UNIVERSITY OF SOUTHERN QUEENSLAND

DIMENSIONS OF ORGANISATIONAL KNOWLEDGE MANAGEMENT (OKM)

A Study on Malaysian Managers using the

Multidimensional USQ KM Scale

A Dissertation submitted by

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ABSTRACT

The case for knowledge management (KM) is firmly established in the wealth of extant literature available and is well corroborated in business best practices. However, the broad scope of KM and its multiple approaches in varied contexts, while credited for their diversity and flexibility, also call for greater universality and coherence in several areas, one of which is in the assessment of organisational knowledge management (OKM) practice. While literature attests to the dynamics of the different dimensions of KM, very limited research has been conducted using a standardised multidimensional scale. This dissertation pertains to the application of an in-house developed instrument, called the USQ KM scale, to empirically study the three key dimensions of OKM identified through literature review, namely OKM strategy, OKM culture and OKM process/technology. The instrument was employed to assess the extent of OKM practice in organisations in Malaysia. Results of the survey on 153 managers provided insights into the state of OKM practice in Malaysia while confirming the mutually dependent relationship between the three dimensions of OKM and giving rise to the researcher's proposed conceptual tripartite OKM model. In addition, demographic factors such as the number of years of service in the organisation and years of service in a specific organisational role were found to have an impact on OKM, supporting previous empirically tested truths about OKM besides revealing a few unique traits in the Malaysian sample. The implications of the study for organisations in Malaysia as well as in other developing countries within similar contexts are especially meaningful for smaller local businesses without the benefit of multinational affiliations usually associated with superior KM capability afforded by greater economies of scale and more sizeable budgets for infrastructure support.

CERTIFICATION OF DISSERTATION

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

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Signature of Candidate   Date

ENDORSEMENT

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Signature of Supervisor/s   Date

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CHAPTER 1   INTRODUCTION

1.1   Background to research

The dynamics of our world economy have changed with the transition of the traditional industrial economy to a knowledge-based one, causing the decline in the relative importance of tangible assets and necessitating a paradigm shift towards an unprecedented reliance on intangible knowledge and intellectual capital (Handzic, Lagumdzija & Celjo 2008). As such, a highly significant development in the past dozen years has been the swift and widespread propagation of knowledge management (KM) in both research and practice (Holsapple & Wu 2008).

Four main factors have spurred the rise of a knowledge-based society in today's knowledge era – firstly, globalisation of the economy forcing companies to be agile, innovative and rapid in their processes; secondly, increasing recognition of the value of specialist knowledge; thirdly, greater awareness of knowledge as a distinct factor of production; and fourthly, higher availability of low-priced networked computing as a tool (Prusak 1996 cited in Myers 1996). Moreover, knowledge is now well recognised as a critical source of competitive advantage (Holsapple & Wu 2008; Ichijo & Kohlbacher 2008) as wealth is increasingly generated from knowledge and intangible assets (Little, Quintas & Ray [eds] 2002), while both technical and non-technical work are becoming knowledge-based (Drucker 1985).

That knowledge is crucial to a country's wealth generation is evident in the correlation of a country's investment in knowledge creation to its level of development (Drucker 1993). In short, knowledge does not merely represent power but also wealth (Natarajan & Shekhar 2001). Therefore with knowledge constituting the foundation for a new economy (Biren, Dutta & Wassenhove 2000) and becoming the preeminent economic resource, surpassing even money and raw materials (Stewart 1998), organisations must now strive towards being knowledge-rich and nurturing that wealth of knowledge. Long-term competitive advantage must be sustained through a series of temporary advantages wherein speed of creating and exploiting knowledge is imperative because hypercompetition emerges when the recurrence and ferocity of competitors' moves accelerate to cause constant disequilibrium and change (Johnson & Scholes 2002). In fact, Malhotra (2003) asserts that knowledge can offer the ultimate business competitive advantage from an action-oriented stance.

Against such a landscape of mounting discontinuous environmental change, KM addresses the critical issues of organisational adaptation, survival and competence (Malhotra 1998); hence a practical understanding and application of KM is essential. Organisations that successfully manage their knowledge have a greater ability to act and adapt, and are thus better poised to thrive in this complex new business environment (Handzic et al. 2008). Even Chief Information Officers (CIOs) who are responsible for their organisations' KM initiatives are themselves expected to be the epitome of a multidisciplinary knowledgeable leader, as inferred from the results of the '2009 State of the CIO

Survey' conducted by *CIO Magazine* in September 2008 among 506 US corporations (Nash 2008). The significance of KM is further underscored by its integration to the policy, strategy and implementation processes of global corporations, governments and institutions, with KM expected to help save annual re-invention costs of US$31 billion at *Fortune* 500 companies amid a fast-growing global KM market that was estimated to reach US$8.8 billion in 2005 (Malhotra 2005).

With such compelling rationale for KM in organisations, the leadership and management of an organisation should take the knowledge imperative seriously. A good starting point would be to understand their current level of organisational knowledge management (OKM) practice and, if possible, to benchmark it with other organisations with a view to improvement and growth. As such, the research in this dissertation sought to address the aforementioned concern of identifying the state of an organisation's OKM.

1.2 Research problem

The research problem or research question may be articulated as follows:

What is the extent of KM practice in organisations in Malaysia?

In relation to the research problem, three main research issues arise, which require investigation in this study:

- **Research Issue 1:** *What is the extent of KM practice in organisations in Malaysia as perceived by managers at their workplace?*

- **Research Issue 2:** *What are the relationships between the dimensions of OKM?*

- **Research Issue 3:** *What are the relationships between demographic characteristics and the managers' perceptions of the three dimensions of OKM?*

Essentially, the researcher argues that OKM is a multidimensional construct defined by three components, namely strategy, culture and process/technology. Hence, a standard, multidimensional scale that reflects the three constructs which was developed by Erwee, Skadiang and Reynolds (2007) in Australia will be applied to managers who represent their organisations in Malaysia. The use of the standard scale would facilitate comparisons with parallel studies in other cultural or national contexts. In this case, the Malaysian study results will be the first study of its kind with this relatively new scale, which has the potential for future comparative studies by other researchers.

Theories and research issues/propositions. The major bodies of theory that will be further covered in Chapter 2 are theories about the nature of knowledge, as well as KM concepts and frameworks which specify how knowledge is created, shared and transferred, and which specify KM success factors.

***Figure 1* Parent discipline and immediate discipline of research**
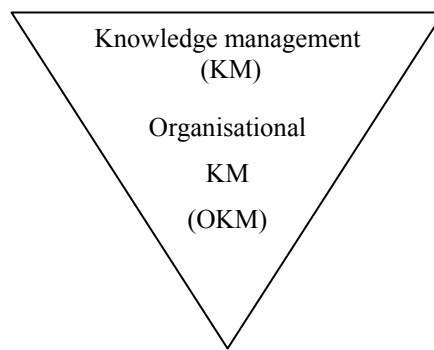
(Source: Developed for the study)

Figure 1 above summarises the relationship between the parent discipline and immediate discipline of the research, which have been outlined in the sections preceding this. The following subsections provide an overview of the parent discipline, KM and its immediate discipline, OKM.

Knowledge and knowledge management (KM). Research on the nature of knowledge indicates two main schools of thought – knowledge as an object and knowledge as a process (Sveiby 2001). Based on their descriptions of knowledge, researchers namely Boland (1987 cited in Malhotra 1999), Laudon and Laudon (1999) and Natarajan and Shekhar (2001) are inclined towards the object point of view.

On the other hand, researchers including Nonaka and Takeuchi (1995), O'Dell and Grayson (1998), Davenport and Prusak (1998), Zack (1999) and Henczel (2001) advocate the process view. Yet other definitions encompass both the object and process viewpoints, including those by Ruggles (1997), Davenport and Prusak (1997), Davenport, DeLong and Beers (1998) and Tiwana (2002). To summarise, knowledge is "a capacity to act" (Sveiby 1994, 1997 cited in Sveiby 2001, p. 2), putting "information into action" (O'Dell & Grayson 1998, p. 6), consists of "actionable information" (Tiwana 2002, p. 37) and is a "means to an end" (Coulson-Thomas 2003, p. 25). In contrast, "unactionable information is *not* knowledge" (Tiwana 2002, p. 46). Knowledge is more than just know-how; it also includes know-why, know-what, know-who, know-where and know-when (Collison & Parcell 2006).

KM is the art of generating value from non-tangible assets (Sveiby 2001), "a conscious strategy of getting the right knowledge to the right people at the right time" (O'Dell & Grayson 1998, p. 6), with the primary focus of "helping the right people apply the right knowledge at the right time" (Tiwana 2002, p. 8). In the business context, the fundamental goal of KM is to facilitate the "opportunistic application of fragmented knowledge through interpretation" (Tiwana 2002 p. 4). Nevertheless Collison and Parcell (2006) recommend that KM should focus on the people who know rather than on the creation of large knowledge repositories.

Importance of organisational knowledge management (OKM). Organisations today are compelled to constantly acquire knowledge for competitive advantage due to rapid market changes, intense competition and technological advancement (Little et al. [eds] 2002). But once a specific competitive advantage is imitated or compromised, the effectiveness of organisational knowledge management (OKM) will determine the speed at which organisations are able to continuously seek new tracks of competitive advantage (Johnson & Scholes 2002). In addition, OKM serves to preserve the entity's pool of knowledge resource which would otherwise be lost through the departure of employees from the organisation (Laudon & Laudon 1999). Ideally, OKM should be implemented in such a way that people manage knowledge as part of their day-to-day work without considering it an additional responsibility, while the organisation's leadership and organisational processes reinforce such an approach (Collison & Parcell 2006).

OKM models. The recognition that people are the locus of much organisational knowledge (Little et al. [eds] 2002) has become a driver for many OKM initiatives. Numerous models on KM revolve around the main themes of knowledge creation, sharing and transfer or their equivalent. These models include the concept of shared space by Schrage (1990 cited in Myers 1996), knowledge transfer matrix or SECI model by Nonaka and Takeuchi (1995), knowledge transfer process model by O'Dell (1998 & Grayson), concept of *ba* or context-space knowledge by Nonaka and Konno (1998), knowledge creation model by von Krogh et al. (2000) and the holistic model by Collison and Parcell (2006).

Previous research. Overall, researchers have attempted to define knowledge and identify typologies or categories of knowledge; analyse knowledge transfer and knowledge creation processes; investigated key success factors that impact OKM; studied stages of knowledge growth in organisations; and applied some form of OKM metrics in quantitative surveys.

Research on typologies of knowledge. Sveiby (1997) analyses definitions or interpretations of knowledge as either belonging to the object or process school of thought. In addition, many KM models, some of which are context-specific, have been developed. Notable generic models include the knowledge transfer matrix or SECI model (Nonaka & Takeuchi 1995), the knowledge transfer process (O'Dell 1998 & Grayson), the concept of *ba* (Nonaka & Konno 1998) and the knowledge creation model (von Krogh, Ichijo & Nonaka 2000) which place emphasis on the processes of knowledge creation, sharing and dissemination.

Research on key success factors of OKM. Researchers such as Tampoe (1993 cited in Myers, 1996); Davenport, DeLong and Beers (1998); von Krogh et al. (2000); and Soo, Devinney and Midgley (2002) have investigated key success factors that impact OKM. In the studies cited, the OKM areas under investigation were mainly related to the way knowledge was shared among people.

Research on knowledge growth stages. A qualitative study on the stages of organisational knowledge growth was conducted on 50 managers of medium-sized and large-sized companies with current and potential use of KM practices, from 2003 to 2006 in the New York metropolitan using Bohn's eight-stage scale comprising the stages of 'complete ignorance', 'awareness', 'measure', 'control of the mean', 'process capability', 'process characterisation', 'know why' and 'complete knowledge' (Aleste 2007). Aleste's findings show that most companies rank between stage three (measure) where knowledge is typically written and stage four (control of the mean) where knowledge is written and embodied in hardware.

Research on KM metrics. Apart from the above, KM research has also considered the type of metrics organisations can use to measure their strategic assets to gauge the returns of their KM effort and investment. Studies on intellectual capital (IC) frameworks have been conducted by various researchers, including the IC audit model by Brooking in 1976, the IC index by Roos, Roos, Dragonetti and Edvinsson in 1997, the intangible asset monitor by Sveiby in 1997 and the knowledge assets map by Marr and Schiuma in 2001 (cited in Marr, Schiuma & Neely 2004). In addition, Darroch (2003) has developed a KM instrument using three interdependent KM constructs of knowledge acquisition, knowledge dissemination and responsiveness to knowledge to assess the level of KM in organisations in New Zealand.

Research gap. The literature review on OKM revealed a research gap which is elaborated in section **1.3 Justification for research** and discussed in greater depth in Chapter 2. Nevertheless, the literature gap may be briefly summarised in the following paragraph.

Current literature attests to numerous KM research and frameworks in areas pertaining to the *KM process* (how knowledge is created, shared and transferred), *KM success factors* (what key influences promote KM) and *KM metrics* (how to measure performance of KM strategies, viz. measuring intellectual assets). From the above, it is observed that there is a lack of empirical research on *KM assessment* (how to gauge the extent of KM practice) using a standard, multidimensional scale that reflects the breadth and depth of OKM in organisations across industries.

1.3   Justification for research

The research problem covers an area with important theoretical and practical implications. Justification for the research may be advocated according to four points specified by Varadarajan (1996 cited in Perry 2002), of which three will be applied here. The three points are firstly, the literature gap or relative neglect of specific research problem by previous researchers; secondly, the importance of research area to business organisations; and thirdly, the usefulness of potential applications of the research's findings.

1.3.1 Gap in literature

An overview of literature shows that researchers have investigated and developed a variety of frameworks on the KM process, KM success factors and KM metrics but have not fully explored the development of a standard, multidimensional KM scale which can be used not only within an organisation but also as a benchmark across organisational and regional boundaries.

Current KM frameworks. Some KM frameworks pertain to how knowledge gets created, shared and/or transferred, viz. they constitute descriptive frameworks of the KM process. Such KM models include the knowledge transfer matrix or SECI model (Nonaka & Takeuchi 1995), the knowledge transfer process (O'Dell 1998 & Grayson), the concept of *ba* (Nonaka & Konno 1998) and the knowledge creation model (von Krogh et al. 2000). On the other hand, KM success factors viz. prescriptive frameworks have been investigated by Tampoe (1993 cited in Myers, 1996); Davenport, DeLong and Beers (1998); von Krogh et al. (2000); and Soo et al. (2002).

Current KM metrics. Frameworks on KM metrics relate to the performance measurement of KM strategies in organisations (Bose 2004). As such, these metrics attempt to translate intangible strategic assets such as intellectual capital into tangible values. However, despite past research on KM metrics (Brooking 1976, Roos et al. 1997, Sveiby 1997 and Marr & Neely 2001, all cited in Marr et al. 2004), there are limitations. Martin (2004) points out that KM metrics are difficult to standardise as organisations tend to choose measurement techniques most relevant to them; besides, KM metrics cannot capture cultural and perceptual dimensions.

Need for standardised multidimensional KM scale. As noted in the two preceding paragraphs, current models of KM tend to place emphasis on the nature of the knowledge sharing process per se, whereas frameworks on KM metrics attempt to quantify the qualitative. The gap in the current state of research and limited availability of scales, beckons the need for a standardised multidimensional KM scale that would assess the extent of KM practice within and across organisational boundaries.

