KNOWLEDGE MANAGEMENT: AN EXPLORATORY STUDY ON OIL AND GAS CONTRACTORS IN MALAYSIA

by

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ABSTRAK

Pengurusan ilmu (KM) dikatakan boleh meningkatkan prestasi organisasi dan kelebihan persaingan. Kajian ini menyelidik samada kontraktor asing dan tempatan dalam sektor minyak dan gas mengurus ilmu mereka dan kalau ya, bagaimana. Secara spesifik, ia melihat bagaimana ilmu dicipta, disimpan, dikongsi dan dilindungi. Selain daripada itu, budaya organisasi, struktur, pengurusan sumber manusia dan teknologi maklumat yang berkaitan dengan KM diselidiki. Pendekatan siasat-disrkriptif yang menggunakan kajian kes berganda digunakan dalam kajian ini. Data dikumpulkan melalui borang soal selidik, temuramah dan data sekunder. Daripada 90 kontraktor minyak dan gas di Malaysia yang diketahui, 12 (5 buah syarikat asing, 7 buah syarikat tempatan) menjadi kajian kes bagi penyelidikan ini. Daripada 5 buah syarikat asing, 4 mengurus ilmu mereka secara sistematik. Diperhatikan bahawa hubungan ibu pejabat-subsidiari mempunyai pengaruh penting ke atas KM. Bagi 7 buah syarikat tempatan, cuma 1 syarikat didapati mengurus ilmunya dengan bertujuan manakala 3 buah syarikat pula sedang atau dalam penyediaan untuk berbuat demikian. Faktor-faktor kemungkinan bagi penerimaan atau penghindaran KM adalah klien, pesaing antarabangsa, perkembangan ilmu, ketidaksinambungan teknologi, saiz dan pengurusan teratas. Bagi 4 kontraktor minyak dan gas yang mengurus ilmu mereka secara aktif, budaya, struktur, pengurusan sumber manusia dan teknologi maklumat digunakan dalam cara dan kadar yang berbeza untuk KM. Disebabkan kajian ini

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KNOWLEDGE MANAGEMENT: AN EXPLORATORY STUDY ON OIL AND GAS CONTRACTORS IN MALAYSIA

ABSTRACT

Knowledge management (KM) is said to improve organisational performance and increase competitive advantage. This study investigates whether foreign and local oil and gas contractors in Malaysia purposively manage their knowledge asset, and if so how. Specifically it looks into how knowledge is created, captured, stored, shared and protected. Additionally, organisational culture, structure, human resource management and information technology in relation to KM are explored. The investigative-descriptive approach using multiple case studies was adopted. Data was collected and triangulated using postal questionnaires, interviews and secondary sources. Out of the 90 known oil and gas contractors in Malaysia, 12 (5 foreign and 7 local), became the case studies for this research. Of the 5 foreign companies, 4 manage their knowledge systematically. Headquarters-subsidiary relationship is found to have an important influence on KM. Of the 7 local companies, only 1 manages its knowledge asset purposively and 3 are either in the midst or planning to do so. The possible factors behind the decision to adopt or avoid KM are clients, international competitors, knowledge expansion, technological discontinuity, size and top management. Of the 4 foreign and local oil and gas contractors that manage their knowledge actively, culture, structure, human resource management and information technology are used in varying ways and degrees for KM. Since this is an exploratory study, further research is recommended to investigate interesting points highlighted by the findings.

CHAPTER 1 – INTRODUCTION

1.1 Background

The concept of KM emerged in the early 1990s. Scholars (e.g. Brown and Duguid, 1991; Davenport et al., 1996; Kogut and Zander, 1992) argue that organisations should treat their knowledge as a valuable strategic asset. An organisation must efficiently and effectively create, disseminate, reuse, embed, store and protect knowledge and expertise (e.g. Hansen et al., 1999; Cross and Baird, 2000; Mohrman et al., 2002). KM utilises a broad range of enabling tools, technologies, managerial practices, including organisational culture (Nonaka and Takuechi, 1995; Albert and Picq, 2004), organisational structure (Brown and Duguid, 2001; Storck and Hill, 2000), human resource management (Robertson and Hammersley, 2000; Desouza and Awazu, 2003) and information technology (Alavi and Leidner, 1999; Armistead and Meakins, 2002) to produce bottom-line benefits by making better use of an organisation's intellectual capital (Davenport and Prusak, 1998).

