>
<td>0.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase customer satisfaction</td>
<td>6 5</td>
<td>5 1</td>
<td>1</td>
<td>18</td>
<td>2.22</td>
<td>1.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase organisation’s competitiveness</td>
<td>9 8</td>
<td>1 0</td>
<td>0</td>
<td>18</td>
<td>1.56</td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9-1 indicates that respondents feel that Efficiency was the most critical factor for ERP system implementation. Other issue consider important were Provide better management tools, and Increase organisations competitiveness Survey results also revealed that respondents believe that ERP system implementation could increase organizational competitiveness.
Implementation Performance Areas

Respondents were further asked to rate the ERP system with respect to its performance in thirteen areas of implementation. The ratings range from 1 to 5 with 1 as excellent, 2 as satisfactory, 3 as cannot determine, 4 as fair and 5 as poor.

Table 9-2 – Areas of ERP Implementation (Performance)

<table>
<thead>
<tr>
<th>Areas</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Package</td>
<td>0</td>
<td>13</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>18</td>
<td>2.61</td>
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<td>Project Control</td>
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<td>1</td>
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<tr>
<td>Project Budget</td>
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<td>4</td>
<td>5</td>
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<td>18</td>
<td>2.72</td>
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<tr>
<td>Project Schedule</td>
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<td>5</td>
<td>7</td>
<td>5</td>
<td>0</td>
<td>18</td>
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<td>0.90</td>
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<tr>
<td>Project Scope</td>
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<td>3</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>18</td>
<td>2.72</td>
<td>1.02</td>
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<tr>
<td>Project Management</td>
<td>1</td>
<td>6</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>18</td>
<td>2.72</td>
<td>0.83</td>
</tr>
<tr>
<td>Communications</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>18</td>
<td>2.17</td>
<td>1.10</td>
</tr>
<tr>
<td>External Consultants</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td>18</td>
<td>3.83</td>
<td>0.99</td>
</tr>
<tr>
<td>Internal Team</td>
<td>0</td>
<td>5</td>
<td>8</td>
<td>5</td>
<td>0</td>
<td>18</td>
<td>3.00</td>
<td>0.77</td>
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<tr>
<td>Training Process</td>
<td>1</td>
<td>14</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>18</td>
<td>2.22</td>
<td>0.81</td>
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<tr>
<td>Technology Infrastructure</td>
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<td>4</td>
<td>6</td>
<td>0</td>
<td>18</td>
<td>2.89</td>
<td>0.90</td>
</tr>
<tr>
<td>Process Redesign</td>
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<td>9</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>18</td>
<td>2.67</td>
<td>0.97</td>
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<tr>
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<td>4</td>
<td>7</td>
<td>1</td>
<td>18</td>
<td>3.11</td>
<td>1.08</td>
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</tbody>
</table>

Table 9-2 indicates that the respondents think that the ERP system will promote excellent Project control and Communications performance and other important issue were Training process. All respondents reported that their organization provided an ERP system implementation consultant or trainer to help them. ERP system implementation was thus facilitated by consultants/trainers providing training, introducing ERP system functions, helping them to smoothly operate the ERP system, train the internal trainer, standardize the customers’ ERP system implementation, and to provide a backbone ERP system infrastructure platform.

ERP System Implementation Problem Areas

Seventeen ERP implementation problem areas were identified and respondents were asked to rate each area according to the extent of their agreement of disagreement. They were asked to choose from 5 options with 1 as agree, 2 as partly agree, 3 as cannot determine, 4 as partly disagree and 5 as disagree.
Table 9-3 – Problem Areas on ERP implementation

<table>
<thead>
<tr>
<th>Problems</th>
<th>Scale 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical issues</td>
<td>8</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>18</td>
<td>1.78</td>
<td>0.94</td>
</tr>
<tr>
<td>Organizational issues</td>
<td>9</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>18</td>
<td>1.67</td>
<td>0.84</td>
</tr>
<tr>
<td>Data Issues</td>
<td>12</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>18</td>
<td>1.50</td>
<td>0.99</td>
</tr>
<tr>
<td>Vendor not delivering promised functionality in a timely fashion</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>0</td>
<td>1</td>
<td>18</td>
<td>2.44</td>
<td>0.98</td>
</tr>
<tr>
<td>Lack of financial resources</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>18</td>
<td>2.28</td>
<td>1.32</td>
</tr>
<tr>
<td>Training Issues</td>
<td>13</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>18</td>
<td>1.67</td>
<td>1.28</td>
</tr>
<tr>
<td>Lack of internal expertise</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>18</td>
<td>1.83</td>
<td>1.20</td>
</tr>
<tr>
<td>Lack of consensus among the business owners</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>18</td>
<td>2.28</td>
<td>1.18</td>
</tr>
<tr>
<td>Lack of consensus among the institution’s senior management</td>
<td>11</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>18</td>
<td>1.78</td>
<td>1.17</td>
</tr>
<tr>
<td>Quality of the software</td>
<td>10</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>1.50</td>
<td>0.62</td>
</tr>
<tr>
<td>Lack of understanding on the capability of the software</td>
<td>6</td>
<td>10</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>18</td>
<td>1.89</td>
<td>0.90</td>
</tr>
<tr>
<td>Inadequate training</td>
<td>9</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>18</td>
<td>1.83</td>
<td>1.10</td>
</tr>
<tr>
<td>Inadequate communications strategy</td>
<td>5</td>
<td>3</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>2.28</td>
<td>0.89</td>
</tr>
<tr>
<td>Resistance to change</td>
<td>14</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>1.22</td>
<td>0.43</td>
</tr>
<tr>
<td>Alignment between software and business process</td>
<td>13</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>18</td>
<td>1.50</td>
<td>1.04</td>
</tr>
<tr>
<td>Customizations</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>2.06</td>
<td>0.87</td>
</tr>
<tr>
<td>Issues in working with external consultants</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>18</td>
<td>2.83</td>
<td>1.34</td>
</tr>
</tbody>
</table>

Table 9-3 provides an overview of the responses relating to organizational and data issues, such as lack of financial resources, training issues, lack of internal expertise, lack of consensus among the institution’s senior management, quality of the software, inadequate training, resistance to change and alignment between software and business process being a hindrance to effective ERP system implementation. Most agreed that these issues presented problems in effectively implementing the ERP system. Others partly agree that technical issues, lack of consensus among the business owners and lack of understanding on the capability of the software are also ERP system implementation problems. A number of respondents could not determine whether these ERP system implementation issues are problems or related to: vendors not delivering promised functionality in a timely fashion, inadequate communications strategy, customization, and issues in working with external consultants. One respondent further added that one possible ERP system implementation problem is that reports turn out to be inaccurate at times, even after people have worked long hours entering data.

ERP System Effectiveness

This study also rated ten areas where effectiveness has been; 1 increased, 2 partly increased, 3 constant, 4 partly decreased, and 5 decreased.
Table 9-4 – Effects on the ERP Solution

<table>
<thead>
<tr>
<th>Scale 1 = very high, 5 = very low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects</td>
</tr>
<tr>
<td>Staff/personnel</td>
</tr>
<tr>
<td>Packaged software</td>
</tr>
<tr>
<td>Database</td>
</tr>
<tr>
<td>Internal applications and code</td>
</tr>
<tr>
<td>Hardware and infrastructure</td>
</tr>
<tr>
<td>Desktop products and services</td>
</tr>
<tr>
<td>Training</td>
</tr>
<tr>
<td>Help desk and user support</td>
</tr>
<tr>
<td>Systems operations and management</td>
</tr>
<tr>
<td>Consulting</td>
</tr>
</tbody>
</table>

Table 9-4 indicates that Staff or personnel effectiveness in using ERP systems has partly increased. The same result was found for Package software use, Internal applications and code, Hardware and infrastructure, Systems operations and management and Consulting. The organization’s database, desktop products and services, training as well as help desk and user support, were found to have a stronger increased effectiveness through using the ERP system. However two respondents commented that the ERP system led to total administration costs increasing due to license fees, hardware, training and implementation and organizations spend more time in managing data in using the ERP system.