Specifically, the research in Malaysia aims to apply a KM scale that was developed prior to a pilot study conducted in Australia, and which had taken into account the organisational dimensions of strategy, culture and process/technology. More details of the scale are outlined in subsection **1.3.3 Potential applications of research findings**.

1.3.2 Importance to business organisations

The research findings have potential practical applications in organisations from all industries, both in the private and public sectors. The following is a list of expected applications which are presented in no specific order of priority.

Firstly, the availability of a scale to evaluate the extent of OKM would provide stakeholders with a snapshot of the state of the organisation's KM practice. Consequently, the management would be able to formulate strategies and plans to reinforce, or adapt, the results of their OKM evaluation. In addition, the KM scale could contribute towards a gap analysis, followed by training needs analysis, where necessary, and HR directors' customised efforts to bridge the gaps identified.

Secondly, a multidimensional KM scale could also help organisations assess the progress or success of a specific KM initiative by measuring the 'before and after' over a period of time. This would enable organisations to monitor if a particular initiative is on track or has achieved its objective. Besides, the extent of progress measured by the scale could be used as justification for performance and rewards.

Thirdly, many small businesses in Malaysia are unfamiliar with the concept and application of OKM. As such, having a standard KM scale could serve as the organisation's 'to-do' checklist, for instance ensuring that managers freely discuss their subordinates' problems together on a regular basis, although this is not the primary aim of the KM scale. Fourthly, on a macro level, a reliable standardised KM scale could be used as a benchmark by researchers, industry associations, professional bodies or government agencies to analyse OKM practice across selected industries.

1.4 Methodology

This section provides an overview of the research methodology which will be further detailed in Chapter 3.

Research paradigm. Positivist and post-positivist paradigms are applied in quantitative research while critical realism and constructivism are relevant to qualitative research (Robson 2002). In this study, the researcher will adopt a post-positivist paradigm, acknowledging the influence of the researcher's background knowledge and values upon the research observation (Reichardt & Rallis 1994 cited in Robson 2002).

Type of research and research design. The study constituted descriptive research instead of exploratory research because its aim was to study population characteristics (Zikmund 2000). Further, the researcher opted for a quantitative research design over qualitative research or action research mainly because quantitative research enables general principles to be readily derived from statistically meaningful data (Sekaran 2003). Moreover, quantitative research facilitates the convenient input of voluminous, quantifiable data for computerised analysis which leads to more objective output (Robson 2002).

Design technique. The study was done through a survey instrument, mainly because a survey enables gathering primary data for original research not done elsewhere before (Rea & Parker 1997). In addition, surveys tend to instill greater confidence in the generalisability of their results (Jick 1983 cited in Gable 1994).

Survey methodology. The self-administered e-mail survey was selected over the face-to-face, telephone and conventional mail surveys after assessing the relative benefits and limitations of all four methodologies. This is attributed to the e-mail survey's wide geographical reach at much lower costs and much less labour compared to the other three methodologies.

Data analysis. After the close of the planned eight-week data collection period, data entry commenced and computerised data analysis using Statistical Package for Social Sciences (SPSS) version 15 followed.

1.5 Outline of the dissertation

This dissertation consists of five chapters. **Chapter 1 Introduction** begins by providing some background to the research problem. It underscores the crucial role of KM in business organisations operating in today's highly competitive and unpredictable environment. Furthermore, the chapter discusses the nature of the research problem, its related issues as well as the expected contributions from the study. Then justification for undertaking the research precedes an account of the research methodology and rationale behind the choices taken. Lastly, the dissertation outline, definitions of relevant key terms, as well as delimitations of the research scope and its key assumptions are presented before the chapter summary.

Next **Chapter 2 Literature Review**, provides details of the researcher's assessment of available academic sources on the parent discipline of KM and the immediate discipline of OKM. This includes an overview on the interpretation of what constitutes knowledge as well as an analysis of the different definitions of KM and a discussion on a few notable KM concepts and frameworks. Furthermore, the chapter presents different dimensions of OKM namely OKM strategy, OKM culture, OKM process and OKM technology, as well as the current state of research in these dimensions. Finally, the literature review identifies the gaps which the researcher seeks to address through primary research.

Subsequently, **Chapter 3 Research Methodology** discusses the choice of research paradigm, type of research, research design strategy, design technique, survey method and research procedure. In addition, Chapter 3 explains the criteria for good measurement, data analysis techniques, limitations and ethical considerations of the research. Then **Chapter 4 Data Analysis** submits the analysis of primary data compiled over the anticipated eight-week data collection period.

Lastly, **Chapter 5 Conclusion** draws inferences from the findings of this study on OKM practice among managers in Malaysia, which was investigated through the application of a multidimensional KM scale. This chapter also reflects on the study's implications, identifies a few limitations that had arisen in the course of the research and offers recommendations for further research.

1.6 Definitions

To ascertain greater uniformity in the understanding and interpretation of terminology, Perry (1997, 2002) suggests that researchers explicitly define key terms at the beginning of their reports to pre-empt potential controversies arising from ambiguity. As such, the following is a list of definitions of key terms used in this dissertation.

Knowledge refers to the combination of high-value information with experience, context, interpretation and reflection, which can be readily applied to decisions and actions (Davenport, DeLong & Beers 1998). Although different typologies or classifications of knowledge have been identified, researchers generally recognise that knowledge is essentially tacit or explicit in nature (Perez & de Pablos 2003).

Explicit knowledge is defined as knowledge that can be codified into a form easily understood by others (Nonaka & Takeuchi 1995). **Tacit knowledge,** in contrast to explicit knowledge, constitutes knowledge that is not easily codified (Nonaka & Takeuchi 1995). Most KM initiatives in organisations tend to place greater emphasis on the sharing, creation and dissemination of tacit knowledge.

Knowledge management (KM) is the facilitation of transferring the right knowledge to the right people at the right time (O'Dell 1998 & Grayson), or in other words, enabling the right people to apply the right knowledge at the right time (Tiwana 2002). Unless otherwise specified, the term KM in this report is used interchangeably with **organisational knowledge management (OKM)**.

Malaysian organisations or **organisations in Malaysia** will refer to all organisations based in Malaysia, irrespective of whether they are home-grown ones or affiliated with a foreign multinational. The rationale is that since such organisations operate in Malaysia, the workforce would consist mainly of Malaysians working within the social, legal and political framework of Malaysia.

USQ KM scale refers to the survey questionnaire or instrument developed by a team of researchers headed by Erwee, Skadiang and Reynolds (2007) of the University of Southern Queensland (USQ). The instrument assesses the extent of KM practice in organisations based on three dimensions namely, OKM strategy, OKM culture and OKM processes.

1.7 Delimitations of scope and key assumptions

Although limitations in a study fall beyond the researcher's control, delimitations in contrast remain within the researcher's influence (Perry 1997). The first delimitation pertains to the target population of the research survey, which comprised members of the Malaysian Institute of Management (MIM). The sampling frame was selected on the assumption that the professional body's entire membership is representative of all managers in Malaysia. Moreover, there is no other professional body in the country whose membership comprised

managers from all management professions across all industries, as opposed to professional bodies such as those for the accounting, engineering or banking professions.

Second, the unit of analysis in the study is the manager rather than the organisation. As such, it was expected that respondents from the same organisation might be among the sample. This was not expected to pose a problem as the researcher was interested in investigating individual employee perception towards the extent of OKM practice.

1.8 Chapter summary

Chapter 1 has established the foundation for this dissertation. At the onset, the research question and issues were identified, followed by the justification for such research. Next, definitions of key terms were specified, and the research methodology outlined and justified. Then the report outline was submitted, followed by limitations of the study. With the foundation in place, the dissertation will proceed to describe the research in greater detail.

CHAPTER 2   LITERATURE REVIEW

2.1   Introduction

The goal of this literature review is to synthesise previous research on organisational knowledge management (OKM) as well as to identify gaps and key research issues. The perspective adopted here is neutral and unbiased, that is, encompassing known views about the subject without advocating any particular position.

As such, the literature review begins with a statement of the research problem, followed by a definition of the core concept, knowledge management (KM). Next is an overview of known research and academic resources on KM, that later narrows down to OKM with an emphasis on OKM strategy, culture, process and technology. To present the current state of research, some works of major researchers are analysed in relation to schools of thought or core themes, complemented by relevant landmark studies.

Following the above is the identification of gaps in literature and how researchers have so far attempted to address these gaps with their propounded frameworks, but have not yet fully addressed the specific research issues identified in the research problem. Figure 2.1 shows a concept map of the literature overview.

Figure 2.1 Concept map of literature overview

Introduction; Statement of research problem

Definition of core concept
● Knowledge management (KM)
(Parent discipline)
● Interpretations of knowledge and categories of knowledge: A historical perspective

Organisational KM (OKM)
(Immediate discipline)
● Understanding OKM
● OKM Strategy, Culture, Process and Technology
- An overview
- Current state of research

Research Issues
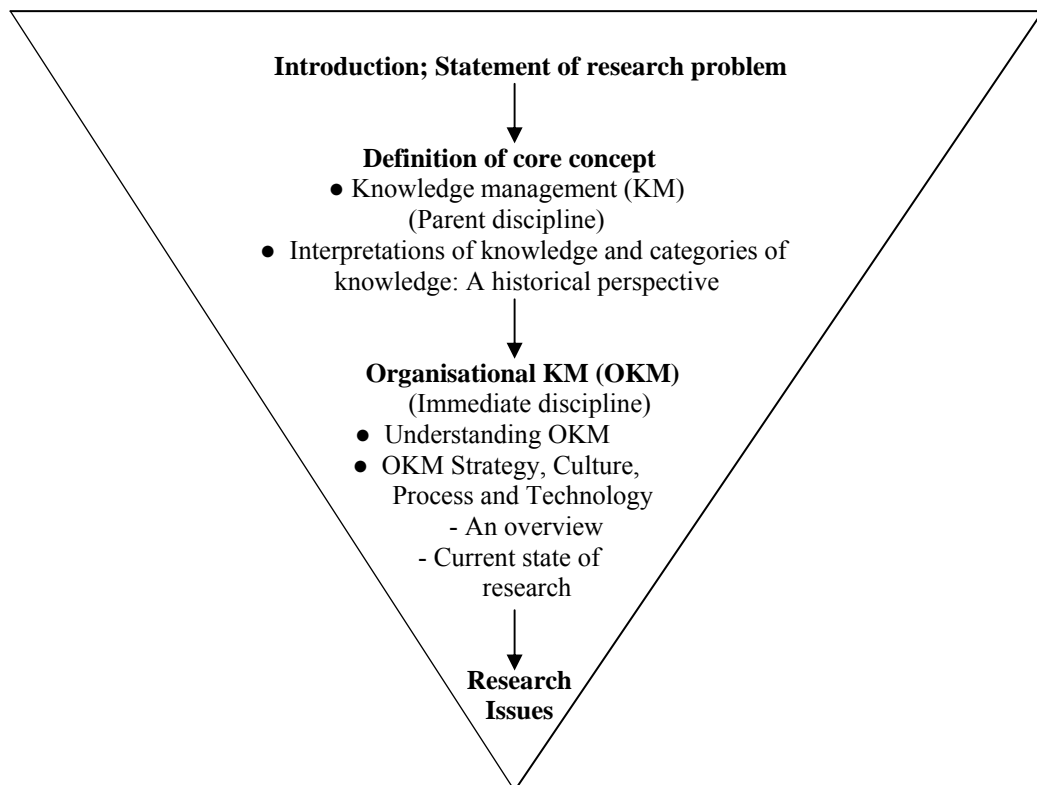
(Source: Skadiang 2008; developed for the study)

Research problem. The research problem may be articulated, as follows:

What is the extent of KM practice in organisations in Malaysia?

Associated with the research problem are specific research issues which would be pointed out in the course of the literature review, where gaps in literature are identified and opportunities arise to address those research issues.

2.2 Definition of core concept

Before moving into KM, it would be useful to first explore the meaning of knowledge. In this discussion, the term knowledge is inclusive of organisational knowledge. Putting it simply, knowledge refers to anything one knows (Orlikowski 1993). An understanding of epistemology or the nature of knowledge is pertinent to gaining insight on KM. This is because how knowledge is managed is dependent on what constitutes knowledge, as we understand it. As such, this subsection presents an overview of the different interpretations of what knowledge is, as well as the various approaches to categorising knowledge.

Definitions of knowledge. Many researchers including Davenport and Prusak (1998) view knowledge to be more of an act or process rather than an artifact. Similarly, O'Dell and Grayson (1998) define knowledge as information in action while Sveiby (1994, 1997 cited in Sveiby 2001) describes knowledge as the capacity to act. Further, Kakabadse, Kakabadse and Kouzmin (2003) attempt to offer insight through their proposed chain of knowledge flow: data-information-realisation-action/reflection-wisdom. Even though individual knowledge is necessary for developing the organisational knowledge base, organisational knowledge is not a simple sum of individual knowledge but is synergistically formed through unique patterns of interactions between technologies, techniques and people, not easily imitated by other organisations because these interactions are shaped by the organisation's unique history and culture (Bhatt 2001).

Other definitions of knowledge commonly allude to a collective accumulation of subjective, contributing factors. For instance, Zack (1999, p. 46) defines knowledge as "that which we come to believe and value based on the meaningfully organised accumulation of information (messages) through experience, communication or inference". In the same vein, Henczel (2001) incorporates into his definition of knowledge, the many intangibles such as experience, intuition, judgment, skills, lessons learnt which can potentially create business value through better informed decisions and improved actions. Further, Bollinger and Smith (2001) refer to knowledge as an accumulation of understanding, awareness or familiarity through study, investigation, observation or experience, subject to one's own interpretation which is in turn influenced by personal experiences, skills and competencies.

Yet other perspectives on knowledge not only recognise the contribution of multiple inputs but also articulate the fluid nature of knowledge. Knowledge has been described as a fluid mix of contextual information, values, experiences and

rules, manifesting in many forms including process knowledge or how-to, catalogue knowledge or what-is, and experiential knowledge or what-was (Ruggles 1997). Alternatively, knowledge may be viewed as a fluid combination comprising framed experiences, values, contextual information, expert insight and intuition that offers an environment and framework to evaluate and incorporate new personal input (Davenport & Prusak 1998). Knowledge is not only relatively fluid, but also socially constructed and dependent on constant revision, thus a lot of so-called common knowledge arises from continually modified perspectives; in other words, knowledge renewal begins with a process of recognising new potentialities or new patterns (Ballantyne 2004).

Two schools of thought – 'object' and 'process' views. Sveiby (1996, updated 2001) suggests two main schools of thought on what knowledge is, namely knowledge as an object – something that can be tangibly manipulated – and in contrast, knowledge as a process. Using this perspective, it is possible to categorise researchers' views on knowledge into the two schools. The categorisation is not meant to pose rigid boundaries but merely serves to analyse researchers' inclination towards one or the other.

Support for 'object' view. Not many researchers subscribe or lean towards this view. These include Boland (1987 cited in Malhotra 1999), Laudon and Laudon (1999) and Natarajan and Shekhar (2001). Apart from Boland, none of these researchers explicitly state that knowledge is something tangible; nevertheless it is observed that they tend to emphasize the role of IT to manipulate knowledge.

Support for 'process' view. Fundamental flaws have been identified in the 'object' view of knowledge. Firstly, viewing knowledge as merely an accumulation of information erodes the core meaning of knowledge, since knowledge resides within the user rather than in the information itself (Churchman 1971 cited in Malhotra 1997). Furthermore, perceiving knowledge as an object could impede what is desirable in an organisation's learning and adaptive capabilities (Gill 1995 cited in Malhotra 1997).