In Malaysia, oil was discovered in the 1880s whereas gas in the 1960s, stimulating many upstream and downstream activities in the process. The oil and gas sector has become one of the nation's key economic sectors. It is the largest tax-payer and the biggest hard-currency earner (Anonymous, 2004). The discovery of deepwater oilfields in Malaysia recently has brightened up the industry. Thus, the future looks promising for companies involved in this sector. The exploration and exploitation of the oil and gas resources were initially done by foreign oil and gas companies. Since its inception in 1974, Petronas has

played an important role in assisting the development of the country's oil and gas resources. Petronas has endeavoured to get as many local companies as possible to participate in this sector. However, oil and gas industry is very challenging, not least because of the advances in engineering technology. Only those that are able to manage themselves in this competitive condition survive.

1.2 Problem Statement

Oil and gas contracting is knowledge intensive. Knowledge is expanding rapidly in the oil and gas industry (Isherwood, 2000) due to the rapid changing technologies. The literature suggests that KM is being practised in the oil and gas industry in developed countries. However, the extent to which KM is practised by the subsidiaries of foreign oil and gas companies in Malaysia is indeterminate. Similarly, the extent to which KM is practised by Malaysian oil and gas contractors has not been documented. Thus, the problem statement for this research can be stated as follows: The state of KM of oil and gas contractors (foreign and local) in Malaysia is not known.

1.3 Research Question

With rapid expansion in knowledge base (Isherwood, 2000) and the depletion of experienced workforce (Troxler and Lauche, 2003), the management of knowledge becomes even more critical (Troxler and Lauche, 2003). Many companies in various industries have been found to practice KM with good effect (Laurie, 2002; Abdul-Aziz and Lim, 2004; Gils and Zwart, 2004; Baark, 2005; Abdul Samad Kazi, 2005). Thus, research questions arose:

1. To what extent do foreign and local oil and gas contractors in Malaysia adopt KM.
2. How do the KM processes unfold in the companies that adopt KM?
3. How do KM enablers exert on the companies that adopt as well as do not adopt KM?

1.4 Research Objectives

This research aims to investigate whether the oil and gas contractors in Malaysia had purposively managed their knowledge asset, and if so how. The knowledge that is the interest of the research is the project management and engineering expertise. Below are the objectives to be achieved in order for this aim to be met:

1. To determine whether foreign and local oil and gas contractors in Malaysia adopt KM.
2. To examine the KM processes of those companies that adopt KM.
3. To explore KM enablers of those companies that adopt as well as do not adopt KM.

The KM processes refer to knowledge acquisition, knowledge storage, knowledge sharing and transferring, and knowledge protection whereas KM enablers refer to organisation culture, organisation structure, human resource management and information technology. This study emulates the works of Gold et al. (2001) and Grant and Grant (2006) in that various KM aspects are explored.

1.4 Outline of Research Methodology

The research adopted the investigative-descriptive approach using multiple case studies. Three complementary data collection methods were utilised, i.e. postal questionnaires, interviews and secondary sources. 90 questionnaires were posted to foreign and local oil and gas contractors in Malaysia. Of the 18 completed questionnaires that were returned, only 12 respondents indicated their willingness to be interviewed. It is these 12 companies that became the case studies. The research methodology is described in greater detail in Chapter 4.

1.5 Implication of Findings

In contrast to their foreign counterparts, the study found that there is a lack of KM application among the local oil and gas contractors in Malaysia. The findings of this study can serve to inspire the latter to manage their knowledge asset more coherently. Specific knowledge management practices detailed out in the case studies can be used as guide for KM implementation.

1.6 Outline of Thesis

Chapter 2 reviews the literature on KM processes and enablers. Chapter 3 gives an overview of the oil and gas industry in Malaysia. Chapter 4 provides details on how the study was conducted and the rationale behind the chosen approach. Chapter 5 and Chapter 6 present the findings and analysis of the foreign and local oil and gas contractors respectively. Finally, chapter 7 addresses the key findings, followed by suggestions for further studies.

CHAPTER 2 – LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on KM. It begins by differentiating knowledge from data and information. It then identifies the drivers of KM, describes the KM processes – acquisition, storage, sharing and transfer and protection - and KM enablers – culture, structure, human resource management and information technology.