Impact of the ERP System Implementation on the Organization’s Productivity

The implementation of the ERP system did not appear to have a consistent positive impact on the organization. Some respondents reported positively while others indicated several disadvantages. Updated financial information is provided on-line by the ERP system, so more detailed information is quickly made available to the people who need it. Reporting, planning and decision-making are made more easily because relevant information is immediately updated. This also facilitates better communication between the departments. Transparency in the organization is improved and work is undertaken more efficiently.
In some cases working procedures and processes needed to be redesigned to fit organizational needs. Some respondents reported that the ERP system implementation resulted in increased workload levels. They are also reported increases in data entry and data verification workload. One respondent stated that some of the generated reports contained errors and therefore significantly impaired work effectiveness of the ERP

Suggestions for Incorporating other ERP System Applications

Sixteen respondents suggested other ERP applications which include a data search function, as well as export and import capacity to allow the flow of data from one software package to another. Data analysis could also include costs estimation to be performed using the system as well as stock control and planning and tracking procurement flow. They also suggested that a centralized database should be provided.

CMM and the Survey’s Results

The findings and results are discussed based upon objectives of the ERP system and how the capability maturity model assessment of the case studied organization. CMM model is tabled in the Methodology chapter which categorises an organization’s maturity level of the ICT enabling infrastructure that can support a K-Adv. The five levels are described below:

- **Level 1**: being inactive and only barely aware of a given aspect only
- **Level 2**: being pre-active in terms of initiating plans for becoming active
- **Level 3**: being active in adopting the particular elements
- **Level 4**: being pro-active in accepting and adopting the approach, and then adapting it to suit the context and circumstances
- **Level 5**: being embedded with the adaptation having become routine and infused as the natural way of doing things

The organization studied has actively invested significant resources for the ERP system implementation. The results of the survey indicates that many respondents in the organization believe that the ERP system is capable of managing cost data and is able to match participant’s perceptions of what the ERP system delivers—their expectations are for the system to improve, cost control and data management and the organization
considers efficiency as its most critical objective and feels that the ERP system can increase the organization’s competitiveness.

Evidence from the organization’s internal communication indicates that it believes that communication performance is excellent post ERP system implementation, and that training issues and resistance to change are very important issues yet to be fully resolved. Therefore, the organization has actively engaged external consultants to provide staff training. The organization understands the importance of effective help desk and user support, desktop products and services and training to effectively deploy the ERP system and has endeavoured to deliver this assistance. Adequate resources and feedback, on-line help, network support and training are however, reactively provided. Some respondents suggest applying further organizational business functions to the ERP system and this demonstrates that the organization is actively promoting the ERP system as a tool to facilitate sustainable competitive advantage through improved information management leading to KM activities.
9.7  Appendix E - Exploratory Survey for Partnering (Survey 2)

9.7.1  Questionnaire of Survey 2

**RESEARCH QUESTIONNAIRE**

**Culture, Relationship and Organisational Culture of “Partnering” in Construction Industry**

**Objective:** The aim is to study the viability of “Partnering” in the supply chain of construction subcontracting procurement

**To the Respondent:** All information that will be obtained in this study will be kept confidential.

<table>
<thead>
<tr>
<th>Name:</th>
<th>Age:</th>
<th>Gender:</th>
<th>Position:</th>
<th>Profession/Trade:</th>
<th>Years in the Industry</th>
</tr>
</thead>
</table>

A.  "Partnering" Solution:

A1. What are your understandings of the "Partnering" in construction industry?

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

A2. What are your expected outcomes if the “Partnering” can be implemented in the construction industry?

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
B. Factors Considered in successfully implementing the "Partnering":

Rate according to importance (1=Very important, 2=Moderately important, 3= Less important, 4=Not important, 5=Not relevant)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Legal Aspects</td>
</tr>
<tr>
<td>2.</td>
<td>Contractual Issues</td>
</tr>
<tr>
<td>3.</td>
<td>Financial Aspects</td>
</tr>
<tr>
<td>4.</td>
<td>Efficiency (reduces cost, improve speed of process)</td>
</tr>
<tr>
<td>5.</td>
<td>Quality Assurance</td>
</tr>
<tr>
<td>6.</td>
<td>Innovation, Technology, Methodology</td>
</tr>
<tr>
<td>7.</td>
<td>Partnering Philosophy</td>
</tr>
<tr>
<td>8.</td>
<td>Supply Chain</td>
</tr>
<tr>
<td>9.</td>
<td>Trade Practice</td>
</tr>
<tr>
<td>10.</td>
<td>Project Management Practice</td>
</tr>
<tr>
<td>11.</td>
<td>Complexity of Works</td>
</tr>
<tr>
<td>12.</td>
<td>Organisational Culture</td>
</tr>
<tr>
<td>13.</td>
<td>Claims Attitude</td>
</tr>
<tr>
<td>14.</td>
<td>Work Relationship</td>
</tr>
<tr>
<td>15.</td>
<td>Risk Management</td>
</tr>
<tr>
<td>16.</td>
<td>Programme of Works</td>
</tr>
<tr>
<td>17.</td>
<td>Workload</td>
</tr>
<tr>
<td>18.</td>
<td>Resources Availability</td>
</tr>
<tr>
<td>19.</td>
<td>Competition</td>
</tr>
<tr>
<td>20.</td>
<td>Language Barrier</td>
</tr>
<tr>
<td>21.</td>
<td>Others, please specify:</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

---
### C. Areas of ‘Partnering” Implementation:

*Rate according to Suitability (1=Very Suitable, 2=Suitable, 3=Cannot Determine, 4=Not Suitable, 5=Very Not-Suitable)*

<table>
<thead>
<tr>
<th>Trades</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Domestic Subcontractors</td>
<td>[ ]</td>
</tr>
<tr>
<td># Major Suppliers</td>
<td>[ ]</td>
</tr>
<tr>
<td>^ M&amp;E Subcontractors</td>
<td>[ ]</td>
</tr>
<tr>
<td>Consultants</td>
<td>[ ]</td>
</tr>
<tr>
<td>Other Subcontractors</td>
<td>[ ]</td>
</tr>
<tr>
<td>Other Suppliers</td>
<td>[ ]</td>
</tr>
<tr>
<td>Other areas, please specify with reasons:</td>
<td></td>
</tr>
</tbody>
</table>

* Domestic Subcontractors include:
  - Excavator, Concrete Placement, Reinforcement Fixer, Bricklayer, Plasterer/Tiler,
  - Carpenter/Joiner, Plumber, Drainlayer, Steel & Metalworker, Structural Stell Worker, Formworker, Painter, Window(glasswall, curtain wall, aluminium window)

# Major Suppliers include:
  - Concrete, Reinforcement, Cement, Sand, Tiles, Sanitary Fittings

^ M&E Subcontractors include:
  - Lift, Escalator, Ventilation, Fire Services, Electrical, IT System
D. Has your organisation adopted "Partnering" before?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Why:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

E. Effects on the "Partnering" Solution:

E1. What are your opinions on the advantages of implementing "Partnering" in construction industry?
   
   Long-Term Advantages:
   
   Short-Term Advantages:

E2. What are your opinions on the disadvantages of implementing "Partnering" in construction industry?
   