The above views imply that dissociating knowledge from the individual knowledge owner not only undermines the value of that knowledge but also renders him or her injustice. Researchers who support the 'process' view of knowledge include Sveiby (1996, updated 2001), Nonaka and Takeuchi (1995), Ruggles (1997), Davenport and Prusak (1998), O'Dell and Grayson (1998), Zack (1999), Henczel (2001), Collison and Parcell (2006), Andreou and Bontis (2007) and Wright (2008).

As the scope of this dissertation does not permit a lengthier discussion on the matter, the views of the above-mentioned researchers are summarised in Table 2.1 which provides a quick historical overview of different well-known descriptions or definitions of knowledge, each of which tends to lean towards one of two main schools of thought. As may be noted from Table 2.1, although more researchers tend to lean towards the 'process' view rather than the 'object' view, all researchers from both schools acknowledge the role of human actors to generate value from knowledge, even if with varying degrees of emphasis.

Knowledge as both object and process. There are, however, some definitions that do not seem to explicitly lean towards either the 'object' or 'process' view but which appear to embrace both views in tandem. For instance, knowledge may be defined as high-value information which, when combined with experience, context, interpretation and reflection, is readily applicable to decisions and action (Davenport, DeLong & Beers 1998), whereas organisational knowledge is said to be processed information entrenched in routines and processes that enable action, while at its core, knowledge is closely linked to personal or human elements (Myers 1996). Also supporting an object-cum-process view of knowledge are the definitions by Ruggles (1997) and Davenport and Prusak (1998), mentioned in an earlier subsection, which pertain to knowledge being a fluid collective of items that possess both tangible (object) and intangible (process) attributes. A summary of the selection of knowledge definitions, highlighted in the previous subsections, is presented in Table 2.1 as follows:

Table 2.1 **Definitions of knowledge: Two main schools of thought**

Researchers who lean towards the *object* school of thought			Researchers who lean towards the *process* school of thought		
Year	Researcher	Definition/Description of knowledge	Year	Researcher	Definition/Description of knowledge
1964 1985	Drucker	Perishable commodity	1994* 1997*	Sveiby *cited in Sveiby 2001	The capacity to act
1987	Boland (cited in Malhotra 1999)	Unproblematic, predefined and prepackaged	1995	Nonaka & Takeuchi	Justified true belief
1999	Laudon & Laudon	No explicit definition; implicit in writing, from their suggestion of knowledge as something manageable through IT.	1998	O'Dell & Grayson	Information in action
2001	Natarajan & Shekhar	No explicit definition; implicit in writing, from their heavy emphasis on IT.	1999	Zack	What we have come to believe and value based on meaningfully organised accumulation of messages through experience, communication or inference
			2001	Henczel	Experience, intuition, skills, judgment, lessons learnt
			2006	Collison & Parcell	Know-how, know-why, know-what, know-who, know-where, know-when
			2007	Andreou & Bontis	KM is dynamic and process oriented.
			2008	Wright	Nature of tacit knowledge is anarchistic and serendipitous.

(Source: Skadiang 2008; developed for the study)

It is worthwhile at this juncture to note that besides the two main schools of thought on knowledge submitted by Sveiby (1996, updated 2001), another dominant school of thought is a resource-based view of knowledge where "KM is complex involving great outflows of resources" (Halawi, Aronson & McCarthy 2005, p. 76) and the purpose of KM is "to leverage an organisation's intellectual assets in sustaining competitive advantage" (Halawi et al. 2005, p. 77). Nonetheless, identifying what constitutes knowledge assets or knowledge capital is in itself a complex task, as reflected in the following observation:

> Most authors subsume all intangible resources to that which is often called the 'central resource' of organisations: knowledge. More exactly, they refer to it as an asset, thus to *knowledge capital*, and assume intellectual capital, intellectual assets, knowledge assets, knowledge capital as synonymous. Yet, there is no common understanding of knowledge or knowledge capital, no commonly accepted definition has been established. (Fried & Orellana 2006, p. 32)

Categories and forms of knowledge. Apart from providing a general framework of what knowledge is, researchers have identified specific categories and forms in which knowledge may be manifested. These knowledge categories and forms are also called typologies of knowledge (Perez & de Pablos 2003). In Figure 2.2, some common typologies or categories of knowledge are presented in chronological order.

Table 2.2 Typologies or categories of knowledge from a historical perspective

Year	Researcher	Characteristics/Categories/Typologies of knowledge
1966	Polanyi	*Explicit* knowledge and *tacit* knowledge; recognised the *tacit* dimension in all forms of knowledge.
1985	Anderson (cited in Zack 1999)	*Declarative* (about something) knowledge, *procedural* (how it occurs) knowledge and *causal* (why it occurs) knowledge
1995	Collins (cited in Ruggles 1997)	*Symbol-type* (codifiable) knowledge, *embodied* (function of physical makeup) knowledge, *embrained* ('physicalness' of brain) knowledge and *encultured* (socially and culturally embedded) knowledge
1995	Jensen & Meckling (cited in Myers 1996)	*Specific* (costly to transfer) knowledge and *general* (inexpensive to transmit) knowledge
1995	Nonaka & Takeuchi	*Explicit* knowledge and *tacit* knowledge
1996	Quinn, Anderson & Finkelstein (cited in Tiwana 2002)	*Know-what* (cognitive knowledge), *Know-how* (advanced skills), *Know-why* (systems understanding) and *Care-why* (self-motivated creativity)
1999	Cook & Brown (cited in Little et al. 2002)	*Skills* (tacit/individual*)*, *Concepts* (explicit/individual*)*, *Genres* (tacit/group) and *Stories* (explicit/group)
2000	Nonaka, Toyama & Konno (2000 cited in Little et al. [eds.] 2002)	*Experiential* (tacit/hands-on experience) knowledge assets, *Conceptual*(explicit/images and symbols) knowledge assets, *Routine* (tacit/embedded in daily operations) knowledge assets, *Systemic* (explicit/packaged and systemised) knowledge assets
2000	Lam (cited in Spring 2003)	*Embrained* knowledge (explicit/individual), *Embodied* knowledge tacit/individual*)*, *Encoded* knowledge (explicit/collective)*,Embedded* knowledge (tacit/collective)
2002	Laszlo & Laszlo	*Human knowledge* – comprising tacit and explicit knowledge *Social knowledge* – comprising synergetic knowledge, i.e. the outcome of individuals and groups working and learning together
2003	Perez & de Pablos [adapted from Snell, Lepak & Youndt (1999)]	*Idiosyncratic* knowledge (high uniqueness/low value), *Ancillary* knowledge (low uniqueness/low value), *Core* knowledge (high uniqueness/high value), *Compulsory* knowledge (low uniqueness/high value)
2007	Moteleb & Woodman	*Personal* (tacit knowledge), *Social* (relationships), *Codified* (explicit knowledge) and *Hierarchical* (taxonomy), according to the focus and locus of the knowledge
2008	Frappaolo	Besides tacit and explicit knowledge, there is an intermediate category, i.e. implicit knowledge
2008	Wright	Delineation between tacit and explicit knowledge is problematic and arbitrary because tacit knowledge can become explicit and vice-versa.

(Source: Skadiang 2008; developed for the study)

From Table 2.2, it is observed that apart from Polanyi (1966) and Anderson (1985 cited in Zack 1999), relatively many attempts to categorise or typify knowledge emerged in the mid-1990s. These include those by Collins (1995 cited in Ruggles 1997), Jensen and Meckling (1995 cited in Myers 1996), Nonaka and Takeuchi (1995), and Quinn, Anderson and Finkelstein (1996 cited in Tiwana 2002); while Cook and Brown (1999 cited in Little et al. [eds.] 2002) and Nonaka et al. (2000 cited in Little et al. [eds.] 2002) continued to refine existing categories towards the end of the millennium. This observed rise in knowledge categorisation during the mid-1990s appears to coincide with the rising popularity of KM reported by Frappaolo (2002) and Dearlove (2003).

Nonetheless, whatever labels these researchers decide to call the different manifestations of knowledge, the common underlying theme acknowledged by most if not all researchers is that knowledge is fundamentally of tacit or explicit nature (Perez & de Pablos 2003). These researchers include Polanyi (1966) who

has been officially credited with the discernment of tacit knowledge, Nonaka and Takeuchi (1995) who have been instrumental in evangelising the importance of tacit knowledge in knowledge-creating companies, Cook and Brown (1999 cited in Little et al. [eds.] 2002) who expanded on the then existing knowledge typologies with their framework, Lam (2000 cited in Spring 2003) who fine-tuned Cook and Brown's framework, and finally, Nonaka, Toyama and Konno (2000 cited in Little et al. [eds.] 2002) who introduced typologies of knowledge assets. However, in a departure from the norm, Laszlo and Laszlo (2002) have opted to categorise both tacit and explicit knowledge collectively as human knowledge, attempting to distinguish it from what they understand to be social knowledge, i.e. knowledge that results from the interaction of individuals and teams learning and working together.

Other definitions in Table 2.2 pertain to various distinguishing characteristics or criteria of knowledge categories, including whether the knowledge is individual or collective in nature (Cook & Brown 1999 cited in Little et al. [eds.] 2002; Lam 2000 cited in Spring 2003), has high or low value to the organisation (Perez & de Pablos 2003), is unique or common (Perez & de Pablos 2003), as well as what the knowledge constitutes or involves (Anderson 1985 cited in Zack 1999; Quinn et al. 1996 cited in Tiwana 2002) and even the cost of knowledge transfer (Jensen & Meckling 1995 cited in Myers 1996). Alternatively, Moteleb and Woodman (2008) propose that when contemplating KM systems development, four distinct categories of knowledge may be distinguished according to its focus and locus: personal, social, codified and hierarchical. In the following sections, a discussion on KM will be presented.

2.3 Overview of knowledge management (KM)

A concise introduction to KM may be effected through two definitions, selected for their succinctness, as follows. Firstly, KM is all about ensuring that the right knowledge gets to the right people at the right time (O'Dell & Grayson 1998). In addition, KM may be referred to as the art of creating value from intangible assets (Sveiby 1996, updated 2001). Applying both definitions simultaneously, it is observed that KM involves not just the appropriate transmission of knowledge but also includes the ability to draw value out of knowledge. Although intangible assets, as submitted by Sveiby, are not necessarily limited to knowledge, the term is suggestive of the potentially enigmatic nature of knowledge. It is the fluidity of what constitutes knowledge that makes defining and practising KM a difficult task, producing various models and interpretations (see section 2.4). Further, Tiwana (2002) emphasizes that KM is not merely about digital networks, smarter intranets or enterprise-wide information highways, but KM is primarily the process of helping the right people apply the right knowledge at the right time, using technology correctly in the right spirit.

KM and the learning organisation. KM in all its expansive scope is not to be equated with the concept of the learning organisation (LO). Due to KM's broad, multidimensional nature which spans almost all the organisation's activities (Wiig 1997), it is possible to confuse organisational KM (OKM) with the LO. According to Scarborough, Swan and Preston (1999 cited in Lewin 2002), OKM

has a specific focus, subscribes to a 'mining' metaphor and takes on a resource-based view of the organisation, whereas the LO embraces a broad focus, subscribes to a 'building' metaphor and adopts a systems-based view of the organisation. In addition, OKM emphasizes the transformation of tacit knowledge to explicit knowledge and tends to come under the purview of chief knowledge officers or information systems managers, while the LO emphasizes the management of tacit knowledge usually under the purview of strategic or human resource managers (Scarborough et al. 1999 cited in Lewin 2002).

A review of mainstream journal articles from January 1990 to August 1998 reveals a total of 402 references to KM and 531 references to the LO; there were more KM references in the first half of 1998 than cumulatively in the preceding five years (Alrawi 2007). Moreover, almost 48 per cent of those KM articles were found in computing journals; whereas about 51 per cent of LO articles were found in HRM, organisation theory and general management journals; while just 0.5 per cent of organisational learning articles were published in computing journals (Alrawi 2007).

KM and business process reengineering. KM is not the same as business process reengineering (BPR) although the former may be used in the latter (Bergeron 2003). Bergeron (2003) further clarifies that KM is concerned with documenting the *what is*, emphasizing collaboration and communities of practice; on the other hand, BPR is about *what should be* and emphasizes benchmarking, best practices and business model change. Additionally, Bergeron (2003) states that KM is associated with tools and techniques such as knowledge audit, knowledge mapping, mentoring, social network analysis, storytelling as well as training and development whereas BPR is associated with downsizing and eliminating non-value added processes.

KM and organisational human capital. It is important to establish a framework for analysing organisational human capital, which combines three important perspectives – knowledge management, intellectual capital and strategic human resource management (Perez & de Pablos 2003). Therefore, it may be inferred that KM is a key element of organisational human capital analysis.

Alternative terminology for KM. There have been suggestions of alternative terms for KM, such as *knowledge leverage* (Clemmons-Rumizen 2001; Davenport and Prusak 1998), *achievement management* (Gurteen 2000), *knowledge enabling* (von Krogh, Ichijo & Nonaka 2000) and *knowledge leadership* (Trompenaars 2003). Although a few alternative terms have been proposed, these researchers are not seriously advocating a change in official terminology but merely suggesting labels that might more clearly reflect what KM means. It is worthwhile to invest time to select the best term for KM to be used within the organisation – whether *performance through learning, shared learning* or a suitable alternative – since inappropriate words could become a hindrance (Collison & Parcell 2006). Arguing that KM is an incomplete concept, the term *knowledge transfe*r has been proposed by English and Baker (2006) as a wider concept in which KM is a subset along with five additional concepts: a knowledge-enabled culture and the four phases of the knowledge transfer race.

Since the main objective of this report is not to delve into semantics, and for the sake of consistency, KM will be used as the generic umbrella term that embraces all variations of KM terminology. The term KM will also be used interchangeably with the term OKM.

2.4 Organisational knowledge management (OKM)

In the previous section, an overview of the parent discipline involved in this study, knowledge management (KM), was provided. As a follow-up, this section discusses a specific area of KM, i.e. organisational knowledge management (OKM) which is the immediate discipline associated with the study.

Managing knowledge is a crucial component in the achievement and sustainability of an organisation's competitive advantage (Perez & de Pablos 2003). To maximise knowledge, organisations must be quick in balancing their knowledge management activities – an act that necessitates changes in three areas: organisational culture, technologies and techniques; yet not merely focusing on the three areas separately but also on the interaction between the three (Bhatt 2001).

2.4.1 Definitions of KM

Apart from the introductory definitions outlined in section 2.2, a few more definitions will be offered here to pave the way for a discussion on the different types of KM models currently available. KM is a broad, multidimensional subject that encompasses most aspects of the organisation's activities, required to create and sustain a balanced portfolio of intellectual capital, and having a focus on knowledge creation, development, organisation and leverage (Wiig 1997). Expressed alternatively, KM is the identification and communication of explicit and tacit knowledge residing within processes, people, products and services (Bollinger & Smith 2001).

Table 2.3 chronologically lists a selection of definitions or descriptions about KM provided by researchers in the past ten-year history. From the table, it may be observed that the definitions of KM acknowledge that KM is a complex series of processes (Garvin 1994; Laudon & Laudon 1999; Bhatt 2001; Anklam 2003; Lake & Erwee 2005; English & Baker 2006) comprising processes which include, but are not limited to, knowledge creation, knowledge acquisition, knowledge sharing, knowledge transfer, knowledge store and knowledge reuse. The listed definitions are also in agreement that human parties constitute the major actors and stakeholders of KM, whether expressed explicitly (O'Dell & Grayson 1998; Tiwana 2002; Lake & Erwee 2005) or implied in meaning.