2.2 Defining Knowledge and Knowledge Management (KM)

2.2.1 What is knowledge?

As a starting point to this chapter, the definitions of data and information are given to differentiate them from knowledge. Data represents meaningless observations or facts (Ahmad et al., 2002; Zack, 1999). Zack (1999) states that information results from placing data within some meaningful content, often in the form of a message.

Alavi and Leidner (2001) define knowledge as information possessed in the minds of individuals; it is personalised information (which may or may not be new, unique, useful or accurate) relating to facts, procedures, concepts, interpretations, ideas, observations and judgments. Ahmad et al. (2002) concur with this definition. They state that knowledge is personal and intangible in nature, whereas information is tangible and available to anyone who cares to seek it out. Knowledge acts as a 'justified true belief', in which people believe and value on the basis of the meaningful and organised accumulation of

information (messages) through experience, communication or inference (Dretske, 1981; Lave, 1988; Blacker, 1995).

Knowledge can either be tacit or explicit (Polanyi, 1966; Nonaka, 1991; Nonaka and Takeuchi, 1995). Tacit knowledge is highly personal, developed from experience, and hard to formalise while explicit knowledge is formal and systematic (Carrillo, 2004). Tacit knowledge is subconsciously understood and applied, difficult to articulate, developed from direct experience and action, and usually shared through highly interactive conversation, storytelling, and shared experience (Zack, 1999). Tacit or implicit knowledge (also referred to as 'experimental' knowledge) is thus both unrecorded and unarticulated. Knowledge gained through experience is often tacit (Mohrman et al., 2002). Tacit knowledge can only be transferred through socialisation and interaction (Al-Hawamdeh, 2003).

Explicit knowledge exists at the epistemological dimension where explication is possible using written or coded formats (Sun and Scott, 2005). It is formal and systematic. Thus, it is easy to communicate and share, for example in product specifications or codes of practice (Carrillo et al., 2004). Explicit knowledge can be stored and diffused more easily than tacit knowledge using various technology systems (Haldin-Herrgard, 2000).

2.2.2 What is knowledge management (KM)?

There are many definitions of KM due to the breadth of the concept and the complex nature of knowledge. According to Armistead and Meakins (2002), KM is "the notion that seeks to represent how organisations create, use and protect knowledge." KM is described as "any process of creating, acquiring, capturing, sharing and using knowledge, wherever it resides, to enhance learning and performance in organisations" (Scarbrough et al., 1999). Webb (1998) defines KM as the identification, optimisation and active management of intellectual assets to create value, increase productivity and gain and sustain competitive advantage.

KM is defined by Quintas et al. (1997) 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 and to develop new opportunity." These knowledge assets include explicit knowledge (information), 'know-how' (learning capacity), 'know-who' (customer capacity) and tacit knowledge in the form of skills and competencies (Al-Hawamdeh, 2003).

Organisations must deliberately design and implement tools, processes, systems, structures, and cultures to improve the creation, sharing, and use of different types of knowledge (human, social, structural) (De Long and Fahey, 2000). Al-Hawamdeh (2003) agree with De long and Fahey's statement by stating:

> "KM requires an infrastructure capable of supporting the creation and maintenance of knowledge repositories, and an environment that enables

the cultivation and facilitation of knowledge sharing and organisational learning."

In essence, the connotations of KM are as follows: its target is the user and creator of knowledge-people; its tool is information technology; its goals are knowledge sharing and innovation; its essence is to regard knowledge as the most important resource, and the key resource of improving the competitiveness; its function is to find, acquire, push and utilise knowledge; it focuses on the contribution of knowledge to the enterprise's competitiveness, and the scientific conformity and reasonable utilisation of knowledge (Gong and Gao, 2005).

Knowledge is also seen by some organisations as a strategic resource that provides them with the means to create innovative products and services, thus giving them a competitive edge in the marketplace. These organisations require KM to ensure that knowledge as strategic resource is managed and leveraged to add maximum value (Plessis, 2005).

2.3.2 Knowledge management (KM) provides competitive advantage

As stated by Macintosh (1999), the marketplace is increasingly competitive and the rate of innovation is rising, so knowledge must evolve and be assimilated at an ever-faster rate. Knowledge provides the organisation with a competitive advantage as it allows the organisation to solve problems and seize opportunities (Earl and Scott, 1999; Parlby and Taylor, 2000; Zack, 1999). According to Bontis (1996), competitive success will be based on how strategically intellectual capital is managed—from capturing, coding, disseminating, to acquiring new competencies through training and development, to re-engineering business processes. Organisations that manage knowledge can evaluate core processes, capture insights about what they find, combine their skills and experiences, innovate and apply new ideas quickly (Parlby and Taylor, 2000).