   Long-Term Disadvantages:
   
   Short-Term Disadvantages:
### F. Selection Criteria of "Partners":

*Rate according to importance (1=Very important, 2=Moderately important, 3=Less important, 4=Not important, 5=Not relevant)*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Financial Scope</td>
<td></td>
</tr>
<tr>
<td>2. Commitment to Programme</td>
<td></td>
</tr>
<tr>
<td>3. Past Performance</td>
<td></td>
</tr>
<tr>
<td>4. Previous Working Relationship</td>
<td></td>
</tr>
<tr>
<td>5. Innovation</td>
<td></td>
</tr>
<tr>
<td>6. Parent Company Support</td>
<td></td>
</tr>
<tr>
<td>7. Use of Information Communication Technology</td>
<td></td>
</tr>
<tr>
<td>8. Subcontracting Policy</td>
<td></td>
</tr>
<tr>
<td>9. Trade / Product / Industry Qualification</td>
<td></td>
</tr>
<tr>
<td>10. Work in Progress</td>
<td></td>
</tr>
<tr>
<td>11. Quality Assurance Systems</td>
<td></td>
</tr>
<tr>
<td>12. Risk Management</td>
<td></td>
</tr>
<tr>
<td>13. Technical Capability</td>
<td></td>
</tr>
<tr>
<td>14. Open Book Accounting Policy</td>
<td></td>
</tr>
<tr>
<td>15. Reputation</td>
<td></td>
</tr>
<tr>
<td>16. Safety Record</td>
<td></td>
</tr>
<tr>
<td>17. Environmental Management</td>
<td></td>
</tr>
<tr>
<td>18. Recent Similar Job Experience</td>
<td></td>
</tr>
<tr>
<td>19. Human Resources Management</td>
<td></td>
</tr>
<tr>
<td>20. Others, please specify:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
H. What is the impact if "Partnering" is implemented in your organisation?

I. How you view relationship between "Partners"?

~ END ~
9.7.2 Analysis of Survey 2 – Partnering

It should be clearly understood that this is a survey of how G-Force participants felt about the value and characteristics of partnering with its supply chain. It was beyond the scope of the pilot study to seek opinions from all partnered organizations with G-Force. While this would have been interesting and useful, it was not a feasibly approach to gaining or adding further insights into how partnering and its ERP integration may have worked in practice. This would be better addressed by a separate study and remains as further research to be undertaken when partnered organizations are experienced with working with G-Force and its ERP. Therefore, results measure perceptions of participants of partnering value and not inferring any definitive ‘truth’ about partnering. The literature provided a useful and more broadly validated set of empirical study results to draw insights from.

Altogether there were 21 replies, 2 replies were excluded because of incomplete responses and non-target respondents, resulting in 19 responses for analysis and under the following headings:

- Respondents’ profile;
- Respondents’ understanding on “Partnering” in the construction industry;
- Respondents’ expectations on “Partnering” in the construction industry;
- Factors considered in successfully implementing the “Partnering”;
- Areas of “Partnering” implementation;
- Experience of “Partnering”; 
- Effects on the “Partnering” solution;
- Selection criteria of “Partners”; 
- Impact of implementing “Partnering”; and
- View on relationship between partners.

Respondents’ Profile

Amongst the nineteen professionals participated in this survey, eight of them have participated the first survey (for ERP). This represents 42% of the returned respondents. These respondents included procurement officers, quantity surveyors, engineers et cetera, and who were representatives of main contractors, subcontractors
and suppliers. The following descriptive statistics provide general demographic characteristics of the sample group:

- Nine people were within 30-35 years old, four were above 40, three were below 30 and three were within 35-40 years old
- Sixteen males and three females
- Two of the responses were received from participants in China
- On average, respondents had already spent 12 years (in the range of 5-28 years) in the construction industry, representing a group of experienced construction professionals
- Most of the respondents are quantity surveyors, as they comprise 52% of the sample while sales engineers were the smallest in number in 11%
- Nine respondents are from civil engineering, while five from building construction, and the other five respondents work both in civil engineering and building construction

Respondents’ Understanding on “Partnering” in the Construction Industry

Since the questionnaire was focused on partnering in the supply chain between main contractor and subcontractor/supplier, the responses are the views from the perspectives of main contractor and subcontractor/supplier. One of the respondents, an experienced Contracts Manager, stated, “Partnering is a relationship management strategy. It gives a new way for client/consultant/contractor/subcontractor to work together against the challenges of the project rather than against each other.” Another respondent, a Sales Engineer, also expressed, “Business relationships for the benefits of all parties, based on trust, openness and respect.” In summary, respondents defined partnering as a relationship management strategy which is based on openness, trust and respect. Mutual benefits are achieved by having better communication between parties, understanding both parties’ needs, cost build-up, business process and the ultimate goals.

In partnering, two or more organizations are tied by a long-term commitment, cooperation and coordination for the purpose of achieving success, satisfaction, and a win-win situation. The latter is achieved when main contractors get good quality and reasonably priced materials with on time delivery while subcontractors and suppliers
get constant and steady work orders and supply contracts from the main contractor. Any confrontation among different parties is prevented by establishing a pre-determined mechanism which results in cost-saving, a harmonized working environment, and a reduction in the construction period.

Respondents’ Expectations on “Partnering” in the Construction Industry

Most of the respondents expect business success by adopting the partnering approach. For example, a Procurement Officer stated, “Long term success and collaborate each other to provide best value service in lowest cost.” This is echoed by a Quantity Surveyor’s saying “Less arbitrations, more collaboration between stakeholders; overall, a better product in terms of time, cost and quality.” Ideally, the expected outcome is a “win-win” situation. All of the parties involved will gain benefits in terms of increases in negotiated contracts. Main contractors receive the final product on time, with satisfied quality and within budget. They achieve reasonable profit and good publicity on managing the project. On the other hand, consultancies receive reasonable fees and good exposure on project design. Thus, these show that no parties suffer losses due to the other parties. In addition, it is expected that partnering can replace a contracting process that is typically adversarial with a more cooperative and constructive one. It can also improve project communications, profitability, and quality while reducing costs, conflict, and exposure to litigation. Expected outcomes also include a better communication and understanding between both parties; and willingness to lose profit temporarily for the long-term benefit of both parties. Through partnering, there can be an increase in the trade work of construction; reduction in the construction period; reduction in the number of claims and potential expenditure in disputes resolution; improvement in the responsiveness to unforeseen problems; and an increase in the chance to get more jobs.

Factors Considered in Successfully Implementing the “Partnering”

As per the literature review, there are twenty key factors identified and included in the questionnaire that are believed to affect the successful implementation of partnering. The respondents were asked to rate each factor according to the degree of importance
with 1 as very important, 2 as moderately important, 3 as less important, 4 as not important and 5 as not relevant.

The following Figure 9-2 shows the results of the survey.

![Figure 9-2](image-url)

**Figure 9-2 – Factors Considered in Successfully Implementing the Partnering**

Legend:

- B01 Legal Aspects
- B02 Contractual Issues
- B03 Financial Aspects
- B04 Efficiency
- B05 Quality Assurance
- B06 Innovation, Technology, Methodology
- B07 Partnering Philosophy
- B08 Supply Chain
- B09 Trade Practice
- B10 Project Management Practice
- B11 Complexity of Works
- B12 Organizational Culture
- B13 Claims Attitude
- B14 Work Relationship
- B15 Risk Management
- B16 Programme of Works
Knowledge Management (KM) Using Enterprise Resource Planning (ERP) System

B17  Workload
B18  Resources Availability
B19  Competition
B20  Language Barrier

Rate according to importance (1=Very important, 2=Moderately important, 3= Less important, 4=Not important, 5=Not relevant)

It can be concluded that “Efficiency”, “Work Relationship” and “Organizational Culture” are the top three significant factors considered in successfully implementing the partnering. The modal values of “Very important” for these factors are 63%, 58% and 53% respectively which means over half of the respondents rank them very critical to making partnering successful.

Areas of Partnering Implementation
There are following six areas suggested for the implementation of partnering:

- Domestic subcontractors include Excavator, Concrete Placement, Reinforcement Fixer, Bricklayer, Plasterer/Tiler, Carpenter/Joiner, Plumber, Drain-layer, Steel & Metalworker, Structural Steel Worker, Form-worker, Painter, and Window Installation
- Major suppliers include Concrete, Reinforcement, Cement, Sand, Tiles, and Sanitary Fittings
- Mechanical and Electrical subcontractors include Lift, Escalator, Ventilation, Fire Services, Electrical, IT System
- Consultants
- Other subcontractors not listed above under the “Domestic subcontractors” category
- Other suppliers not listed above under the “Major suppliers” category

The respondents were asked to rate suitability with 1 as very suitable, 2 as suitable, 3 as cannot determine, 4 as not suitable, and 5 as very unsuitable.
The following Figure 9-3 shows the results of the survey.