In addition, the definitions emphasize the intent of KM, i.e. to add and generate value (Garvin 1994; Talisayon 2008) for the organisation. Moreover, the definitions suggest a reliance on technology to facilitate KM, with two of those definitions explicitly using the term 'technology' (Tiwana 2002; Anklam 2003). Furthermore, two of the listed definitions highlight the role of intangible assets

(Sveiby 1996, 2001; Anklam 2003), while another two stress on the importance of timeliness (O'Dell & Grayson 1998, Tiwana 2002). It is also observed that Tiwana (2002) appears to have expanded on O'Dell and Grayson's (1998) people-oriented definition by explicitly adding technological and spiritual dimensions.

Table 2.3 **Selection of KM definitions from a historical perspective**

Year	Researcher	Definition/Description of KM
1994	Garvin	A collection of processes that enables knowledge to be a key factor in adding and generating value; involves creation, acquisition and knowledge transfer.
1998	O'Dell & Grayson	Getting the right knowledge to the right people at the right time
1999	Laudon & Laudon	The proactive and systematic efforts of an organisation to manage its knowledge assets; involves four aspects – knowledge creation, knowledge sharing, knowledge dissemination and knowledge store.
2001	Bhatt	A process that can be categorised into knowledge creation, knowledge validation, knowledge presentation, knowledge distribution and knowledge application activities.
1996 updated 2001	Sveiby	The art of creating value from intangible assets
2002	Tiwana	Facilitates opportunistic application of fragmented knowledge through interpretation; helping the right people apply the right knowledge at the right time using technology correctly and in the right spirit.
2002	Bontis, Crossan & Hullan , cited in Andreou & Bontis (2007)	While intellectual capital is akin to a stock (object), KM is analogous to a flow (process).
2003	Anklam	A collection of disciplines, technologies and practices ingrained in an information infrastructure which supports creation, sharing and leverage of both tangible and intangible assets.
2005	Lake & Erwee	In the context of networks, KM involves "cooperating across organisational boundaries to systematically find, select, organise, distil, present and share authorised information that meets the strategic and operational learning intent of all parties to cooperation." The definition assumes all parties have established strategic policies against unauthorised transfer of confidential information, and all parties do not source unauthorised information but willingly share authorised information.
2006	English & Baker	KM is an incomplete concept that should come under the broader concept of knowledge transfer (KT). Hence, KT is actually KM plus 5 key concepts: knowledge-enabled culture, development of a rapid learning organisation, systematic use of knowledge transfer methods, a focus on intellectual capital, and reuse of knowledge. The KT race is a never-ending, metaphoric race that must be won.
2007	Weber (p. 333)	KM refers to "the allocation of knowledge assets as a means to improve organisational processes."
2008	Talisayon	KM is enabling and enhancing capabilities to perform business processes or work processes; ultimate aim of KM is value creation
2008	Wright	Since tacit knowledge is anarchistic and serendipitous in nature, its so-called management tends to be likewise. Hence, it is necessary to consider new, more holistic, serendipitous and open structures to bridge an organisation's knowledge gap, usually filled in by tacit knowledge.
2008	Cruywagen, Swart & Gevers (p. 103)	"KM should not only be viewed in terms of its underlying activities, but also in terms of the organisation in which it is or will be deployed." Hence the need for contextual sensitivity within a KM framework.

(Source: Skadiang 2008; developed for the study)

Ever since the 1990s, definitions of KM have highlighted its importance within and across organisational boundaries. The underlying theme has resonated through the first decade of this new millennium as KM definitions continue to even more aggressively and inextricably entwine KM within business and organisational contexts (Lake & Erwee 2005; English & Baker 2006; Weber 2007; Talisayon 2008; Cruywagen et al. 2008). The later definitions of KM also emphasize KM in the light of changing environmental factors. Specifically, Lake and Erwee (2005) provide a definition of KM in the context of a formal business network comprising people and parties that share knowledge across organisational boundaries. Lake and Erwee's definition is relevant in today's highly interconnected world, not only due to the pervasiveness of technology but also arising from the need for greater strategic global alliances in an increasingly competitive landscape.

Further, English and Baker (2006) suggest that KM is an incomplete concept and therefore propose the broader umbrella term *knowledge transfer* which encompasses KM plus five key concepts as follows: knowledge-enabled culture, development of a rapid learning organisation, systematic use of knowledge transfer methods, a focus on intellectual capital, and reuse of knowledge. English and Baker (2006) also view knowledge transfer as a metaphoric race without a finish line, which demands victory, and whose profound implications ring true in our world of escalating challenges. Along the similar paradigm of fulfilling today's competitive business needs, Talisayon (2008) considers KM from the perspective of productivity and quality. KM, according to Talisayon, is the enabling and enhancement of capabilities to perform business processes or work processes, which includes the sourcing and deployment of the right knowledge assets for achieving the desired results, with the ultimate aim of creating value.

Arguably, definitions of KM in the latter years might seem to be 'more of the same' as researchers contemplate whether anything significantly new or different could be reinforced into current definitions of KM. At worst, an emerging KM definition might be a rehash of what had been submitted before, and at best it embraces a refinement or renewed understanding of the subject matter. Nevertheless, it is observed that the definitions of KM have widened in scope and expanded as if to accommodate the increasing complexity of contemporary times and circumstances. This is evident in the additional nuances to the interpretation of KM as demonstrated in the definitions by Wright (2008) and Cruywagen et al. (2008). The former describes tacit knowledge as anarchistic and serendipitous in nature, which therefore necessitates a more holistic approach that embraces new, serendipitous and open structures to bridge organisational knowledge gaps, most of which can only be filled by tacit knowledge. Moreover, in contrast to the conventional KM wisdom of applying best practices, Cruywagen et al. (2008) stress the need to determine the organisational context first so that best-fit practices, rather than best practices, would be applied. Although one might reason that the choice between what is deemed best practice and best-fit practice is merely a matter of semantics, the exhortation to incorporate contextual sensitivity within the KM framework is not without merit.

2.4.2 Schools of thought

From the array of definitions of KM supplied in academic literature, it is observed that the practice of KM has developed according to different schools of thought or along distinct routes. According to Bollinger and Smith (2001), the first school of thought perceives KM to be primarily an IT issue while the second subscribes to KM as mainly a human resource issue, and finally, the third promotes the development of processes that measure and capture organisational know-how. Not dissimilarly, Wiig in an interview by Lelic (2002) identifies three approaches – the IT-dominant approach, the OL approach and the intellectual capital approach, of which the first is the least successful. Maier and Remus (2003) simplify the landscape by narrowing down to just two main schools – human-oriented fractions and technology-oriented fractions.

Apart from the above, Gebert, Geib, Kolbe and Brenner (2003) attest that KM models may be broadly categorised according to how knowledge is perceived and analysed in those models. As such, the models may be identified as firstly, epistemology-oriented models which consider knowledge as an entity with distinct traits; and secondly, ontology-oriented KM models which define knowledge solely through its relationships with the environment. Although each category of KM models has its own strengths and weaknesses, applying both epistemological and ontological perspectives can offer great synergy, leading to a hybridisation of KM models apparent in many KM models of the last decade (Gebert et al. 2003).

Adding to the categorisation of KM models are Kakabadse et al. (2003) who propose five types of KM models – first, the philosophical model which is concerned with what constitutes knowledge; second, the cognitive model which views knowledge as an asset that can be managed and measured; third, the network model which focuses on acquisition, sharing and knowledge transfers through a network of relationships; fourth, the community practice model which builds on the sociological and historical perspective; and fifth, the quantum model which assumes that current information and communication technology will fundamentally change when built using quantum principles such as the complementary support offered by IT-based tools that simulate virtual scenarios of decision outcomes.

A concluding thought on KM may be summed up by Thomas, Kellogg and Erickson (2001) who assert that reducing KM to merely the delivery of information to a person or a set of people is missing the mark; more than this is the important focus on the social context: relationships, awareness, common ground, incentives and motivation.

2.4.3 Notable KM models

In the following subsections, a number of notable generic KM models are outlined.

The knowledge transfer matrix (SECI model). Also known as the knowledge creation and conversion model, this model by Nonaka and Takeuchi (1995) identifies four modes of knowledge transfer, i.e. from individual to individual (socialisation), individual to group (externalisation), group to organisation (combination) and organisation to individual (internalisation). At the same time that these modes of knowledge transfer occur, conversion of knowledge takes place, namely tacit knowledge to tacit knowledge (socialisation), tacit knowledge to explicit knowledge (externalisation), explicit knowledge to explicit knowledge (combination) and explicit knowledge to tacit knowledge (internalisation), as represented in Table 2.4.

Table 2.4 **Knowledge transfer matrix**

To \ From	Tacit	Explicit
Tacit	Socialisation	Internalisation
Explicit	Externalisation	Combination

(Source: Nonaka & Takeuchi 1995)

The knowledge transfer process model. Knowledge transfer may be represented as a cyclical process comprising seven steps (O'Dell & Grayson 1998), as depicted in Figure 2.2.

Figure 2.2 **Knowledge transfer process model**
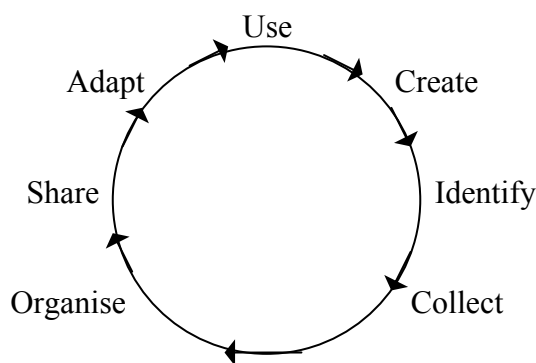
(Source: O'Dell & Grayson 1998)

This model explicitly lists 'share' as a distinct step within knowledge transfer. As such, O'Dell and Grayson's interpretation of knowledge sharing being a component of knowledge transfer is unlike that of Nonaka and Takeuchi (1995) whose SECI model depicts knowledge transfer to be synonymous with knowledge sharing. Furthermore, O'Dell and Grayson (1998) assert that the creation of a successful knowledge transfer system may be achieved by firstly, discovering the organisation's value propositions; secondly, creating environmental enablers, and thirdly, embarking on a structured process for

designing the entire initiative. From the success advice recommended above, it is noted that at least two out of three of them have some links with human-related factors. Therefore, the investigation of cultural and demographic factors on individuals' attitudes in knowledge sharing in this study is relevant.

***Ba* – the concept of shared space.** The *ba* concept of shared space advocated by Nonaka and Konno (1998) and again by Nonaka, Toyama and Konno (2000 cited in Little et al. [eds.] 2002) appears to be a more in-depth and complex version of the framework proposed by Schrage in 1990. While Schrage's shared space concept is more physical, Nonaka and Konno (1998) refer to *ba* as a multi-contextual platform for emerging relationships, which may be physical, virtual or mental. Self-transcendence, i.e. going beyond the boundary of oneself and others, occurs in *ba* and enables knowledge to be created through these interactions; but since such knowledge cannot be isolated from its context, the knowledge is said to be embedded in *ba* (Nonaka et al. 2000 cited in Little et al. [eds.] 2002). Figure 2.3 shows the four types of *ba*, followed by an explanation on the meanings of the different manifestations of *ba*.

Figure 2.3 Four types of *ba* (context-knowledge space)

Type of interaction

		Individual	Collective
Media	Face-to-face	Originating *ba*	Dialoguing *ba*
	Virtual	Exercising *ba*	Systemising *ba*

(Source: Nonaka, Toyama & Konno 2000 cited in Little et al. [eds.] 2002)

'Originating *ba*' corresponds to socialisation, where individuals share their experiences, emotions and mental models face-to-face, and where self transcends to others. 'Dialoguing *ba*' corresponds to externalisation where individuals' share and articulate mental models and skills as concepts. 'Systemising *ba*' refers to collective and virtual interactions that offer mainly a context for the combination of existing explicit knowledge which is transmittable to a large number of people in codified form through information systems. Lastly, 'exercising *ba*' corresponds to internalisation and encompasses both individual and virtual interactions. According to the researchers, it is the role of the organisation's knowledge producers and top management to supply the necessary conditions for *ba* to be built and energised. An example of a necessary condition is creative chaos, where top managers might intentionally throw in a seemingly impossible or ambitious expectation to evoke a sense of crisis among employees, thereby energising employees to achieve greater heights; done strategically at the right time in the right place, creative chaos will produce good results without inducing organisational disorder.

It is observed that the framework by Nonaka et al. (2002) recognises both face-to-face and virtual interaction. The model also proposes different types of *ba* for different modes of sharing, meaning *ba* is dependent on who shares and how, quite unlike Schrage's (1990 cited in Ruggles 1997) model which is generic in its application.

In a further study on knowledge creation within multi-organisational projects, Rice and Rice (2005) applied the SECI model to knowledge accumulation and learning processes. They argue that the transfer of SECI principles to multi-organisational projects and alliance arrangements will permit better and more effective knowledge management across organisational boundaries. Rice and Rice (2005, p. 676) opine that the SECI model is "prescriptive in its presentation of the types of processes required for the successful implementation of organisational learning", in terms of its processes (socialisation, externalisation, combination, internalisation) as well as the social and relational context necessary to facilitate knowledge exchange ('originating *ba*', 'dialoguing *ba*', 'systematising *ba*' and 'exercising *ba*'). Rice and Rice (2005) also note that the presence or absence of these processes and contexts may be viewed as potential antecedents or barriers to successful knowledge creation within an organisation.

The knowledge creation model. In this model, von Krogh, Ichijo and Nonaka (2000) propose five steps of knowledge creation: sharing tacit knowledge, creating concepts, justifying concepts, building a prototype and cross-levelling knowledge, where creation and justification of concepts entail the use of metaphors and analogies, whereas cross-levelling of knowledge ascertains that the knowledge created by a certain group in the organisation becomes meaningful to others including the uninitiated. In addition, von Krogh et al. (2000) suggest five enablers of knowledge creation: instilling a knowledge vision, managing conversations, mobilising knowledge activists, creating the right context and globalising local knowledge. The researchers recommend globalising local knowledge so that knowledge which is created in one part of the organisation is made accessible to the whole organisation. This model outlines what needs to take place after sharing to render the knowledge useable and valuable. Besides, this model focuses only on the sharing of tacit knowledge, implying that explicit knowledge is relatively unimportant in knowledge creation, and/or that sharing tacit knowledge is mandatory for knowledge creation.

The holistic model. Collison and Parcell (2006) derived their holistic KM model after much careful deliberation with their team of experienced practitioners. The model links learning processes, knowledge capture and knowledge transfer to daily business.