2.3.3 Knowledge management (KM) contributes to more effective decision-making

Knowledge is required for more effective and efficient decision-making (Kakabadse et al., 2003). Organisations experience tension when the tidal wave of information crashes against the limits of each individual's ability to process

vast amounts of data in a timely manner (Mohrman et al., 2002). According to Macintosh (1999), the amount of time available to experience and acquire knowledge has diminished. KM plays a significant role in this situation.

Huang (1998) highlights that responsiveness is a key to survival, including delivery of services, speed of implementation of global solutions and efficient processes. In addition, he states that continuous improvement in operational efficiency and productivity is essential to long-term earning growth. Al-Hawamdeh (2003) agrees with Huang by stating that speed and responsiveness are determining success factors in the new economy. It has created the need for organisations to have organised information to facilitate their operations, information that is timely, accurate, useful and, more importantly, tailored to the organisation's need. There is also increased pressure on firms to recycle and reuse knowledge instead of continually reinventing the wheel (Al-Hawamdeh, 2003).

2.3.4 Collaboration

Collaboration is becoming more prevalent due to the advent of the internet and the e-business environment, necessitating platforms for collaboration and knowledge sharing across geographical and organisational boundaries (Mudge, 1999). According to Plessis (2005), organisations are compelled to implement KM to enable the creation of platforms, processes and standards for collaboration and knowledge sharing across geographical and organisational boundaries. Besides that, in the e-business environment, collaboration is essential as organisations or business units in organisations collaboratively

design products across geographical boundaries and sometimes across organisational boundaries. There is also collaboration in the form of virtual communities internal and external to the organisation, e.g. through intranets and extranets. These communities share knowledge on a wide variety of issues.

2.3.5 Organisational and geographical distribution

As competition in the global market intensifies and the pace of technological change accelerates, firms increasingly build cooperative ventures in order to sustain and enhance their competitiveness (Grotenhuis and Weggeman, 2002). Companies are becoming more global and decentralised where individuals in the different organisations often do not see themselves as being part of a larger whole (Mohrman et.al, 2002). Organisations are increasingly working in a distributed environment. Knowledge is often fragmented within the organisation (Zack, 1999). Without KM, knowledge sharing is not effective, mostly taking place between units that are closest to one another physically (Hargadon and Sutton, 2000; Martiny, 1998).

2.3.6 Internet, improved telecommunications and technology

A wealth of information and knowledge are generated as people move around the internet (Hildreth and Kimble, 2005). Dramatic changes in the way of working and developments in telecommunications and technology have made KM increasingly important (Mudge, 1999; Parlby and Taylor, 2000). Most organisations have high-speed networks and telecommunications infrastructure, which enable quick and efficient knowledge sharing. This leads to the requirement for organisations to manage the wealth of knowledge that is

travelling through these high-speed networks and telecommunications technologies. Abdul Samad Kazi (2005) states that internet today facilitates online discussion and access to remote documents.

2.3.7 Knowledge attrition

For an increasing number of companies, human and intellectual capital, rather than physical or financial capital, are the keys to competitive success (Mohrman et. Al, 2002). Thus, employee turnover (Machintosh, 1999; Cross and Baird, 2000) and early retirement of the work force (Machintosh, 1999) lead to loss of knowledge. When they leave, they take their knowledge and experience with them, leading to knowledge attrition in the organisation (Hargadon and Sutton, 2000; Mudge, 1999). The loss of skilled workers reduces an organisation's ability to identify production problems and take corrective action. Clark and Poruban (2001) highlight that the firm cannot hire as many people as they are leaving. This means that new hires will have to be twice as productive as present workers.

2.3.8 Internal inefficiencies

Time and selection is a driver for KM. People find it difficult to know which knowledge is available and which sources are the best to use. This means they waste time in finding the right sources (Hargadon and Sutton, 2000; Martiny, 1998; Zack, 1999). Missed opportunities, wasted time and operational inefficiencies represent competitive disadvantage and contribute to excessive cost, reduced revenue and poor bottom line are reasons why organisations implement KM (Parlby and Taylor, 2000).