![Figure 9-3 – Areas of Partnering Implementation](image)

Legend:

C01 Domestic Subcontractors
C02 Major Suppliers
C03 M&E Subcontractors
C04 Consultants
C05 Other Subcontractors
C06 Other Suppliers

The first suggested area of partnering implementation is “Domestic Subcontractors”. 58% of the respondents agree it is suitable because works complexity is lower, it can save time and money in the long term; and it is easy to control and implement.

The second suggested area of partnering implementation is “Major Suppliers”. Although 58% of the respondents feel this area are very suitable, 11% of them rank it very unsuitable. The reasons for its suitability are that partnering can ensure substantial quantities of material are available at lower price fluctuations throughout the contract period; avoid major contractual variances leading to dispute and long term collaboration means lower cost, and more competitiveness in the market. However, one respondent ranked it very unsuitable because it is difficult to compromise the strategies between main contractors and suppliers.

The third suggested area of partnering implementation is “M&E Subcontractors”. 47% of the respondents agree this area is very suitable and argue that they are the specialists
and experts in a particular field; partnering can improve productivity and quality through better communication.

The fourth suggested area of partnering implementation is “Consultants”. 57% of the respondents feel this area is very suitable. However, 11% of them rank it very unsuitable. Those who feel it is very suitable comment that close and co-operative partnering relationships improve communication in design and coordination, thereby reducing disputes. On the contrary, the reason for ranking it very unsuitable was because it is difficult to work with the client’s agency as a partner.

The fifth suggested area of partnering implementation is “Other Subcontractors”. 74% of the respondents are not able to determine the suitability of this area. However, two of the respondents have the same suggestion that partnering is very suitable for tunnelling work. Because such heavy civil work is a very complicated operation, the involvement of subcontractors at the early stages is highly recommended.

The sixth suggested area of partnering implementation is “Other Suppliers”. 68% of the respondents are not able to determine the suitability of this area and only 26% feel that it is suitable. Some respondents suggest that partnering can be applied for suppliers of consumables and office furniture, which could ensure lowest supply cost with best quality. However, it is not suitable for the selling of scrap material due to price fluctuations.

In addition, one respondent further suggests that it is especially suitable for consultancies such as independent checking engineering (ICE) or for alternative design. The reason is that they could obtain more innovative ideas for saving.

Most respondents agreed that partnering is very suitable for a “Major Supplier” and “Consultants”. The modal values of “Very suitable” for these two factors are 58% and 53% respectively. The significant reasons for its suitability are ‘ensuring most economic supply price”, avoiding major contractual variances leading to disputes and long term collaboration means lower cost.
Experience of Partnering
There were 17 respondents, as main contractors or subcontractors, experienced in partnering with clients and/or consultants. However, there was no partnering experience between main contractors and subcontractors. Two respondents, one from China, had zero experience in partnering because the organization from China did not realize the importance of partnering.

Effects on the “Partnering” Solution
The effects are viewed and classified as long-term advantages, short-term advantages, long-term disadvantages and short term disadvantages.

Long-Term Advantages of Implementing Partnering – Partnering helps in establishing trust and maintaining good working relationships among contractual parties which include clients, consultancies, subcontractors, and suppliers. It promotes good understanding among organizations that contributes to the smooth implementation of projects; better price offers and maintains competitive power in the market. It encourages a working environment and relationships where all partners contribute equally to the success of a project, less arbitrations and a win-win situation. A vital advantage of implementing partnering is that it brings more steady business opportunities to contractual parties. It improves efficiency of business performance in terms of cost, quality and time which result in better business performance. It helps in increasing business profit, reducing loss and getting reasonable and competitive prices for tendering. Partnering ensures constant supply of services or material without major impact due to market fluctuation. It also assures reliability of material supply, technical support and competitive prices. In addition, it is an effective and efficient problem-solving method. It helps in quick resolution of any disputes, and it makes easy the adoption of value engineering.

Short-Term Advantages of Implementing Partnering – These include securing the project, cutting down administrative works, solving the cash flow problem, and maintaining competitive prices. Good public relations are also exercised by
maintaining a good working relationship with other organizations. Communication is improved since a platform for better dialogue is provided. Through partnering, stakeholders can concentrate on building the design instead of identifying liabilities or risks. It ensures quality and timely completion of projects at a relatively low price. It resolves problems quickly and unnecessary arguments, particularly on site level coordination.

Long-Term Disadvantages of Implementing Partnering – Six respondents were not able to find any long-term disadvantages, but one respondent, a Contracts Manager, views lack of competitiveness as one long-term disadvantage of implementing partnering. This is because of reliance on a single supplier or subcontractor which results in loss of touch with the open market, and loss of opportunities. There is also a shortage in innovation and a lack of bargaining power since only one source is usually tapped. Because of differences in opinion, arguments may occur. If arguments are not resolved quickly, partnerships tend to become difficult to maintain. At other times, employers tend to take advantage of stakeholders. Thus, the selection of a good partner is important to prevent catastrophic outcomes. Moreover, trust between parties does not show up until some years into the relationship. This is because not all parties are contributing equally to achieve business success.

Short-Term Disadvantages of Implementing Partnering – Seven respondents are not able to identify short term disadvantages, but one respondent, a Quantity Surveyor, stated that one short-term disadvantage of implementing partnering may be experienced when subcontracting partners have finance or supervision problems and funding or other kinds of assistance may be needed. Higher costs may be incurred by organizations due to lack of competition. Also, loss of profit may occasionally be experienced due to a partner’s lack of capability, financial shortage or other reasons. Other disadvantages include loss of claims entitlement, lack of incentive, holding meetings for the sake of meetings, increase of internal procedures, and lack of contractual records for late information.
Selection Criteria of “Partners”

As per the literature review, there are nineteen criteria identified and included in the questionnaire that are believed to affect the selection of partners. The respondents were asked to rate each factor according to the degree of importance with 1 as very important, 2 as moderately important, 3 as less important, 4 as not important and 5 as not relevant.

The following Figure 9-4 shows the results of the survey. (n=19)

Figure 9-4 – Selection Criteria of Partners

Legend:
F01  Financial Scope
F02  Commitment to Programme
F03  Past Performance
F04  Previous Working Relationship
F05  Innovation
F06  Parent Company Support
F07  Use of Information Communication Technology
F08  Subcontracting Policy
F09  Trade / Product / Industry Qualification
F10  Work in Progress
F11  Quality Assurance Systems
F12  Risk Management
From these nineteen criteria, four of them were rated as very important in the selection decision. They are “Past Performance”, “Financial Scope”, “Commitment to Programme” and “Previous Working Relationship”. The modal values of “Very important” for these criteria are 74%, 58%, 53% and 53% respectively which means that over half of the respondents rank them as very critical in selecting partners.

Impact of Partnering Implementation

Respondents shared their views on the impact of partnering in organizations. Positive impacts of partnering include a positive change in company culture and practice from top level down to bottom level. Better business performance through shared experience and knowledge between parties may also happen. Improved communication and collaboration with suppliers and subcontractors may take place to improve performance of projects. Another impact of partnering is the increase in the organization’s competitiveness in the market since both parties want to benefit from the collaboration. This results in a higher chance of a lower tender price. Partnering also increases brand value. A good working relationship between parties is regarded as an important asset. This tends to result in a more steady work order and supply contract, as well as the establishment of long-term partnerships which assures excellent services offered to customers. Fewer disputes also occur between parties. On the other hand, four respondents conveyed negative effects. One of them pointed out partnering may cause his organization to suffer acceleration cost to maintain own reputation. Also, staff resources may be reduced. Two respondents considered that there can be potential loss
of some good performance suppliers or subcontractors as they may not be willing to adopt the partnering method.