Figure 2.4 **The Holistic Model**
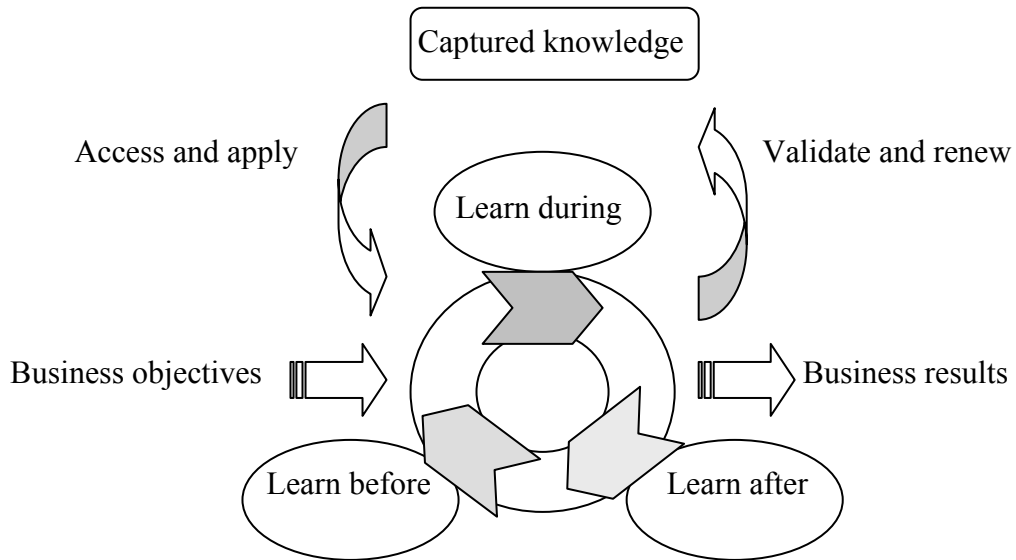
(Source: Collision & Parcell 2006)

Summary of current state of research on KM models. Two KM models have emerged in the Australian context. Firstly, the one designed by Delahaye (2005) which comprises two interacting systems, namely a formal or legitimate system and an informal or shadow system. The other is a new emerging model associated with unlearning (Becker 2005) as distinct from learning, at both the individual and organisational level. This model discusses unlearning in terms of its relationship to the existing literature on types of knowledge, how unlearning might occur within different levels of knowledge, and the link to individual and organisational learning.

In addition, Gray and Densten (2005) have developed an Organisational Knowledge Management model by integrating the Competing Values Framework (adapted from Quinn 1988) with Nonaka and Takeuchi's SECI model. The model is discussed in greater detail in section **2.4.5 OKM culture**.

Overall, Moteleb and Woodman (2007) observe the prevalence of two dichotomies in KM models within extant literature: firstly, the analysis dichotomy scholars who examine how knowledge is analysed and subsequently perceive KM models as epistemological and ontological models; secondly, the working dichotomy scholars who note how we work with knowledge and thereby discern KM models as analytical models and actor models. As such, Moteleb and Woodman (2007) propose a KM system (KMS) Modelling Matrix (Figure 2.5) that shows the four domains of KM models as being contingent upon what the focus and locus of the knowledge is.

Figure 2.5 KMS Modelling Matrix

Approaches to Analysing Knowledge
(Analytical Dichotomy)

		Epistemological	Ontological
Approaches to Working with Knowledge (Working Dichotomy)	**Actor**	**Personal** Tacit Knowledge Cognitive Maps Cognition	**Social** Relationships Communities of Practice Storytelling
	Analytical	**Codified** Explicit Knowledge Expert System Artificial Intelligence	**Hierarchical** Taxonomy Intranet Neural Networks

(Source: Moteleb & Woodman 2007)

Despite considerable progress in both theory formulation and practice, as demonstrated in the vast variety of KM models available, Diakoulous, Geogopoulos, Koulouriotis and Emiris (2004) argue that various contradictory evaluations have been noted, which mainly arise from the fact that KM is still in its early stages; hence, there are still many debatable issues pertaining to basic KM processes, pursued KM objectives and appropriate measures to establish KM activities. An example demonstrating one such so-called debatable issue is discussed in one of the following subsections. Nevertheless, this does not mean that existing KM models are without value; there is no one-size-fits-all model, so it is up to the individual organisation to fine tune existing models according its own unique context, or design its own KM model with the help of relevant consultants.

Amid the vast assortment of KM models in publication and practice, it makes sense to remember that as with knowledge, people are at the heart of the KM philosophy, so the success or failure of OKM really depends on how organisations manage and motivate its employees (Bollinger & Smith 2001). It is human actors and knowledge which form the basic building blocks of organisational capabilities (Spanos & Prastacos 2004). In short, it is difficult to manage knowledge but organisations can develop a conducive environment for knowledge sharing to thrive – the right conditions, right means, right actions and right leadership – such that KM becomes an unconscious competence (Collison & Parcell 2006). The next few sections provide an overview of the three dimensions of OKM – strategy, culture and process/technology – areas in which the study was involved.

2.4.4 OKM strategy

Since the mid-1980s, global competition has been evolving to increasingly emphasize product and service quality, responsiveness, diversity and customisation (Wiig 1997), all of which would depend on an OKM strategy. Today's entrepreneurial environment continues to be characterised by market globalisation, intensified competition and rapid technological change, where tangible assets no longer provide sustainable competitive advantages, but are being substituted by intangible assets and intellectual capital, especially in knowledge-based industries such as information and software services (Pablos & de Perez 2003). As there is a positive and significant relationship between transformational/transactional leadership and the stimulant determinants of the work environment for creativity in the context of KM (Politis 2004), the KM initiative should therefore constitute a strategic initiative from the top management. In short, to be truly effective, knowledge sharing has to be built into the organisation's business strategy (McDermott & O'Dell 2001).

Current state of research. An overview of academic literature indicates OKM as a well-recognised organisational strategy. Knowledge sharing across the organisation is increasingly used as a strategic tool to boost customer service, decrease product development times and to share best practices (Skyrme 1997). Knowledge is increasingly promoted as the most strategically important resource and learning the most strategically important capability for business organisations (Clarke 2001). Furthermore, intellectual capital is gaining increasing recognition as the only true strategic asset (Meso & Smith 2000).

Hence, it is imperative to make sharing knowledge a direct part of the business strategy (McDermott & O'Dell 2001) as KM initiatives are unlikely to succeed unless integrated with business strategy and related to the development of organisational core capabilities (Clarke 2001). In short, the effective implementation of a sound OKM strategy and becoming a knowledge-based organisation is considered mandatory for success as organisations thrive in the knowledge economy (Binney 2001). The aims of OKM strategy include generating or capturing knowledge, structuring and providing value to accumulated knowledge, transferring knowledge, and establishing mechanisms for the use and re-use of such knowledge – in short, the aims relate to the four basic processes of KM (Perez & de Pablos 2003).

Metrics or performance measures are required to measure the performance of KM strategies (Bose 2004). Researchers such as Marr, Schiuma and Neely (2004) have reviewed existing measurement approaches and models for organisational knowledge assets such as the Skandia navigator, the intellectual capital (IC) index approach by proposed by Roos et al. in 1997, the IC audit model submitted by Brooking in 1976 and the intangible assets monitor designed by Sveiby in 1997.

Figure 2.6   Knowledge Assets Dashboard
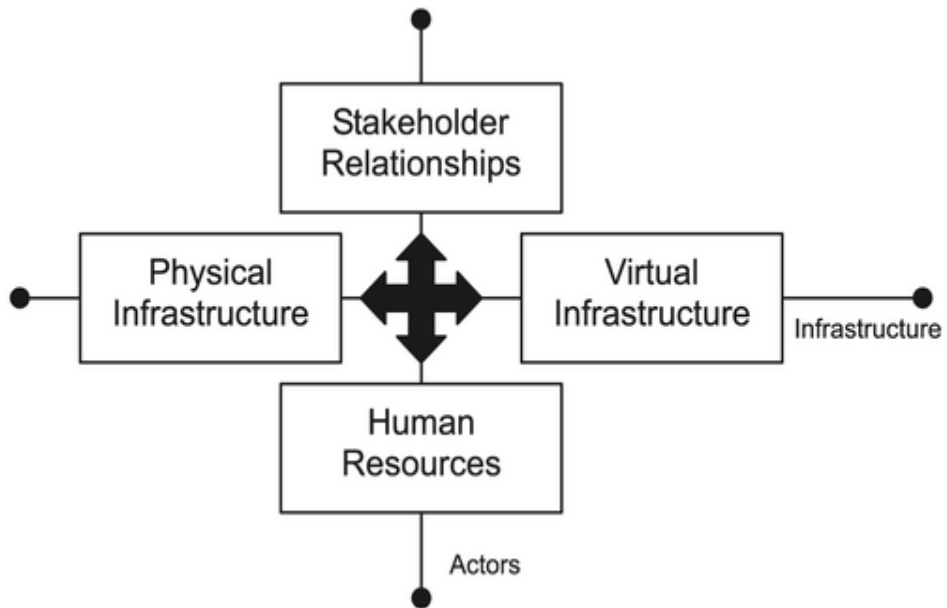
(Source: Marr, Schiuma & Neely 2004)

From their review and analysis, Marr, Schiuma and Neely (2004) have created their own knowledge assets dashboard (Figure 2.6) and introduced it with the knowledge assets map (Figure 2.7) developed earlier by Marr and Schiuma in 2001. The knowledge assets dashboard clarifies the interaction between actor and infrastructure knowledge assets and aims to be a comprehensive tool that helps identify key knowledge assets.

Figure 2.7   Knowledge Assets Map
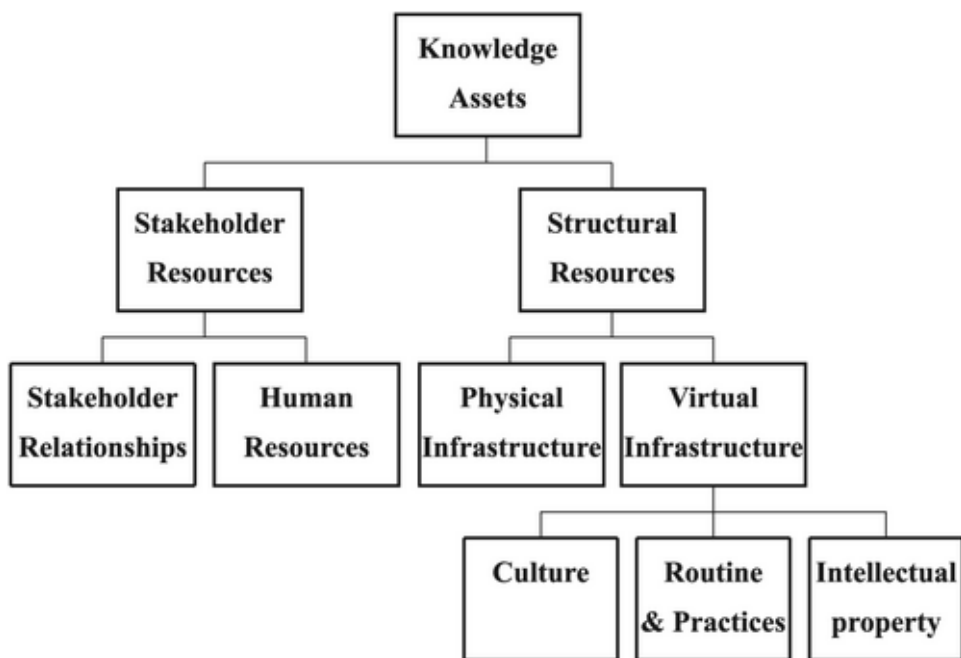
(Source: Marr & Schiuma 2001 cited in Marr, Schiuma & Neely 2004)

The future practice of KM will depend on both the quality of the metrics available and whether output from these metrics can offer tangible added value to organisations (Bose 2004). While calls for standardisation of KM metrics are understandable, introducing standards to such a vast and complex field may not be advisable as metrics cannot capture cultural and perceptual dimensions; moreover, the selection of metrics is very much up to individual organisations to freely choose techniques of measure most relevant to themselves (Martin 2004).

2.4.5 OKM culture

KM is basically a cultural construct because different cultures have different ways of structuring meaning, for example in the USA, the adage 'knowledge is power' is relevant whereas in Japan, knowledge is only knowledge when it is shared as one's status depends on how much one contributes to the group (Trompenaars 2003 cited in Lelic 2003). Another reason why knowledge sharing is influenced by cultural issues is mainly because it involves face-to-face communication – a people-oriented process replete with human issues of which culture is a key characteristic. It is a people-oriented process because typically, 42 percent of corporate knowledge resides in human brains, (Biren, Dutta & van Wassenhove 2000) or 90 percent of the true value of intellectual capital resides in the heads of an organisation's knowledge workers, including their skills, experience, insight, intuition and the trust they have established over the years (Barth 2000). In addition, the nature of knowledge is fuzzy and closely linked to the people who possess it; it is created invisibly within the human brain, revealed through sharing with others (Davenport, DeLong & Beers 1998). As such, implementing a people-oriented process such as knowledge sharing requires a focus on the social network (Malhotra 1999) and sensitivity to cultural issues. After all, it is people who can convert knowledge potential into bottom-line benefits (Skyrme 1997).

An OKM culture is one in which knowledge sharing is the norm, to the extent that it becomes an unconscious competence (Collison & Parcell 2006), where employees truly understand that sharing knowledge, and not knowledge itself, is power (Gurteen 1999). Furthermore, a strong, positive organisational culture is vital to learning, development and the sharing of skills, resources and knowledge (Bollinger & Smith 2001). In a supportive culture of OKM, employees and teams are recognised and rewarded for sharing and using learning in their daily activities (Collison & Parcell 2006).

Culture is manifested through two dimensions: the visible dimension – structure, stories and spaces – and invisible dimension – unspoken organisational core values that guide what people do and how view each other's actions, both of which are linked by the behaviour of organisational members (McDermott & O'Dell 2001). Therefore, McDermott and O'Dell (2001) state that within a knowledge sharing culture, people naturally share ideas and insights without coercion, expecting others to do so as well.

Current state of research. Underscoring the importance of culture on knowledge sharing are some studies conducted by researchers including Kanter

(1988 cited in Myers 1996); Stewart (1991 cited in Little et al. [eds.] 2002); Biren, Dutta and van Wassenhove (2000). However, these studies demonstrate that organisation culture had an impact on the extent of knowledge sharing but did not specifically cover aspects of personal culture, i.e. cultural background of participants. Another study by Crawford and Strohkirch (2006) finds that individuals with greater communication apprehension are significantly less effective in a variety of KM functions; however, it may be argued that communication apprehension is associated with one's personality trait rather than culture.

Further, Gray and Densten (2005) have developed an Organisational Knowledge Management model which integrates the Competing Values Framework (adapted from Quinn 1988) with Nonaka and Takeuchi's knowledge creation and conversion model. They reason that their integrated model aids understanding of the social and organisational cultural processes which drive knowledge creation and underpin organisational effectiveness. In situations "where a culture of knowledge hoarding creates barriers to knowledge sharing" (Bontis et al. 2002 cited in Gray & Densten 2005 p. 600), Gray and Densten note that models such as their Organisational Knowledge Management model should serve as a basis for management development or facilitate the diagnosis of inadequate KM processes.

From an overview of literature on KM culture, it is observed that researchers tend to highlight, usually one of, a few common underlying themes. The possible themes include trust, rewards, knowledge sharing, communities of practice (COPs) and some form of how-to guidelines. These universal themes will be presented in greater detail in the ensuing paragraphs in no particular order of priority.

Trust. Developing trust and mutual respect is an important outcome when organisations try changing or influencing their OKM culture (Skyrme 1997). Since employee attitudes are largely influenced by organisational culture, the culture must exude trust, honesty, respect and integrity before employees feel comfortable to share (Bollinger & Smith 2001). In other words, trust may be considered a prerequisite for knowledge sharing.