2.4 Knowledge Management (KM) Processes

Many researchers and authors have proposed a number of KM processes (Table 2.1).

Table 2.1: KM processes according to various authors or researchers.

Authors/ Researchers	Steps in KM Processes	Phrases in KM Processes
DiBella and Nevis (1998)	3	Acquire, disseminate, utilise.
Marquardt (1996)	4	Acquire, create, transfer and utilise, store.
Wiig (1993)	4	Create and source, compile and transform, disseminate, apply and value realize
Van der Spek and Spijkervet (1997)		Develop new knowledge, secure new and existing knowledge, distribute knowledge, and combine available knowledge.
Ruggles (1997)	3	Generate (create, acquire, synthesise, fuse, adapt), codify (capture, represent), transfer.
O'Dell(1996)	7	Identify, collect, adapt, organise, apply, share, and create.
Holsapple and Joshi (1997)	6	Acquire, select, internalise, use, generate, externalise.

Organisations use a combination of strategies for knowledge creation, adoption, distribution, and review and revision. Some of these strategies are for knowledge assimilation, others are for knowledge controls, and yet some others are for knowledge applications (Bhatt, 2000).

Based on the literature, five core processes of KM are adopted for this study: knowledge creation, knowledge storage, knowledge acquisition, knowledge sharing and transferring, and knowledge protection.

2.4.1 Knowledge creation

Knowledge creation refers to the ability of an organisation to develop novel and useful ideas and solutions (Marakas, 1999). By reconfiguring and recombining foreground and background knowledge through different sets of interactions, an organisation can create new realities and meanings. New knowledge is created as employees face new challenges and problems, and learn by applying existing frameworks and trying new approaches (Mohrman et al., 2002).

Knowledge creation is not a systematic process that can be planned and controlled (Lynn et al., 1996; Mayo, 1959). It is a very chaotic and unstructured. The success of knowledge creation is a chance event, based on the convergence of the world reality and the structure of one's thinking (Horgan, 1996). Together with pure chance, motivation and inspiration play an important role in knowledge creation (Bhatt, 2000).

Despite knowledge creation being a chance event, it can still be managed with a sense of direction. Many organisations create new knowledge through experimentations and cross functional debates. Experimentations and debates not only generate new knowledge, but also reject unfit proposals quickly (Bhatt, 2000). Knowledge creation is the improvement of the certainty of a piece of knowledge and occurs during a learning experience. The creation occurs though the detection and correction of errors (Argyris and Schon, 1978). A lesson learned is an example of an output from knowledge creation. A lesson learned documents the planned actions, results, and recommendations to overcome errors or ensure success. Knowledge is created in learning experience (e.g. problem-solving experience, project or task) (Kotnour et al., 1997).

2.4.2 Knowledge acquisition

Knowledge can be attained internally or externally. Knowledge can be acquired internally through past experience, social interaction, informal events, research and development, and repositories. Knowledge can be acquired externally through purchase, corporate mergers and acquisitions, and alliances.

2.4.2.1 Internal knowledge acquisition

Learning from past experiences (Albert and Picq ,2004; Mcdermott,1999) is a way for knowledge acquisition. According to Cross and Baird (2000) and Michailova and Husted (2003), learning from the experience of others improves quality and speed of problem solving. By embedding learning, companies can reduce the information overload of their employees and improve the

consistency and effectiveness of knowledge use throughout an organisation (Cross and Baird, 2000).

Human capital which resides in the individual can be disseminated within organisation through social interaction (e.g. training courses, internal conferences, forum and mentoring relationship) (Lesser and Storck, 2001; Nahapiet and Ghoshal, 1998; McDermott, 1999). Cross and Baird (2000) state that employees primarily absorb knowledge through social interaction–by working with those who apply knowledge gleaned from past experience. Besides that, people usually rely upon a network of relationships for information and advice. They seek information from trusted and capable colleagues, rather than turning to databases or policy and procedure manuals. Apart from Cross and Baird (2000), Bresnen et al. (2003) agree with the importance of social interaction. According to them, processes of knowledge capture, transfer and learning in project settings rely very heavily upon social patterns, practices and processes in ways which emphasise the value and importance of adopting a community-based approach to managing knowledge.