**View on Relationship in Partnering**

One of the participants from China stated that relationship is “Very important”, despite the fact that he has zero experience in partnering. 3 respondents agreed that having good communication between partners is important in achieving business success. Both parties should be open, honest, reliable, helpful and cooperative. They should have the same vision and interest to promote innovations, quality and cost-effective business solutions. However, maintaining a good relationship between parties is very difficult to attain due to different cultures. Sometimes, the relationship between partners, which is good at the beginning of a project gradually, becomes shaky as time passes and the budget is tightened. There are also possibilities that partners tend to look for their own benefit. At times, partners just want to get the job without thinking of contributing to the partnering process. Disputes, arguments and conflicts are inherent in partnerships. This may be the result of differences in beliefs and opinions. Thus, overcoming them is very important in the partnering agenda for every involved party.
9.8 Appendix F - Exploratory Survey for Leadership (Survey 3)

9.8.1 Questionnaire of Survey 3

RESEARCH QUESTIONNAIRE

Respondent Number: ______

Leadership, Power and Culture

Objective: The aim is to study the relationship of leadership, power and culture in the strategies formulation and implementation

To the Respondent: All information that will be obtained in this study will be kept confidential.

Name: ____________________  Age: ______ Gender: ________ Male (M) / Female (F)
(A) below 30; (B) 30-35; (C) 35-40; (D) above 40
Position: ________________  Profession: ________________ ( )
(A) Secondary, (B) Undergraduate, (C) Postgraduate
Education: ________________  ( ) Years in the Industry
         ( ) Years in the Organisation

A. Leadership, Power and Culture

Rate according to importance (1=Very important, 2=Moderately important, 3=Less important, 4=Not important, 5=Not relevant)

A1. What is your view of the importance of leadership in strategies formulation and implementation?

1 2 3 4 5

A2. What is your view of the importance of power for a leader in strategies formulation and implementation?

1 2 3 4 5

A3. What is your view of the importance of culture impact on power to a leader in strategies formulation and implementation?

1 2 3 4 5
### B. Leadership and Power

**B1. As a follower, please rank your preferred style of leadership.**

*Please rank from 1 - 6.*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Laissez-faire</td>
</tr>
<tr>
<td>b.</td>
<td>Democratic</td>
</tr>
<tr>
<td>c.</td>
<td>Autocratic</td>
</tr>
<tr>
<td>d.</td>
<td>Bureaucratic</td>
</tr>
<tr>
<td>e.</td>
<td>Transactional</td>
</tr>
<tr>
<td>f.</td>
<td>Transformational</td>
</tr>
</tbody>
</table>

**B2. Please rate the importance of following sources of power to a leader.**

*Rate according to importance (1=Very important, 2=Moderately important, 3= Less important, 4=Not important, 5=Not relevant)*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Formal authority</td>
</tr>
<tr>
<td>b.</td>
<td>Control of scarce resources</td>
</tr>
<tr>
<td>c.</td>
<td>Use of rules, and regulations</td>
</tr>
<tr>
<td>d.</td>
<td>Control of decision process</td>
</tr>
<tr>
<td>e.</td>
<td>Control of knowledge</td>
</tr>
<tr>
<td>f.</td>
<td>Control of information</td>
</tr>
<tr>
<td>g.</td>
<td>Control boundaries</td>
</tr>
<tr>
<td>h.</td>
<td>Ability to cope with uncertainty</td>
</tr>
<tr>
<td>i.</td>
<td>Control of technology</td>
</tr>
<tr>
<td>j.</td>
<td>Interpersonal alliances and networks</td>
</tr>
<tr>
<td>k.</td>
<td>Control of &quot;informal organisation&quot;</td>
</tr>
<tr>
<td>l.</td>
<td>Control of counter-organisations</td>
</tr>
<tr>
<td>m.</td>
<td>Symbolism</td>
</tr>
<tr>
<td>n.</td>
<td>Gender and the management of gender relations</td>
</tr>
<tr>
<td>o.</td>
<td>Use of organisational structure</td>
</tr>
</tbody>
</table>
B3. Please rank the style of leadership, in your opinion, reply power more to maintain his/her leadership.
Please rank from 1 - 6.

a. Laissez-faire
b. Democratic
c. Autocratic
d. Bureaucratic
e. Transactional
f. Transformational

B4. Which style of leadership can be found in your organisation?
Rate according to occurrence (1=Always, 2=Often, 3=Sometimes, 4=Seldom, 5=Never)

a. Laissez-faire
b. Democratic
c. Autocratic
d. Bureaucratic
e. Transactional
f. Transformational

C. Culture and Power

C1. Which of the following national cultures, in your opinion, reply power more frequent in making decision?
Detail countries for each national cultures as per Annex
Please rank from 1 - 10.

a. South Asia
b. Anglo
c. Arab
d. Germanic Europe
e. Latin Europe
f. Eastern Europe
g. Confucian Asia
h. Latin America
i. Sub-Sahara
j. Nordic Europe
C2. Which of the following national cultures, in your opinion, will provide more power to the leader in making decision?

Please rank from 1 - 10.

<table>
<thead>
<tr>
<th>Country</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Asia</td>
<td></td>
</tr>
<tr>
<td>Anglo</td>
<td></td>
</tr>
<tr>
<td>Arab</td>
<td></td>
</tr>
<tr>
<td>Germanic Europe</td>
<td></td>
</tr>
<tr>
<td>Latin Europe</td>
<td></td>
</tr>
<tr>
<td>Eastern Europe</td>
<td></td>
</tr>
<tr>
<td>Confucian Asia</td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td></td>
</tr>
<tr>
<td>Sub-Sahara</td>
<td></td>
</tr>
<tr>
<td>Nordic Europe</td>
<td></td>
</tr>
</tbody>
</table>

C3. Which of the following national-cultural value norms is most relevant to leadership and organisational practices?

Please rank from 1 - 9.

<table>
<thead>
<tr>
<th>Value Norm</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance orientation</td>
<td></td>
</tr>
<tr>
<td>Future orientation</td>
<td></td>
</tr>
<tr>
<td>Assertiveness</td>
<td></td>
</tr>
<tr>
<td>Power distance</td>
<td></td>
</tr>
<tr>
<td>Humane orientation</td>
<td></td>
</tr>
<tr>
<td>Institutional collectivism</td>
<td></td>
</tr>
<tr>
<td>In-group collectivism</td>
<td></td>
</tr>
<tr>
<td>Uncertainty avoidance</td>
<td></td>
</tr>
<tr>
<td>Gender discrimination</td>
<td></td>
</tr>
</tbody>
</table>

D. Making Decision

D1. Has/have the leader(s) of your organisation used power positively in making decision?

Yes [ ]

Why: ____________________________________________

No [ ]

Why: ____________________________________________
D2. What do you think of the outcome(s) if power is not used positively in making decision?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

D3. What is/are your opinion(s) about leader? ethical concerns in exerting power?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

D4. What is/are the adverse effect(s) if power is not used positively?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

E. Empowerment

E1. What of the following is the important essence for empowerment?

Rate according to importance (1=Very important, 2=Moderately important, 3=Less important, 4=Not important, 5=Not relevant)

a. Psychology
b. Expertise
c. Hierarchy
d. Trust-worthy
e. Delegation
f. Ability
g. Experience
h. Situation
i. System
E2. What is the degree of empowerment in your organisation?
Rate according to importance (1=Very important, 2=Moderately important, 3=Less important, 4=Not important, 5=Not relevant)

1 2 3 4 5

E3. Do you agree leader should empower his/her subordinates to make decision?