Without mutual trust, only the most perfunctory business knowledge will be shared. To address this, organisations should promote more interactions through dialogues to nurture so-called relationship specific knowledge that can mediate deeper exchanges between employees (Ballantyne 2004). Moreover, organisation culture is not homogeneous but consists of subcultures which may differ from, or are opposed to, the organisation as a whole; thus even within organisations that strongly support knowledge sharing, there will be those who do not share similar core values and are unsupportive towards sharing knowledge (McDermott & O'Dell 2001). This aforementioned observation has implications for studies on trust when dealing with multiple subcultures. For example, a study of explicit knowledge exchange in a formal regional business network in Australia substantiated the reality that in a network, "people have to trust each other, understand what is confidential and what is shared across boundaries, earn respect for each party's technical competence and actively

search out knowledge termed in contexts that may or may not exist in their existing schemata" (Lake & Erwee 2005, p. 645).

Rewards. OKM culture may be changed or influenced through rewards (Skyrme 1997). A study on best-practice companies by McDermott and O'Dell (2001) shows that these companies incorporate sharing knowledge into daily work processes, including making knowledge sharing a general part of their performance appraisal. Although aligning reward and recognition to knowledge sharing is one way of making knowledge sharing visible, none of the best-practice companies interviewed believed that reward and recognition systems alone were effective in motivating people to share knowledge (McDermott & O'Dell 2001). Where the nature of the reward is concerned, a study which drew 1,535 respondents from nine different organisations in four different countries reveals that employees prefer professional and personal development as incentives, over salary increases and promotions (Gamelgaard 2007).

Knowledge sharing. KM is not an end in itself but is basically about sharing knowledge and utilising it (Gurteen 1999). Sharing of knowledge across the organisation is valuable as a strategic tool to enhance customer service, cut down product development time and disseminate best practices (Skyrme 1997). In addition, knowledge is usually locally acquired but not evenly distributed across organisations (Spring 2003), hence the importance of knowledge sharing. Knowledge dissemination is directly linked with the breadth of knowledge sharing within organisational boundaries, distinguishing thriving organisations from merely surviving ones (Spanos & Prastacos 2004). Moreover, knowledge sharing should occur not just among employees but also between partners, allies, intermediaries, suppliers and customers (Perez & de Pablos 2003; Spring 2003). Organisational boundaries are becoming increasingly permeable and variable; therefore as organisational knowledge is derived from inter-organisational relationships, it becomes a case of managing beyond the firm (Spring 2003).

A further study (Behrend & Erwee 2007) on knowledge sharing was conducted on virtual project teams in multi-location environments, which involved members with highly complex work and a membership mix of internally employed personnel, external partners or other contract staff. The findings of the study reveal that in such contexts, aspects of trust, shared language and a common vocabulary, informal networks, boundaries and risk associated with uncontrolled (boundary-spanning) knowledge exchange all impact knowledge sharing processes in multicultural teams.

Apart from COPs, informal networks also play a key role in knowledge sharing. Informal networks may be defined as networks where individuals form connections based on social or personal relationships rather than work-related relationships – these personal communications are significant when people discover, gather and utilise tacit knowledge that are scattered across the organisation (Awazu 2004). An exploratory industry survey by Handzic and Chaimungkalnont (2004) indicates that informal socialisation exerts a much stronger positive impact upon creativity than organised socialisation.

Only effective collaboration and communication across the entire organisation can give KM the push it requires. For a knowledge sharing culture to begin, every employee must become responsible for his or her own learning even though top management buy-in is important (Gurteen 1999). Moreover, as knowledge exists within individual employees and also in a composite sense within the organisation, organisations need to develop a mechanism for tapping into the collective intelligence and skills of employees (Bollinger & Smith 2001). From a review of literature, these mechanisms include a knowledge networking infrastructure that offers four levels, i.e. connectivity, communications, conversations and collaboration (Skyrme 1997) as well as social interaction using different possible methods like apprenticeship, direct interaction, networking and action learning to spur tacit knowledge diffusion (Haldin-Herrgard 2000).

Another possible mechanism is the use of dialogues – an interactive process of learning together – which, although spontaneous and disorderly among counterparts, are bounded by a serious aim to reach mutual understanding or what is termed as relationship-specific knowledge, which is constantly updated and fed back into dialogue within iterative cycles of learning (Ballantyne 2004). The format of questions posed to individuals who possess the desired knowledge does matter because question structure, whether open-ended or closed, affects their response and hence, the knowledge sharing process (Bircham-Connolly, Corner & Bowden 2005). Moreover, language and the meaning ascribed by different people to different words play an important role in constructing knowledge within organisations and other social contexts (Renzl 2007).

In addition, rich face-to-face interactions can inspire tacit knowledge development and diffusion because they are carried out within the unique context of a site or facility (Spring 2003), not too dissimilar from what Hayek (1945 cited in Myers 1996) calls 'knowledge of the time and place' or idiosyncratic knowledge. Lake and Erwee (2005, p. 656) corroborate that "the combined knowledge of members is increased through participating in the knowledge sharing process, and the strengthened relationships and trust built through interaction in the knowledge process increases the chance of continued community and individual benefits".

Taking into account knowledge sharing in virtual teams, which includes a limited amount of face-to-face meetings, Behrend and Erwee (2007) find that project team members who harness new, on-demand knowledge from external areas (boundary spanners) are able to enhance a project's reactiveness in challenging, dynamic situations. Findings of the study also reveal the profile of an 'ideal' virtual team member – "open minded, proactive, flexible and positive person with good communication skills" (Behrend & Erwee 2007, p. 18).

Further, Gurteen (2004) prescribes after action reviews (AARs) besides sharing, dialogue and best practices. AARs are highly useful during an event (Baird & Henderson 2001); but besides learning after performing an action or task, learning also takes place before and during the execution of that task (Collison & Parcell 2006).

Communities of practice. Sharing the discovery and synthesis of intellectual activity is associated with the formation of knowledge COPs (Clarke 2001). Hence, it is important to nurture communities of knowledge practice where individuals are drawn together to share specialist knowledge, supporting and nourishing one another's knowledge development (Skyrme 1997). As knowledge is inextricably tied in with human cognition, and the management of knowledge occurs within an intricately structured social context, so a COP may be defined by common tasks, methods, goals or approaches among its members (Thomas, Kellogg & Erickson 2001).

Due to the nature of their activities, COPs require appropriate facilitation and moderating skills (Skyrme 1997). Therefore organisations should provide coaching in the area of coordinating interactions within COPs because meaningful interactions are necessary in expanding an organisation's collective knowledge (Bhatt 2001). It is also important to have a knowledge leader or champion who can actively drive the knowledge agenda, stimulate interest and commitment, and is an effective user of technology (Skyrme 1997).

Cothrel and Williams (1999) offer five guidelines on COPs. Firstly, organisations should not just look at end results but also focus on the dynamics of COPs as level of participation naturally grows if members feel a strong sense of belonging. Secondly, there should be a greater emphasis on members' needs rather than the needs of other stakeholders including sponsors and technologists; hence, managers of COPs should ideally come from the community itself as they must have in-depth knowledge of members' needs. Thirdly, control over the COP should not become too tight – even if non-business discussions occur, they should be considered as part of the glue that holds the community together as long as not done in the extreme. Fourthly, it is wrong to assume that the community will be self sustaining; thus important roles need to be identified, for instance subject-matter expert, knowledge manager, moderator/facilitator and help desk. Fifthly, there should be consideration of environmental factors such as cultural norms and values and leadership styles, which may positively or negatively impact COP efforts.

Landmark study. McDermott and O'Dell (2001) conducted a study in collaboration with the American Productivity and Quality Centre (APQC) on 40 companies that were perceived as having successful knowledge sharing. A preliminary survey on the 40 companies identified a dozen organisations that were deemed to have already built knowledge sharing into their culture. Then the list was further narrowed down by a second extensive survey to a six-hour interview with each of the following five leading companies, namely including American Management Systems, Ford Motor Company, Lotus Development Corporation, National Semiconductor Corporation and PricewaterhouseCoopers LLP (Limited Liability Partnership).

From that study, culture was identified as often being seen as the key inhibitor of effective knowledge sharing. It was also found that these organisations did not change their culture to match their KM initiatives, but rather, they adapted their approach to KM to fit their culture. This finding is in contrast to the assertion by Bhatt (2001) that since an organisation's core competencies are deeply

entrenched in organisational practice, it is only by changing organisational culture that an organisation can affect the interaction between its people, technologies and techniques, which facilitates knowledge sharing.

On the other hand, McDermott and Dell (2001) find it is much more essential to match KM approaches to the overall style of one's organisation than to directly imitate the practices of other organisations; this may be achieved by linking sharing knowledge to solving practical business problems; tying sharing knowledge to a pre-existing core value; introducing KM in a way that matches the organisation's style; building on existing networks that people use in their daily work; and encouraging peers and supervisors to exert pressure to share. In addition, all the best-practice companies in that research consider knowledge sharing a practical way to solve business problems, constantly stressing that databases, knowledge systems and knowledge initiatives must all have a clear business purpose, whereas unclear links with a business goal is the main reason why some KM programmes fail (McDermott & O'Dell 2001).

The McDermott and O'Dell (2001) research also reveals three different ways in which organisations link sharing knowledge to the business: Firstly, knowledge sharing is made a direct part of the business strategy, for example, PricewaterhouseCoopers (PwC) built sharing knowledge into its business strategy and brand identity as depicted in their tagline 'People, knowledge and worlds', with an extensive visible structure for KM with appointments of a global Chief Knowledge Officer (CKO) a CKO for each of its six business lines and many employees dedicated to KM.

Secondly, sharing knowledge is tied with another key business initiative, for instance, under the Ford 2000 initiative, global product development teams were linked to enable team members to review other teams' analyses of similar design elements, thus reducing product development cycle time and avoiding reinvention of the wheel. Thirdly, knowledge is shared routinely as part of way the people work, where knowledge sharing is treated as simply part of how specific business problems are solved, without the necessity of even labeling it as knowledge sharing. In short, the main underlying lesson from the research by McDermott and O'Dell (2001) may be summarised as follows: Having a successful OKM culture involves balancing both visible and invisible dimensions of the culture – visibly demonstrating the importance of sharing knowledge while building on invisible core values.

2.4.6 OKM process/technology

OKM process. Organisations must create operational systems and processes to capture and retain knowledge as intellectual capital is difficult to build and disperse especially if employee knowledge turns outdated fast without the infusion of new knowledge, and is lost when employees leave (McCann & Buckner 2004). Knowledge is created from business activity; therefore it needs to be captured and embedded into business processes for sustainable business improvement (Collison & Parcell 2006).

Current state of research. A review of academic literature reveals that numerous researchers promote the sharing of best practices as a key factor within the OKM process. Knowledge resides in databases or through sharing of experiences and best practices, or through other sources both internal and external to the organisation (Bollinger & Smith 2001). Researchers also acknowledge the role of subject matter experts and reward incentives for contributing knowledge. All these views are discussed in the ensuing subsections.

Best practices. First of all, the importance of measuring and capturing the organisation's know-how through developed processes is evident in one of the three KM approaches suggested by Bollinger and Smith (2001). The processes mentioned above include the identification, creation and sharing of best practices (Gurteen 2004). Furthermore, the increasing use of IT and growing importance of intellectual assets have caused executives to scrutinise how knowledge underlying their businesses might be utilised (Hansen, Nohria & Tierney 2000), again leading to the development and sharing of best practices. Besides, organisational knowledge can reside in best practices (Bollinger & Smith 2001) and is entrenched in routines and processes that enable action (Myers 1996), so the identification of best practices for these routines and processes would contribute towards the entire organisational knowledge base.

Moreover, having a reliable process in place, be it the identification or sharing of best practices, will help generate knowledge that does not consist merely of accidentally true beliefs but knowledge learnt through the intelligent application of that reliable process (Blackman, Connelly & Henderson 2004). In addition, it makes sense to build learning into work processes and job support tools as learning can be created, improved or re-engineered (Coulson-Thomas 2003). Likewise, Bhatt (2001) asserts that creating a nurturing and learning-by-doing type of environment can help sustain an organisation's competitive advantages.

Amid a complex, volatile environment, organisations must realise the need to continually innovate, authenticate and apply new knowledge to add value to their products, processes and services (Bhatt 2001). Organisations should also constantly acquire knowledge externally through its people, partners and any other relevant sources (McCann & Buckner 2004) in their efforts to innovate and add value to products, processes and services.

Subject matter experts. Apart from recognising the key role of best practices in the OKM process, organisations should maintain a knowledge web in which knowledge experts collectively help refresh and refine the organisation's evolving pool of knowledge; therefore, it is pertinent to identify subject matter experts and implement specific initiatives that encourage expert contributions, as well as to recognise various key roles such as human knowledge editors, analysts, brokers and navigators (Skyrme 1997). Likewise, there is a need to identify roles such as the subject-matter expert, knowledge manager, moderator/facilitator and help desk; but one needs to be wary that although expert divisions within an organisation are initially done out of a need for efficiency, they might inadvertently turn into systems of control and communicative constraint (Cothrel & Williams 1999). In addition, when

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hierarchical authority forces a singular view of order, intricate relationships between departments and divisions break down, and routine processes and their performance inevitably suffer (Ballantyne 2004).

In summary, knowledge work involves raising the visibility of knowledge, leading to the development of knowledge processes, process owners and governance structures using techniques of analysis and improvement borrowed from the quality movement (Prusak 2001). However, sources of knowledge such as employees, customers, suppliers and other key sources can come and go; hence, it is vital to have knowledge retention goals and strategies although this seems to be a less appreciated component of strategic KM (McCann & Buckner 2000).

OKM technology. Researchers and practitioners who subscribe to the IT-dominant school of KM thought believe that if extensive computer networks and communications tools for group collaboration are developed, people will have a greater propensity to share information and knowledge (Bollinger & Smith 2001). Likewise, those who hold onto the quantum model of KM would tend to see progress in KM as being supported and reliant by technology-related tools (Kakabadse et al. 2003). Moreover, the strategic execution of an organisation's business model may be accelerated through the right use of technologies (Malhotra 2005).

KM tools can help achieve OKM objectives because technology can widen knowledge and enable generation, codification and transfer of knowledge assets, thereby enhancing the knowledge processes within organisations (Pablos & de Perez 2003). Bollinger and Smith (2001) acknowledge that most KM systems involve some aspect of information technology although this is not a prerequisite, but in contrast, Prusak (2001) claims that there is absolutely no way that even a small organisation can share knowledge effectively without using technology, what more a large or a geographically dispersed one. In fact, there is adequate evidence to suggest the necessity of information communications technology (ICT) for efficient knowledge sharing in our present organisational environment as ICT offers mechanisms that enable people and workgroups to interact with content and other people who might be separated by time and distance (Bosua & Scheppers 2007). Similarly, IT can help maintain the dialectic relationship between, and mutual reconstitution of, individual, collective, organisational and cultural knowledge (Cecez-Kecmanovic 2004). Nevertheless, it must also be noted that pervasive, transparent computing cannot digitise, codify or easily distribute the premium value of knowledge (Prusak 2001).