Informal events enhance interaction with one another, activate informal discussions and transfer tacit knowledge between team members (Leonard and Sensiper, 1998). Hoegl and Schulze (2005) show that Phonak, a worldwide leader company in digital hearing instrument, organised a series of events (e.g. company day out, bicycle tours or barbeque) to help the staff from all location to know each other informally. McCann and Buckner (2004) also state that organisations can build knowledge internally by developing the existing

individual and collective knowledge base through research and development. Tacit knowledge of the organisation's workers can be captured into its repositories (Natarajan and Shekhar, 2000). However knowledge embodied in documents does not necessarily translate into useful and usable knowledge unless it is read, digested, manipulated and communicated from one person to another person (Al-Hawamdeh, 2003).

2.4.2.2 External knowledge acquisition

Process, technology expertise or market intelligence can be purchased from external sources (Natarajan and Shekhar, 2000). Corporate mergers and acquisitions are means of external knowledge acquisition (McCann and Buckner, 2004). Alliances also provide a platform for organisational learning, giving firms access to the skills and competencies of their patents (Kogut, 1988; Westney, 1988).

According to Inkpen (1998), alliances provide firms with a unique opportunity to leverage their strengths with the help of their partners. Combining the complementary skills and knowledge of the partners results in unique learning opportunities. However, depending exclusively upon successful deals for acquiring critical intellectual capital can be hazardous (McCann and Buckner, 2004). A balanced approach that utilises both external acquisition and preserves the capacity for internal knowledge building is wise.

2.4.3 Knowledge storage

Knowledge storage refers to organisational memory processes. Knowledge is formally stored in the KM physical memory systems such as computer databases and file cabinets in codified form, and informally retained in the workers' minds, values, norms and beliefs associated with organisational culture and structure (Walsh and Ungson, 1991; Kogut and Zander, 1992; Johnson and Paper, 1998; Liebowitz and Beckman, 1998; Cross and Baird, 2000).

Codifying all or certain portions of an organisation's knowledge base is one approach to store knowledge (Abdul-Aziz and Lim, 2004). Knowledge becomes codified when it is expressed in words, numbers, scientific procedures, or universal principles and is stored in paper or electronic form, thus rendering it the characteristics of being explicit and systematic (Coombs and Hull, 1998; Cohendet and Meyer-Krahmer, 2001). Knowledge repositories make accessible "what we know" as an organisation (Ruggles, 1998). Over time, these repositories contribute to the maintenance of the firm's shared intelligence and organisational memory. The popular paper-based media employed for the storage of company's knowledge include standard operational procedures (SOPs), reports and newsletters (Yang and Wan, 2004). Another way is to develop an electronic document system that codifies, stores, disseminates, and allows re-use of knowledge. Thus, good information technology infrastructure is important for KM (McDermott, 1999).

Personalised knowledge is knowledge that is 'closely tied to the person who developed it and is shared mainly through direct person-to-person contacts'

(Hansen et al., 1999). It is tacit or implicit in form, and tends to manifest in routines or unwritten procedural rules (Abdul-Aziz and Lim, 2004). For organisations that use people as repositories, team members' continuity is important (Boiral, 2002). Proper human resource management systems should therefore be instituted to ensure that valued personnel do not leave the organisation (Mohrman et al., 2002).

2.4.4 Knowledge sharing and transfer

Knowledge sharing, in its broadest sense, refers to the communication of all types of knowledge, which includes explicit knowledge, the 'know-how' and 'know-who' which are types of knowledge that can be documented and captured as information, and tacit knowledge in the form of skills and competencies. Effective sharing involves the actions of transmission and absorption by the sender and potential receiver respectively. The critical outcome of knowledge sharing is the creation of new knowledge and innovation that significantly improve organisational performance. Leonard-Barton (1995) states that sharing knowledge helps staff solve problems directly related to their day-to-day work. Davenport and Prusak (1998) state that for knowledge transfer to take place, it has to be received, processed, and absorbed. Pfeffer and Sutton (1999) assert that knowledge of how to enhance performance is not readily or easily transferred across or within firm. Various industry studies have shown this trend. For example, O'Dell and Grayson (1998) reflect that the transfer of best practices or knowledge within firms is extremely poor. They believe that for knowledge sharing to work, organisations must embrace the

internal transfer of knowledge as a core process designed to deliver dramatic and sustainable improvement in performance.