Yes □
Why: ________________________________
______________________________
______________________________
______________________________
______________________________
No □
Why: ________________________________
______________________________
______________________________
______________________________
______________________________

E4. What are the advantages of empowerment?
______________________________
______________________________
______________________________
______________________________
______________________________

E5. What are disadvantages of empowerment
______________________________
______________________________
______________________________
______________________________
______________________________

~ END ~
### Annex to Questionnaire

#### National Cultures

<table>
<thead>
<tr>
<th>South Asia</th>
<th>Indonesia</th>
<th>Philippines</th>
<th>Malaysia</th>
<th>Thailand</th>
<th>Iran</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angie</td>
<td>England</td>
<td>Australia</td>
<td>South Africa (White Sample)</td>
<td>Canada</td>
<td></td>
</tr>
<tr>
<td>Arab</td>
<td>Qatar</td>
<td>Morocco</td>
<td>Turkey</td>
<td>Egypt</td>
<td>Kuwait</td>
</tr>
<tr>
<td>Germanic Europe</td>
<td>Austria</td>
<td>Switzerland</td>
<td>Netherland</td>
<td>Germany</td>
<td></td>
</tr>
<tr>
<td>Latin Europe</td>
<td>Israel</td>
<td>Italy</td>
<td>Portugal</td>
<td>Spain</td>
<td>France</td>
</tr>
<tr>
<td></td>
<td>Switzerland (French Speaking)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>Hungary</td>
<td>Russia</td>
<td>Kazakhstan</td>
<td>Albania</td>
<td>Poland</td>
</tr>
<tr>
<td></td>
<td>Germany</td>
<td>Slovenia</td>
<td>Georgia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confucian Asia</td>
<td>Taiwan</td>
<td>Singapore</td>
<td>Hong Kong</td>
<td>South Korea</td>
<td>China</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td>Costa Rica</td>
<td>Venezuela</td>
<td>El Salvador</td>
<td>Guatemala</td>
<td>Mexico</td>
</tr>
<tr>
<td></td>
<td>Colombia</td>
<td>Bolivia</td>
<td>Brazil</td>
<td>Argentina</td>
<td>Ecuador</td>
</tr>
<tr>
<td>Sub-Sahara</td>
<td>Namibia</td>
<td>Zambia</td>
<td>Zimbabwe</td>
<td>South Africa (Black Sample)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nigeria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nordic Europe</td>
<td>Finland</td>
<td>Sweden</td>
<td>Denmark</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.8.2 Analysis of Survey 3 – Leadership

The population of about 50 potential respondents comprising those from Survey 1 and 2 for “ERP implementation” and “Partnering viability” plus other senior managers was asked to complete the questionnaire in the survey. The number of participants is determined based on willingness to participate in the research and also special characteristics of participants to make sure perspectives gathered from the research would be as comprehensive as possible.

A total of 36 respondents were asked to complete the questionnaire and 32 replied, representing an (89%) response rate. The terms used in the survey instrument were clarified with each respondent in face-to-face meetings or over telephone-conversation so that there could no confusion about what was being asked. Finally, the result is analyzed under the following headings:

- Respondents’ profile;
- Respondents’ perception of leadership, power and culture in strategies formulation and implementation;
- Respondents’ views on relationship of leadership and power;
- Respondents’ views on relationship of culture and power;
- Respondents’ views on relationship of power and decision-making; and
- Respondents’ perception of empowerment.

Respondents’ Profile

Amongst those thirty-two respondents in this survey, eight of them have participated both the first (for ERP system) and second survey (for partnering). This represents 25% of the returned respondents. Three of them have participated the second survey (9% of the total).

Thirty-two respondents participated in this survey. They represent staff from building and civil engineering operations and the central supporting department. They include two responses from participants in China and five responses from expatriates from France, Canada, Australia and the United Kingdom.
The following descriptive statistics provide general demographic characteristics of the sample group. The sample selected could be categorized as having high levels of technical skill/knowledge and be well experienced in both the industry and the organization’s routines. This group should have knowledge of usefulness of the ERP and potential barriers to its practical and effective deployment within the organization including supply chain partners.

- In terms of age distribution 5 were below 30 years of age, 10 were between 30 and 35, 5 between 35 and 40 and 12 were above 40 years of age. Thus, the sample was slightly biased towards those above 35 years old (54%) when compared to those below 35 (45%)
- Nine were females and 23 male. The bias was largely in favor of male 72% against female (28%)
- The sample represents a knowledge worker group with 2 people having secondary school highest qualifications, 12 with undergraduate qualifications and 18 having post graduate qualifications
- In terms of experience in the construction industry, 6 people had between 3 and 8 years, 11 have 9 to 14 years, 7 had 15-20 years, 4 had 21 to 26 years and 4 people had 27-32 years of experience
- In terms of years in the organization, 17 people had between 2 and 5 years tenure, 5 had 7 to 11 years, 5 had 12 to 16 years, 4 had 17 to 21 years and 1 had 22 to 26 years with the organization
- In terms of their professional base, 18 people were quantity surveyors, 2 were procurement officer, 3 were building engineers, 1 was a structural engineer, 2 are information technology (IT) specialists and 6 people were civil engineers

Respondents’ Perception of Leadership, Power and Culture in Strategies Formulation and Implementation

A majority of the respondents (66%) considered leadership as a very important factor in strategies formulation and implementation (see Figure 9-5).
Aside from leadership, power is also deemed as necessary in establishing strategies and realizing them. Power was ranked as “very important” by 31% of respondents and “moderately important” by 56% of respondents (see Figure 9-6).

Similarly, much emphasis is given to the effect of culture on power to a leader who is making the decisions; 16% and 44% of respondents ranked it “very important” and “moderately important” respectively (see Figure 9-7).
Figure 9-7 – Importance of Culture Impact on Power

In summary, participants perceived a high or moderate level of importance of leadership in strategy development and deployment. Use of power and the cultural impact upon the leaders’ use of power to make effective ERP deployment decisions and partnering strategy was an important issue. This suggests that participants want their senior managers to be actively engaged in leading the ERP development and deployment. It also suggests that this company staff are aware of the need for leaders to use appropriate power.

Respondents’ Views on Relationship of Leadership and Power

The last sub-section established that respondent accepted and believed that leaders need to use power to influence followers and that it is important for leaders to align their use of power with cultural norms. This sub-section investigates the sources of power of a leader. A series of questions were asked about the important sources of power that were available to be used by leaders, and the degree to which the respondents felt that these sources were applied. Results from these questions could then be used to highlight the preferred sources of power that leaders should apply.
Table 9-5 indicates that “Control of the decision process”, “Formal authority”, “Ability to cope with uncertainty” and “Interpersonal alliances and networks” were viewed as the most important sources of power for a leader (the first tier).

Moreover, moderate importance is stressed on the following: “Use of rules and regulations”, “Control of scarce resources”, “Control of information”, “Control of knowledge”, “Control of informal organization”, “Control of technology”, and “Use of organizational structure” (the second tier of Table 9-5).

“Control boundaries”, “Control of counter-organizations” and “Management of gender relations” were considered as the least important aspects of power for a leader (the third tier Table 9-5). The latter issue may be reflected in the strong bias towards the sample being mainly male although this result may also have cultural overtones.

This leads to the style of leadership that was perceived to have been used. Respondents were asked to rank what they felt was needed in a leadership style to be used given a leader’s reliance on using power to maintain leadership. They were also asked to
nominate their perception of the actual management style experienced for this type of situation.

Table 9-6 – Ranking of Leadership Styles

<table>
<thead>
<tr>
<th>Perceived Leadership Style</th>
<th>Needed Rank</th>
<th>Agreement with rank</th>
<th>Actual Rank</th>
<th>Agreement with rank</th>
<th>Ranking Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autocratic</td>
<td>1</td>
<td>32/32</td>
<td>3</td>
<td>16/32</td>
<td>2</td>
</tr>
<tr>
<td>Bureaucratic</td>
<td>2</td>
<td>26/32</td>
<td>4</td>
<td>15/32</td>
<td>2</td>
</tr>
<tr>
<td>Democratic</td>
<td>3</td>
<td>23/32</td>
<td>1</td>
<td>23/32</td>
<td>2</td>
</tr>
<tr>
<td>Laissez-faire</td>
<td>4</td>
<td>17/32</td>
<td>2</td>
<td>20/32</td>
<td>2</td>
</tr>
</tbody>
</table>

It is interesting to observe that the data reveals a substantial gap between the leadership ranking as preferred versus the perceived actual situation. Table 9-6 illustrates the perceived needed management style in terms of reliance on power to maintain leadership and perceived actual leadership style. Respondents for example ranked autocratic as being perceived as being needed to for reliance on power to lead and make decisions with a laissez-faire style being ranked least in this area. However, they ranked their most preferred leadership style as democratic with bureaucratic as being their least preferred leadership style.