Current state of research. Binney (2001) proposes how KM applications and their enabling technologies can be mapped onto the KM spectrum, as depicted in Table 2.5 as follows:

Table 2.5 How KM applications and enabling technologies map onto the KM spectrum

	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and Creation
K M A p p l i c a t i o n s	• Case-Based Reasoning (CBR) • Help Desk Applications • Order Entry Applications • Service Agent Support Applications	• Data Warehousing • Data Mining • Business Intelligence • Management Information Systems • Decision Support Systems • Customer Relationship Management (CRM) • Competitive Intelligence	• Intellectual Property • Document Management • Knowledge Valuation • Knowledge Repositories • Content Management	• TQM • Benchmarking • Best Practices • Quality Management • Business Process (Re) Engineering • Process Improvement • Process Automation • Lessons Learned • Methodology • SENCMM, ISO9XXX, Six Sigma	• Skills Development • Staff Competencies • Learning • Teaching • Training	• Communication • Collaboration • Discussion Forums • Networking • Virtual Teams • Research & Development • Multi-disciplined Teams
E n a b l i n g T e c h n o l o g i e s	• Expert Systems • Cognitive Technologies • Semantic Networks • Rule-based Expert Systems • Probability Networks • Rule Induction Decision Trees • Geospatial Information Systems	• Intelligent Agents • Web Crawlers • Relational and Object DBMS • Neural Computing • Push Technologies • Data Analysis and Reporting Tools	• Document Management Tools • Search Engines • Knowledge Maps • Library Systems	• Workflow Management • Process Modelling Tools	• Computer-based Training • Online Training	• Groupware • Chat Rooms • Video Conferencing • Search Engines • Voice Mail • Bulletin Boards • Push Technologies • Simulation Technologies
	• Portals, Internet, Intranets, Extranets					

(Source: Binney 2001)

Lake and Erwee (2005) have applied Binney's aforementioned model of 'KM applications and enabling technologies' to a study on an Australian regional business network. The businesses involved in the study were categorised according to size: small, medium or large. Membership was classified as patrons or general members, whereas ownership was distinguished in terms of owners or non-owners. Respondents' preference for the types of 'KM applications' and 'enabling technologies' are summarised in Table 2.5a as follows. It illustrates the diverse uses of the technologies among businesses of different size and preferences of network members.

**_Table 2.5a_ KM Applications and Enabling Technologies preferred
in relation to Membership, Size and Ownership**

KNOWLEDGE MANAGEMENT APPLICATIONS					
Transactional applications	**Analytical applications**	**Asset management applications**	**Process applications**	**Developmental applications**	**Innovation and creation applications**
Preferred by • Patrons • Large businesses • Non-owners	Preferred by • Patrons • Large businesses	Preferred by • Patrons • Large businesses • Medium businesses	No significant differences across membership, size and ownership	No significant differences across membership, size and ownership	No significant differences across membership, size and ownership
ENABLING TECHNOLOGIES					
Transactional	**Analytical**	**Asset management**	**Process**	**Developmental**	**Innovation and creation**
Preferred by • Patrons • Large businesses	No significant differences across membership, size and ownership	Preferred by • Patrons • Large businesses	Preferred by • Owners • Large businesses • Medium businesses	Preferred by • Patrons • Large businesses	Preferred by • General members • Medium businesses

(Source: Adapted from Lake and Erwee 2005)

A further review of literature shows that many researchers demonstrate the relevance of technology in OKM but these researchers also qualify what they profess with the reminder that nothing can completely replace the critical role of the human actor. In the subsequent paragraphs, the benefits of technology in OKM will be reviewed and the limitations presented after that.

Most knowledge management systems involve some aspect of computer information technology such as databases although this is not a prerequisite (Bollinger & Smith 2001). However, effective KM normally requires the application of relevant technology together with organisational, social and managerial initiatives, where the role of technology is usually to overcome time or space barriers, which may improve motivation or reduce barriers in generating electronically shareable knowledge (Marwick 2001). Highly reliable and flexible IS capability is positively associated with successful KM (Choi 2003). Networked computer systems across organisational boundaries can improve information and knowledge flow to achieve business objectives (Skyrme 1997).

Furthermore, technological and methodological tools can be designed to aid numerous processes in new knowledge creation among both individuals and groups (Thomas, Kellogg & Erickson 2001). Moreover, technology has a vital role in transforming the corporate culture to a knowledge sharing one, helping people around the world to work collaboratively where once it was not possible (Gurteen 1999). However, the applications of technology may be limited in certain situations. Organisations that sell relatively standardised products which

meet common needs are good candidates for what is termed the codification strategy, i.e. to codify and store their knowledge in databases where it can be accessed and re-used repetitively by any employee (Hansen et al. 2000). Besides, the strongest contribution by technology is in explicit knowledge such as search and classification but technology is weaker in helping towards creating and communicating new knowledge (Marwick 2001).

The use of powerful IT and communications tools can support organisations in, say, data mining, but in a dynamic environment where businesses face unpredictable and unique problems, IT is at best an enabler since it is only through people that information can be interpreted and transformed into knowledge (Bhatt 2001). Although technology helps, no technology can stimulate knowledge flow if cultural and organisational contexts are ignored (Clarke 2001). Traditional KM systems merely focus on know-what and know-how whereas a successful KM system reflects the *care-why* – loyalty and caring – which lies at the heart of sustained competitive advantage (Bollinger & Smith 2001).

Other concerns about the deployment of technology in KM pertain to its metrics. Swift technological progress has fuelled KM practice, facilitating extensive awareness and adoption of KM systems by organisations that believe KM systems are able to support the KM process and impact key activities including data search and retrieval, but yet there is uncertainty in how to quantitatively justify the benefits of KM systems and capture more meaningful knowledge and access it in a more timely manner (Wickramasinghe 2003).

While acknowledging the benefits of technology, researchers also point out things which humans can achieve where technology is lacking. Even as technology enables information to be increasingly easier and faster to access at low or negligible cost wherever and whenever, the value of cognitive skills such as judgment, design, leadership, decision making, persuasiveness, wit, innovation, aesthetics and humour become even more valuable than ever (Prusak 2001). In short, where technology is the equaliser, it is the individual unique human element that becomes the differentiator.

Therefore, researchers should not lose sight of the human factor in KM no matter how attractive the case for IT is. Amid other KM models, KM may be represented as a philosophy-based model which need neither be technology intensive nor technology-driven but rather actor-intensive and actor-centred, since top teams in learning organisations would focus on dialogue and depend less on technology (Kakabadse et al. 2003). Similarly, although IT enables coordination between COPs and minimises human and physical constraints such as time and space, yet meaning still depends on human individuals and their interpretation (Bhatt 2001).

Recent landmark/noteworthy studies. Three studies will be cited here. First, a landmark research by Maier (2002) on German-speaking companies comprising 445 of 'Top 500 Companies' and 59 of 'Top 50 Banks', led to the following six conclusions: i) almost all large organisations have an intranet and groupware solution; ii) many KM systems functions are not fully used although utilised,

sometimes due to technical causes but mostly because it would have exacted considerable organisational change; iii) most organisations built their own KM systems; iv) integrative KM systems functions dominate but interactive and bridging KM systems functions lag behind; v) KM-related information and communication technology systems lack integration; and vi) KM systems were found to be highly complex.

Second, a study conducted by Wickramasinghe (2003) revealed a key unexpected finding as he compared KM systems in theory to KM systems in practice. Although a theoretical standpoint showed that KM systems are able to support knowledge architecture as well as the two faces of knowledge – knowledge as a subject and knowledge as an object – the results showed otherwise. KM systems were found to be unable to support subjective knowledge, thereby reducing KM systems to an organisational memory system. Such a fundamental anomaly, as Wickramsinghe (2003) describes it, has implications for both theory and practice as well as for further research.

Third is a study performed by Choi (2003) in which 1,000 questionnaires on 39 attributes were distributed to 1,000 selected firms in the USA. The questionnaires were completed by executives and managers who were deemed to be most knowledgeable about KM operations within their firms. Results of the study showed that the five leading factors important for KM success were i) a KM-supportive culture; ii) top management leadership and commitment; iii) IS capability; iv) performance management and v) KM education, whereas benchmarking and knowledge sharing were not rated as highly. However, only one factor i.e. IS capability, out of the five success factors, was positively associated with KM success although numerous studies have shown that organisational culture had been singled out as the most critical factor for KM implementation. Only organisations already engaged with KM implementation, recognise IS as an enabler for KM success (Choi 2003).

2.4.7 Study on OKM scale

In addition to the landmark studies described in the previous subsections is a study by Darroch (2003) using a scale he developed to measure KM behaviour and practices in organisations with at least 50 employees in New Zealand. Relying on a definition of KM by Bennett and Gabriel (1999), Darroch (2003) expounds that KM comprises three interdependent components: knowledge acquisition, knowledge dissemination and responsiveness to knowledge; hence, the scale was developed to reflect these three closely related attributes. Results of the study confirm that the KM scale developed significantly correlated with all types of innovation (Darroch 2003).

2.5 Research issues

From the overview of the current state of KM research in the areas of OKM strategy, culture, process and technology, the following observations may be made: Firstly, the literature review shows that previous research has already

been done in each of the three OKM areas mentioned above. However, the researchers in these studies were inclined to focus on specific or individual OKM areas for analysis instead of covering multiple areas.

One exception is the study on KM behaviours and practices by Darroch (2003), outlined in the previous subsection, which used three closely interdependent KM attributes as a measure: knowledge acquisition, knowledge dissemination and responsiveness to knowledge. Table 2.6 shows the overlapping relationship between Darroch's (2003) KM attributes and the OKM dimensions submitted by Erwee, Skadiang and Reynolds (2007).

Table 2.6 Relationship between KM attributes *(Darroch 2003)* and OKM dimensions *(Erwee, Skadiang & Reynolds 2007)*

KM attributes	*OKM dimensions*		
	OKM strategy	**OKM culture**	**OKM process/technology**
Knowledge acquisition			
Knowledge dissemination			
Responsiveness to knowledge			

(Source: Skadiang 2008; developed for the study)

Secondly, as a corollary of the first observation, there is no standard, widely recognised assessment tool to gauge the extent of KM practice in organisations. Again, the study by Darroch (2003) is noted, for which a new KM scale had to be developed. Although there might exist some forms of proprietary tools or instruments employed by professional consulting firms, it would be reasonable to infer that these instruments are not necessarily built upon conventional academic principles. Moreover, some of these tools or instruments might have been highly customised to fit the client's unique requirements pertaining to type of industry, nature of business as well as financial, political and cultural factors. Besides, a lack of instruments is not uncommon in relatively new fields such as KM. For example, there is a scarcity of studies on a survey scale to evaluate KM success factors (Choi 2003).

The above review on KM literature leads us to Research issue 1: *What is the extent of KM practice in organisations in Malaysia as perceived by managers at their workplace?*

As such, the study attempts to bridge the literature gap by employing a standardised KM scale developed through input from various researchers (Erwee, Skadiang & Reynolds 2007; Reynolds 2003; Skadiang 2004) that would

assess the multidimensional nature and practice of OKM among organisations in Malaysia, and which has been used in a pilot study in Australia.

Main theories and frameworks for this research. The main theories and frameworks used in the study are outlined in Table 2.7, Table 2.8 and Table 2.9 as follows. The three tables provide an overview of the three dimensions under study – OKM strategy, OKM culture and OKM process/technology.

Table 2.7 **OKM strategy and issues for research**

Year	Researcher	Elements in OKM strategy	Potential issues for research
1997	Skyrme	Knowledge sharing as a strategic tool	Issues for research pertaining to OKM strategy include the following:
2000	Meso & Smith	Intellectual capital as the only true strategic asset	• how strongly the organisation considers KM central to its strategy;
2001	Bhatt	Strategy of imitation, replication and substitution; not necessary to create knowledge from scratch	• whether employees clearly understand the objectives of their OKM strategy;
2001	Clarke	Knowledge as a strategic resource; KM must be integrated with business strategy	• whether employees feel involved in their OKM strategy;
2001	McDermott & O'Dell	Knowledge sharing must be a direct part of business strategy.	• how well the organisation exploits its OKM strategy.
2003	Pablos & de Perez	OKM strategy aims to generate, add value, transfer and use/re-use knowledge	
2004	Bose Martin Marr, Schiuma & Neely	Metrics to measure OKM strategy	

(Source: Skadiang 2008; developed for the study)

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Table 2.8 **OKM culture and issues for research**

Year	Researcher	Elements in OKM culture	Potential issues for research
1961	Burns & Stalker (cited in Myers 1996)	Social context	Issues for research pertaining to the degree/extent/depth of OKM culture includes the following:
1982	Dessler	Personal factors	
1988	Kanter (cited in Myers 1996)	Organisational cultures of pride	• how actively employees contribute to OKM activities;
1991	Badaracco (cited in Myers 1996)	Open communication	
1991	Stewart (cited in Little et al. [eds.] 2002)	Organisational culture	• whether employees are encouraged to look for KM ideas internally and externally;
1993	Orlikowski	Homogeneity; Familiarity	
1993	Tampoe (cited in Myers 1996)	Individual competence Motivated state Staff commitment Facilitative work environment	• whether the organisation encourages the formation of work groups or teams;
1995	Valley, Neale & Mannix (cited in Williams, Neale & Gruenfield 1998)	Familiarity and positive relationships	• whether there is close working relationships among employees;
1995	Moorhead & Griffin	Group characteristics	
1995	Nonaka & Takeuchi	Process of socialisation	
1996	Quinn et al. (cited in Tiwana 2002)	Compensation structure	• whether employees are encouraged to build knowledge-relationships with suppliers, customers etc;
1997	Skyrme	Facilitation and moderations skills in COPs Knowledge leader or champion	
1998	Davenport, DeLong & Beers	Right organisational environment	• whether contributions of new ideas are rewarded by the organisation;
1999	Amabile	Expertise Creativity Self-motivation	
1999	Malhotra	Social network	
2000	Appelbaum, Bailey, Berg & Kalleberg (cited in Pfeffer & Hinds 2001)	Trust	• whether employees assume personal responsibility for their own learning;
2000	Biren, Dutta & van Wassenhove	Organisational culture	
2001	Baird & Henderson	After-action reviews	• whether there is professionalism, trust, respect and commitment among employees;
2001	Bhatt	Coaching on how to coordinate interactions in COPs	
2001	Bollinger & Smith	Trust, honesty, respect and integrity in culture Internal and external sources of knowledge	• whether the organisation encourages learning from mistakes;
2001	McDermott & O'Dell	Reward Recognition system Culture – build knowledge sharing around existing culture instead of changing culture for KM initiatives Consideration of subcultures	• level of dialogue/sharing among employees at different levels of managerial hierarchy, e.g. employee with peers, manager with subordinate and vice versa;
2001	Sindell	Organisational culture Reward structure	
2002	Edmonson	Psychologically safe environment	• the level of informal networks within the organisation;
2002	Figallo & Rhine	Familiarity Trust Open communication Supportive social atmosphere	

Table 2.8 OKM culture and issues for research *(continued)*

Year	Researcher	Elements in OKM culture	Potential issues for research
2002	Stapleton	Personality	• usual preference of the way problems are solved at work, e.g. whether employees first try to look for a previous solution or try to solve problems from scratch, whether employees consult managers, peers or someone outside the organisation.
2002	Sveiby & Simons	Knowledge workgroup synergy Employee attitude Culture of collaboration	
2002	Tiwana	Reward	
2003	Perez & de Pablos	Sharing between employees, suppliers, customers, etc.	
2004	Awazu	Informal networks	
2004	Ballantyne	'Relationship-specific knowledge'	
2004	Gurteen	Sharing, dialogue, best practices and after-action reviews	
2004	McCann & Buckner	Acquire external knowledge	
2005	Lake & Erwee	Culture and trust in sharing within a formal business network (beyond organisational boundaries)	
2006	Collison & Parcell	Knowledge sharing as part of daily work; an unconscious competence	
2007	Behrend & Erwee	Impact of trust, shared language, common vocabulary, informal networks, boundaries and risk associated with uncontrolled (boundary-spanning) knowledge exchange on knowledge sharing processes in multicultural teams Socio-cultural skills Characteristics of the 'ideal' virtual team member	