Knowledge transfer can take many forms (Mohrman et al., 2002). One way is to establish virtual teamwork and networks that allow employees throughout the world to access expertise wherever it is located. Besides that, knowledge repositories and communities of practice can be built to facilitate knowledge sharing. For explicit knowledge, Mohrman et al. (2002) suggest that it can be shared through contribution and referred to databases and other documents that can be placed in various searchable forms.

Tacit knowledge is obtained by internal individual processes like experience, reflection, internalisation or individual talents (Haldin-Herrgard, 2000). Tacit knowledge is harder to manage than explicit knowledge. It cannot be found in databases, textbooks, manuals or internal newsletters for diffusion.

Different methods like expert referrals, lessons-learned sessions, stories, gossip, conferences, communities of practice, apprenticeship, direct interaction, discussions, watching one another work, networking and action learning that include face-to-face social interaction and practical experiences are more suitable for supporting the sharing of tacit knowledge (McDermott, 1999; Pfeffer and Sutton, 1999; Haldin-Herrgard, 2000; Mohrman et al., 2002). Phone calls, meetings and personal acquaintances across units are normally associated with successful transfer (Epple et al., 1991; Darr et al., 1995; Ingram and Baum, 1997). Intensive integrative practices, such as cross-functional meetings and

broad participation from multiple functions further increase the chances of successful transfer (Hoopes and Postrel, 1999).

Some argue that the risk associated with articulating and transferring tacit knowledge are so high that it is more effective to avoid transferring such knowledge and accept the higher costs associated with coordinating a diverse set of organisational skills (Grant, 1996). However, it has also been argued that organisations must try to diffuse knowledge; otherwise, it will be difficult to reap the leveraged benefits of knowledge (Sanchez, 1997).

2.4.5 Knowledge protection

Firms should protect knowledge which is valuable to them. Knowledge protection can produce core competence, control use of knowledge, make use of the best knowledge, and keep valuable knowledge away from competitors (Li and Wang, 2005).

Knowledge is difficult to protect because it is difficult to detect its expropriation, or illegal imitation (Liebeskind, 1996). In addition, unlike most intangible assets, knowledge is intrinsically mobile, because it resides in the heads of individuals (Grant, 1996). Companies typically try to protect their trade secrets by requiring employees to sign legally binding documents through non-disclosure agreements (confidentiality agreements), non-compete agreements (restrictive covenants) and assignment provisions (Brandt, 1997; Hannah, 2006) and implementing relevant company policies (Brandt, 1997). However, Liebeskind (1996) argues that an employment contract can place only limited restrictions on

an employee's freedom to leave the firm. In addition, Thompson and Heron (2002) posit that traditional employment contracts may no longer be effective in bonding knowledge workers and retaining loyalty.

Other traditional means of protection are various rules, including access restrictions, which limit employees' rights to enter certain areas of a company's facilities, use or copy sensitive documents and use computers and certain means of communication; and handling procedures, which establish what employees can and cannot do with trade secrets when they have access to them (Desouza and Awazu, 2003; Hannah, 2006). Then there are knowledge legal protection and social protection (Holsapple, et.al 2000). The first manifest as patent and trade mark to assure organisational ownership of knowledge. Once knowledge is used by competitors, the organisation can get back its rights through law. Social protection is to set up corporation image to prevent of imitation.

2.5 Knowledge Management (KM) Enablers

The study looks at organisation culture, structure, human resource management and information technology as KM enablers. The literature on these are provided below.

2.5.1 Culture and knowledge management (KM)

Schein (1985) defines organisational culture as a model of basic assumptions and beliefs that are shared by members of an organisation, that operate unconsciously, and that define an organisation's view of itself and its environment. Organisational culture is believed to be the most significant input to effective KM, and organisational learning in that corporate culture determines values, beliefs and work systems that could encourage and impede learning (knowledge creation) as well as knowledge sharing (e.g. Alavi and Leidner, 2001; Gold et al., 2001; Leonard-Barton, 1995), and ultimately, decision making (Kettinger and Grover, 1995; Schein, 1985).

In a study of 453 firms, over half indicated that organisational culture was a major barrier to success in their KM initiatives (Ruggles, 1998). Watson (1998) also highlights culture as the biggest impediment to knowledge transfer. Thus firms must increasingly view their culture as a competitive resource that must be managed in order to become a learning organisation (Kayworth and Leidner, 2003). No KM programme can succeed without a shift in corporate culture if they wish to develop a knowledge-based, and learning organisation (Wah, 2000; Albert and Picq, 2004).