Figure 9-8 – Perceived Existing Leadership Style
Results indicated in Figure 9-8 provide some interesting observations. The dominant style appears to be bureaucracy combined with autocracy. A democratic style plays a more minor role with a laissez faire style playing an even more subservient style. This could be interpreted as meaning that leaders effectively use power in these predominant styles indicated in Table 9-6, because ERP deployment and partnering strategy are by nature a company-wide system and therefore needs adherence to corporate norms and rules. It also could reflect a conflicting application of power given the stated preferences for a more democratic leadership style desired as expressed in Table 9-6. However, flexibility in leadership style is suggested in Figure 9-8 with the background leadership styles that have been observed by survey participants. Certainly, Table 9-5 indicates that the power sources understood to be important suggests the need for leaders to be firm (if not tending towards autocracy) and the power instruments are highly transactional.

The paradox revealed in the results reported above relate to the issue of empowerment.

Respondents’ Views on Relationship of Culture and Power

Respondents were asked to rank the national cultures in related to culture and power when leaders are formulating and deciding strategy. Sub-Sahara and Nordic Europe were regarded as the national cultures which are frequently dependent on power in making decisions (see Table 9-7). Whilst, Confucian Asia was considered as the provider of power to leaders in decision-making (see Table 9-8).
Table 9-7 – National Cultures (Rely Power in Making Decision)

<table>
<thead>
<tr>
<th>National Cultures</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Sahara</td>
<td>1.5</td>
</tr>
<tr>
<td>Nordic Europe</td>
<td>1.5</td>
</tr>
<tr>
<td>Latin America</td>
<td>3</td>
</tr>
<tr>
<td>Confucian Asia</td>
<td>4</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>5</td>
</tr>
<tr>
<td>Latin Europe</td>
<td>6</td>
</tr>
<tr>
<td>Germanic Europe</td>
<td>7</td>
</tr>
<tr>
<td>Arab</td>
<td>8</td>
</tr>
<tr>
<td>Anglo</td>
<td>9</td>
</tr>
<tr>
<td>South Asia</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 9-8 – National Cultures (Provide Power to Leader in Making Decision)

<table>
<thead>
<tr>
<th>National Cultures</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confucian Asia</td>
<td>1</td>
</tr>
<tr>
<td>South Asia</td>
<td>2</td>
</tr>
<tr>
<td>Arab</td>
<td>3</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>4</td>
</tr>
<tr>
<td>Sub-Sahara</td>
<td>5</td>
</tr>
<tr>
<td>Anglo</td>
<td>6</td>
</tr>
<tr>
<td>Latin America</td>
<td>7</td>
</tr>
<tr>
<td>Germanic Europe</td>
<td>8</td>
</tr>
<tr>
<td>Latin Europe</td>
<td>9</td>
</tr>
<tr>
<td>Nordi Europe</td>
<td>10</td>
</tr>
</tbody>
</table>

Respondents were then asked to rank the relevance to them of cultural norms as they perceive them to be important to the quality of their leader’s decision making and ability to facilitate the ERP system’s deployment. Table 9-9 illustrates the consensus of results with rank and degree of agreement at that rank. The list of dimensions used is derived from the GLOBE study.
Table 9-9 – National-Cultural Value Norms Relevant to Leadership and Organizational Practice

<table>
<thead>
<tr>
<th>Cultural Norms (dimensions) Relating to Leadership and Power Use</th>
<th>Perception of Importance Ranking</th>
<th>Degree of agreement with rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance orientation</td>
<td>1</td>
<td>32/32</td>
</tr>
<tr>
<td>Organizational collectivism</td>
<td>2</td>
<td>31/32</td>
</tr>
<tr>
<td>In-group collectivism</td>
<td>3</td>
<td>27/32</td>
</tr>
<tr>
<td>Future orientation</td>
<td>4</td>
<td>25/32</td>
</tr>
<tr>
<td>Power distance</td>
<td>5</td>
<td>24/32</td>
</tr>
<tr>
<td>Humane orientation</td>
<td>6</td>
<td>23/32</td>
</tr>
<tr>
<td>Uncertainty avoidance</td>
<td>7</td>
<td>23/32</td>
</tr>
<tr>
<td>Assertiveness</td>
<td>8</td>
<td>20/32</td>
</tr>
<tr>
<td>Gender equalitarianism</td>
<td>9</td>
<td>15/32</td>
</tr>
</tbody>
</table>

The ranking of these dimensions or norms illustrated in Table 9-9 suggests that the respondents had strong elements of Anglo performance based values (ranked 1 of the 9). This further suggests a preference for a democratic leadership style. However, Confusion cultural values that could favor an authoritarian style of leadership occupied ranks 2 through 9. The ranking therefore indicates that the participants’ leadership style needs and that which they experienced, relates more closely to the ranking choices expressed in Table 9-6. The implication of this is that the leader must balance the predominantly Confusion style of leadership that is based on a highly collectivist cultural norms with a predominant (ranked 1) Anglo or Western ranking for a performance norm. This sets up an interesting tension in providing the necessary leadership style due to the paradox that is inherently part of the cultural norms of this group. The impact of this upon leadership is that leaders need to balance delicately between expecting and demanding performance at the individual as well as group level while maintaining and recognizing the need for engendering harmony within groups to avoid destroying much of the social capital that is developed in such cultures.

Respondents’ Views on Relationship of Power and Decision-Making

Respondents were asked for the following questions:

- Has/have the leader(s) of your organization used power positively in making decision?
• What do you think of the outcome(s) if power is not used positively in making decision?
• What is/are your opinion(s) about leader’s ethical concerns in exerting power?
• What is/are the adverse effect(s) if power is not used positively?

Most of respondents (78%) agreed that the leader(s) of the organization used power positively in making decisions. The reasons are that both the role and power demarcations of individual positions are clearly identified within the organizational structure.

The organization’s document of the “Delegation and Limits of Authority” has clear indications of the power of different levels as well as some mechanism governing the application of power to ensure that it is not exceeded and abused and that leaders comply with the regulations. Respondent 10 (a Project Manager) said, “In almost all the cases, the decision making is clearly from top down and with clear vision into the future, not just looking at the current situation.” [sic] Respondent 11 (a Quantity Surveyor) added, “Sometimes we have multiple tasks on hand at the same time; we need the leader to have overall plan and make the right decision in the constraint time.” [sic] Respondents generally agreed that leaders have been making decisions and using their delegated power with their experience, knowledge and ability, in the right way. Decisions have been made in a proper manner about which people within the organization are informed and they understand the rationale of those decisions.

Respondents were asked for the possible outcome(s) if power is not used positively in making decisions. The responses were summarized below:
• Increased non-productive time
• Management bombs are set within the organization because the overall performance of the organization will be pulled down
• Role ambiguities to the subordinates and dissatisfaction from subordinates leading to disloyalty and no sense of collectivity to the organization
• Creation of unnecessary arguments
• The relevant question becomes much more difficult to solve
Respondents also felt that a leader must have moral leadership and ethics. These are very important and if moral leadership and ethical practices are not observed, the entire organization may be negatively affected. Respondent 8 (a Hong Kong Quantity Surveyor working 6 years in the studied organization) said, “Equal opportunities and Racialism are the delicate area of highlights when exerting power of leadership. The result may lead to a sorrow court case of discrimination upsetting the reputation (brand name) of the organization.” [sic] Respondent 11 (a Hong Kong Quantity Surveyor working 4 years in The studied organization) pointed out, “For Western culture, not rely on power frequency in making decision and try to collect all opinions from the participants; For Eastern culture, more rely on the power frequency and require loyalty without hesitation.” [sic] As the decision making power of top management is very important to the survival of the organization, if there is an ethical problem involved in the process, it is very difficult to bring to an end. Therefore, a leader should be a role-model, displaying a positive attitude, exemplary behavior, suitable morals, lack of bias and integrity, for subordinates to follow. When a leader exerts power for the purpose of work but it is not his/her personal preference, it must be done in the right place, at the right time and in the right way. In addition, leaders should not have personal monetary gain in exerting power; he/she should be impartial, fair and
transparent. The leader must have a clear mind when exerting his authorized power and a clear understanding of the limits of his power.

On the other hand, when respondent were asked to comment on what would occur if power is not used positively the following was seen to apply:

- The relevant question may become more difficult to solve.
- Duplicate the works.
- Affect the tender or project price and profit.
- Discourage morale.
- Breeding malpractices.
- Increased non-productive time.
- Dissatisfaction from subordinates leading to decreased productivity and inefficiency.

In addition, respondents pointed out some other adverse effects if power is not used positively in making decisions; the organization will lose money and its reputation, there will be an increase in the organization's exposure to risk. This damages the morale of the team members and may destroy the trust and loyalty of the median and junior management level. In turn, it becomes difficult to create good relationships and co-operation among colleagues.

Respondents said that power corrupts and the leaders of the organization may become autocratic. The objectives and planning of the organization may fail. Productivity would then be reduced and the organization would collapse if all the staff followed a similar practice. Customers would also lose faith in the organization. If a leader repeatedly used his/her power in a negative manner, there would be uncertain outcomes, no clear direction or decisions followed. People in the organization would no longer perform well under his/her orders.

In summary two inferences may be made. Because 78% of the respondents felt that the leaders used power positively we may assume that power was indeed applied positively. Second, answers to open-ended questions revealed about possible consequences in the above related to the absence of deleterious consequences for not
using power positively. This infers that the respondents had a sound understanding of the questions asked and support their view of the leader’s use of power positively.

Respondents’ Perception of Empowerment

As per the literature review, there are nine essences for empowerment identified and included in the questionnaire: Psychology, Expertise, Hierarchy, Trust-worthy, Delegation, Ability, Experience, Situation and System.

The respondents were asked to rate each factor according to the degree of importance with 1 as very important, 2 as moderately important, 3 as less important, 4 as not important and 5 as not relevant.

Figure 9-9 illustrates detailed results that provide insights into the constituent elements of empowerment that were valued by respondents.

Most of the respondents viewed “Psychology” (3% viewed “very important” and 47% ranked “moderately important”); “Experience” (34% viewed “very important” and 44% ranked “moderately important”); “Trustworthy” (53% viewed “very important” and 25% ranked “moderately important”); “Delegation” (34% viewed “very important” and 34% ranked “moderately important”); “Ability” (59% viewed “very important” and 28% ranked “moderately important”); and “Expertise” (44% viewed “very important” and 50% ranked “moderately important”) as necessary in empowerment.
In summary, most of the respondents viewed the behavior elements of “Expertise”, “Trustworthy”, “Ability” and “Experience” as standing out as being essential for empowerment. The elements “Psychology”, “Hierarchy” and “Delegation” were rated as necessary in empowerment but of moderate or lesser importance. “Situation” and “System”, however, were considered moderate to less important for empowerment. These results are strongly supported by the literature on trust. They also indicate that the respondents had a good understanding of the nature of key elements of a trust relationship between leaders and followers.

The respondents were then asked to rate the degree of empowerment in the organization with 1 as very important, 2 as moderately important, 3 as less important, 4 as not important and 5 as not relevant to their experience in ERP deployment, partnering strategy and formulation of company’s strategy.
As per Figure 9-10, findings showed that 3 respondents (9%) felt empowerment to be very important, 26 people (81%) felt it to be moderately important and 3 (9%) felt it to less important. Thus, (9+81=90%) of the respondents generally believed that empowerment is manifested in the studied organization. These empowerment ratings strongly support the cultural norms shown in Table 9-5 where performance was ranked as first –being relevant and ahead of many of the cultural dimensions. This indicated a preferred autocratic and bureaucratic expected leadership style. However, in Table 9-6 the actual experienced style was indicated as democratic and then laissez-faire. This presents additional interesting insights into tensions between leaders exerting a more democratic or laissez faire style for this cultural rather than an autocratic or bureaucratic one.

Further qualitative open-ended questions do yield findings relevant to Figure 9-10. Respondent 1 (a Senior Quantity Surveyor working in the studied organization 12 years) said, “On some circumstance, subordinates should be empowered to make decision in order to widen their exposure and to feel the similar mind of a leader.” [sic] Respondent 3 (a Managing Quantity Surveyor working 8 years in the studied organization) shared a similar view,

“It is absolutely true that leaders cannot do everything. A clear delegation of power to subordinates is necessary for the smooth operation of business.”
Respondent 9 (a senior Project Quantity Surveyor working 5 years in the studied organization) agreed,

“The leader cannot do everything himself/herself, he/she should delegate some power to his/her subordinates to make some minor decision, but the guideline should be very clear what is minor.” [sic]

Most of the respondents agreed that empowerment is a kind of delegation and is based on trust. This promotes learning, progression, responsibility and expression. It also provides training and development opportunities for followers and frees up the leader’s time to focus on bigger issues. Therefore, efficiency of decision-making; job satisfaction, a sense of belonging to the organization and staff morale are promoted. This may also be a successful method of leadership training for potential successors to the leader. By allowing subordinates to be more initiated and accountable, performance is enhanced. Through empowerment, leaders are able to collect more ideas and subordinates have more opportunities to expose their leadership skills when making decisions. This leads to greater confidence and contribution to the organization. In the end, the status of a rising star has been built up gradually.

When respondents were asked for their views of the advantages and disadvantages of empowerment in an organization, they were able to point out the differences. These together with the comments cited above further enlighten us into the reality of the conflict and tensions resulting from the paradox of the respondents’ expressed need for more direction and a more autocratic and bureaucratic leadership style and the experienced style which appears to have been more democratic (as actual in Table 9-6). Perceived advantages and disadvantages of empowerment are provided below.

- Advantages of empowerment in an organization were as follows:
  - Efficiency in work can be increased because the processes in the organization flow.
  - Resources can be utilized efficiently.
  - Decision-making becomes more flexible.
  - Decisions can be made quickly and effectively.
• Leaders (those who empower) can be released from too much stress and pressure in working.
• The subordinates (those who are empowered) can become efficient, confident, knowledgeable, and equipped.
• Unity, sense of belonging, and job satisfaction can increase among leaders and subordinates.

- Disadvantages of lack of empowerment in an organization were as follows:
  • Loss of profit can happen since improvement on the process is limited.
  • Resources can be wasted and overspent since there is a lack of careful planning.
  • Outputs may not be delivered on time as a result of a chaotic system. The staff delegated to deliver the results may be incapable.
  • Confidential information can leak out as a result of unimproved organizational structure.
  • Controlling subordinates can become difficult
  • Decisions can become biased, weak and inconsistent.
  • Conflicts can arise among subordinates and leaders.
  • It would be hard to define the level of authority in most areas.
  • Dictatorship can happen since no future leaders can be trained. Hence, the existing leader can monopolize the processes in the organization.
  • Standardization and coordination of activities can become complex which can result in inefficiency among employees.

In summary, it becomes clear that empowerment behavioral elements must be matched to cultural expectations. The leadership style preferred as expressed in Table 9-6 was autocratic and bureaucratic which is line with what we would expect in a mostly Confucian cultural setting; however the actual experienced leadership style was reported as democratic. The most importantly ranked behaviors illustrated in Figure 9-9 are trust based on performance elements and interestingly, slightly less highly rated were behaviors relating to “Hierarchy” and “Delegation” as well as “Psychology”. This infers the kind of deference to formal authority and respect for the leaders’ face in being in charge that one would expect from this cultural setting. The outcome of robust...
empowerment would be a workplace where the leader would seek participants to volunteer ideas and criticism of current practices based upon their knowledge, experience and ability. Clearly, these empowerment behaviors can clash with cultural norms. Therefore, the proper leadership style and aspirations of participants towards empowerment present real challenges for all concerned and require a delicate balance that acknowledges cultural norms and practices.