(Source: Skadiang 2008; developed for the study)

Table 2.9   OKM process/technology and issues for research

Year	Researcher	Elements in OKM process/technology	Potential issues for research
1996	Myers	Knowledge is entrenched in routines/processes that enable action.	Issues for research pertaining to OKM process/technology include the following:
1997	Skyrme	Identify subject matter experts, human knowledge editors, editors, analysts, brokers and navigators. Maintain knowledge web, refine evolving pool of knowledge.	i) whether organisations have a formalised OKM process in place, i.e.
1999	Cothrel & Williams	Identify subject matter experts, knowledge manager, moderator/ facilitator and help desk.	• whether induction is given to new employees;
1999	Gurteen	Technology helps transform corporate culture to a sharing one.	• whether subject matter experts are identified and rewarded for their contributions;
2000	Hansen, Nohria & Tierney	Scrutinise how knowledge underlying business can be used.	
2001	Bhatt	'Learning-by-doing' Ultimately, 'meaning' still depends on human interpretation.	• whether the organisation invests resources in measuring employees' competencies periodically and in building up their know-how;
2001	Bollinger & Smith	Knowledge can reside in databases and best practices. But information technology is not a prerequisite.	
2001	Clarke	Apply technology within cultural and organisational contexts	• whether the organisation invests resources in the quality assurance of its information;
2001	Marwick	Effective KM normally requires relevant technology.	
2001	Prusak	No way for organisations to share effectively without technology! But computing cannot transfer premium value of knowledge. If technology equalises all else, then value of human cognitive skills becomes the differentiator.	• whether the organisation identifies both internal and external best practices in a OKM formalised process;
2001	Thomas, Kellogg & Erickson	Technological/methodological tools aid new knowledge creation in individuals and groups.	• whether transferring best practices among employees is a formalised OKM process.
2002	Maier	KM systems are found within top companies though not always well utilised. Interactive and bridging KM systems lagged behind integrative KM systems.	ii) the degree/extent of KM systems in the organisation, i.e.
2003	Choi	Five factors are important to KM success, but only one, i.e. reliable/flexible IS, is positively associated with KM success.	• whether technology is used effectively to link employees to external parties;
2003	Pablos & de Perez	KM tools help achieve OKM objectives.	• whether technology is used to capture work-related information/knowledge/ documents or databases;
2003	Wickramsinghe	In a study, KM systems were better in supporting the objective, rather than subjective aspect of knowledge.	
2004	Blackman, Connelly & Henderson	Reliable processes should be in place, not 'accidentally true' beliefs.	• whether employees are trained to use technology to support closer working relationships;

Table 2.9 **OKM process/technology and issues for research**
(continued)

Year	Researcher	Elements in OKM process/technology	Potential issues for research
2004	Cecez-Kecmanovic	IT/IS can maintain dialectic relationship between individual, collective, organisational and cultural knowledge.	• whether there are KM metrics to measure know-how of employees to financial results such as budget achievement, new business development, work group innovation, and cost-benefit of KM activities, as well as to non-financial results such as employee mentoring and contributions to work group and team development.
2004	Coulson-Thomas	Build learning into work processes.	
2004	Gurteen	Sharing of best practices	
2004	McCann & Buckner	Creation of operational systems and processes	
2005	Lake & Erwee	KM applications and enabling technologies (adapted from Binney 2001) for knowledge sharing in virtual teams within a formal business network	
2007	Behrend & Erwee	Need for tool-related skills (in virtual teams)	
2007	Bosua & Scheepers	ICT is necessary for efficient knowledge sharing.	

(Source: Skadiang 2008; developed for the study)

Figure 2.8 **Dimensions of Organisational Knowledge Management**
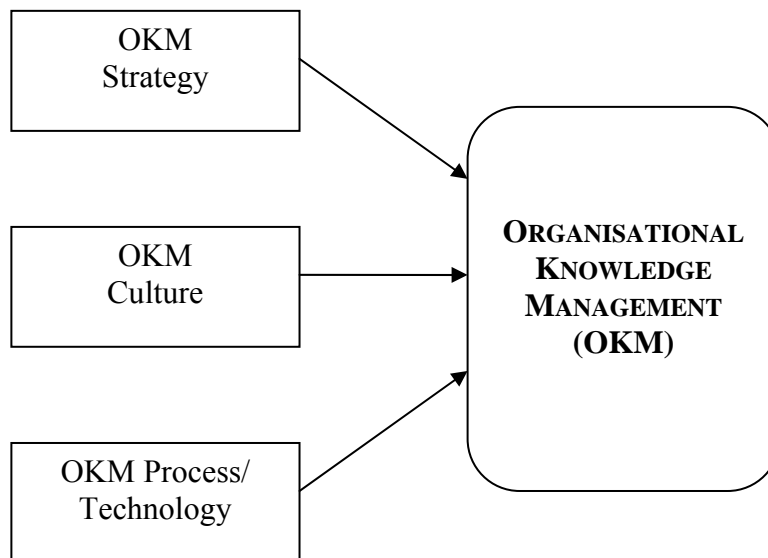
(Source: Adapted from Erwee et al. 2007)

The three dimensions of OKM are graphically represented in Figure 2.8 above. The review of literature on the different distinct dimensions of OKM led the researcher to another issue of interest, i.e. whether in practice there is any relationship between OKM strategy, OKM culture and OKM process/technology. This interest was expressed as Research Issue 2: *What are the relationships between the dimensions of OKM?*

Since knowledge sharing across the organisation is increasingly relied upon as a strategic tool (Skyrme 1997) and requires integration with business strategy in order to succeed (McDermott & O'Dell 2001; Clarke 2001), Research Issue 2 entailed an investigation of the relationship between OKM strategy and OKM culture in the Malaysian management fraternity. Secondly, the study also probed the relationship between OKM strategy and OKM process/technology as previous research has shown that the strategic execution of organisational business models may be enhanced through appropriate application of relevant technologies (Malhotra 2005), and that KM systems and initiatives must have lucid business objectives (McDermott & O'Dell 2001). Thirdly, previous studies have demonstrated that organisational mechanisms such as establishing a knowledge networking infrastructure (Skyrme 1997) and apprenticeship (Haldin-Herrgard 2000) are effective ways of promoting a knowledge sharing culture (Bollinger & Smith 2001), whereas instilling a culture change to enhance interaction between people, technologies and techniques can facilitate better knowledge sharing (Bhatt 2001). Hence, the study sought to explore the relationship between OKM culture and OKM process/technology, as well.

A corollary to the second research issue led to the third research issue, i.e. whether demographic factors such as "years of service in the organisation" would predispose a manager in Malaysia to be better acquainted with the organisation's strategy, more immersed in its organisational culture, and become better with in-house processes and supporting technology, since KM literature has attested that trust, usually built over time and frequent interaction, would enhance knowledge sharing and exchange. As such, these had led to the formulation of Research Issue 3: *What are the relationships between demographic characteristics of the managers and their perceptions of the three dimensions of OKM?*

In addition to the aforementioned research issues, company size was also deemed an organisational characteristic of interest due to the importance of understanding the relationship between size and performance in organisations (Gooding & Wagner III 1985 cited in Lee 2004). At least one past study in Malaysia has shown a positive correlation between company size and KM investment (Chong 2005 cited in Ida 2008), while in contrast, a study by Lee (2004) showed no impact of organisation size upon KM practice although it must be noted that the sample size in Lee's survey was only 38. Furthermore, organisation size has been repeatedly demonstrated to influence the propensity of organisations to adopt innovation (Ashley 2007); in this case, OKM might be construed to be an innovative business approach in the challenging environment today.

2.6   Chapter summary

The literature review in Chapter 2 began with an introduction to the chapter's contents in **2.1 Introduction**, followed by section **2.2 Definition of core concepts** which gave an overview of several fundamental concepts of KM, including the main perspectives of what constitutes knowledge, the different

manifestations typologies of knowledge as well as the interpretations of KM and organisational approaches to KM.

This was followed by a more detailed treatise of the concepts outlined in section 2.2, namely section **2.3 Overview of knowledge management (KM)** and section **2.4 Organisational knowledge management (OKM)**. While section 2.3 offered an overview of knowledge sharing that addressed some basic epistemological concepts of what knowledge and what KM entails, section 2.4 covered the specific contributions of major researchers and how these have historically developed. In addition, section 2.4 dealt with various KM definitions, different schools of KM thought, notable KM models and the three dimensions of OKM – OKM strategy, OKM culture and OKM process/technology – including the principles the researchers have studied and the practices they advocate.

Finally, section **2.5 Research issues** outlined how the review on KM literature led to the recognition of perceived literature gaps and identification of the three research issues to be investigated in the study.

CHAPTER 3   RESEARCH METHODOLOGY

3.1 Introduction

Preceding this chapter, the literature review conducted had identified the lack of studies which applied a standardised scale to determine the extent of OKM (organisational knowledge management) practice in private and public sector organisations. Arising out of the literature gap was the research objective to study the dimensions and extent of OKM in Malaysia, using a standard instrument that would enable future comparisons with parallel studies in other cultural or national contexts.

Accordingly, Chapter 3 documents the research methodology for this study. The chapter is organised into 18 sections as follows: introduction; research paradigm; types of business research; research design; design techniques; survey methods; research procedure; scales; sources of errors; reliability, validity and sensitivity; instrument design; background of the USQ KM scale; pilot study; data analysis; research project plan; ethical considerations; limitations of study; and finally the chapter summary.

3.2 Research paradigm

To determine a suitable research paradigm requires an assessment of a few well-known research paradigms, namely positivism, relativism, constructivism, realism and postpositivism. The assessment of a paradigm for this study is summarised in Table 3.1.

Table 3.1 **Assessment of research paradigms for this study**

Research Paradigm	Distinctive Characteristics/Scope	Relevance to this study
Positivism (also known as empiricism)	• A philosophical approach commonly adopted by scientists as the so-called standard view of science, which assumes that objective knowledge is gathered from direct observation or experience, rendering it free of the observer's personal values (Robson 2002). • Emphasizes the application of strict rules and procedures to yield quantitative data which is then subjected to hypotheses testing (Robson 2002). • Limited only to observable phenomena as it is difficult to separate facts from values (Blaikie 1993 cited in Robson 2002).	An inappropriate approach to this study where no scientific laws are operable in a cultural, social or organisational context. (Blaikie 1993 cited in Robson 2002).
Relativism	• Comes under many labels including constructivist, naturalistic or interpretative (Robson 2002). • In its extreme form as philosophical relativism, it claims that there is no external reality independent of human consciousness; hence no objective reality exists (Robson 2002).	Not appropriate for this study since objective reality was a pre-requisite to conducting the study (Robson 2002).
Constructivism	• Compares self-constructed models with outside world to select the 'right' one (Robson 2002). • Constructivists concede that absolute relativism might be too unscientific as it presumes that one model is as acceptable as any other (Heylighen 1995). • Believes that reality is often socially constructed (Heylighen 1995).	Not relevant to this study since its research question had to be defined in advance, whereas in constructivism, the research question cannot be fully established beforehand due to multiple perspectives or realities (Robson 2002).
Realism	• Claims to avoid both positivism and relativism (Robson 2002). • Views scientific methods to be fallible and most scientific knowledge as merely approximate (Boyd 2002). • Believes that no fact is beyond dispute, so the task of science is to invent theories to explain the real world and test theories through rational criteria (Robson 2002).	As realism is typically associated with qualitative research, realism was not relevant to this study which relied significantly on quantitative techniques.
Postpositivism *(selected for this study)*	• Committed to objectivity but concedes that the researcher's theories, hypotheses, background knowledge and values can influence observation (Reichardt & Rallis 1994).	Appropriate for this study.

(Source: Skadiang 2008; developed for the study)

Application of postpositivism. Postpositivism, though committed to objectivity, endeavours to resolve criticisms about positivism – while positivists argue that the researcher and the researched are independent of each other, postpositivists

concede that the researcher's theories, hypotheses, background knowledge and values can influence the observation (Reichardt & Rallis 1994). As outlined in Table 3.1, the postpositivist approach was deemed appropriate for this study mainly because of the paradigm's balanced perspective which emphasizes objectivity while recognising that background knowledge and values can influence what is observed.

3.3 Types of business research

This section briefly evaluates the main types of business research and identifies which type of business research was used for this study and why. Essentially, there are three main types of business research, namely exploratory, descriptive and causal research, determined by the nature of the problem addressed (Zikmund 2000). As an alternative to the above-mentioned tripartite classification of research, Robson (2002) distinguishes types of research as exploratory, emancipatory, explanatory (causal) and descriptive. An assessment of the rationale for descriptive research for this study is summarised in Table 3.2.

Table 3.2 **Assessment of business research type for this study**

Type of Business Research	Characteristics/ Scope	Relevance to this study
Descriptive research *(selected for this study)*	• Describes a phenomenon or characteristics of subjects within a sample or entire population (Getter 1997; Sekaran 2003). • Requires extensive prior knowledge of the situation and related items to be researched (Robson 2002). • Often implemented through surveys and observation especially in social science (Getter 1997). • Endeavours to address the *who, what, when, where* and *how* of a problem but does not explain the cause for its findings (Yin 2003; Zikmund 2000).	Relevant to this study as it involved the investigation of the perceptions/attitudes of a specific population towards KM practice in the workplace.

(Source: Skadiang 2008; developed for the study)

Application of descriptive research. Overall, descriptive research seeks to depict an accurate profile of persons, events or situations (Robson 2002). Since this study involved the investigation of the perceptions or attitudes about OKM of a specific population, namely managers in Malaysian organisations, towards knowledge management practice at their place of work, it therefore constituted descriptive research.

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3.4 Research design

The determination of the type of business research for this study was followed by the contemplation of a suitable research design. Essentially, the research design is a master plan that specifies the methods and procedures for collecting and analysing required information (Zikmund 2000). The three main types of research design are action research, qualitative research and quantitative research (Perry 1997). Alternatively, research design may come under fixed design or flexible design (Robson 2002).

For this study, quantitative research was deemed the most appropriate design as it can determine the quantity or extent of an outcome in numbers, usually through surveys and experiments which offer a precise approach to measurement (Zikmund 2000). Furthermore, quantitative research has most or all the following characteristics: sample selection from identified populations; assignment of samples to various conditions; instigation of change on one or more variables; control and measurement of variables; and hypothesis testing (Robson 2002). Unlike qualitative research which relies heavily on the researcher's discretion in acquiring rich information that is mostly verbal and usually from a few people (Bordens & Abbott 2002), quantitative research involves pre-specifying a conceptual framework for researchers to know at the onset what to do, what to look for and how to do them (Robson 2002). As the Malaysian study was preceded by the development of a survey instrument based on sound theoretical concepts to yield data for statistical analysis, the study's characteristics befitted quantitative research.

Alternative names: Fixed and flexible designs. Fixed research designs necessitate a well-developed conceptual framework with clear specifications that involves applying tested procedures such as experiments and surveys, while flexible designs or qualitative research designs are suitable for social research (Anastas & MacDonald 1994 cited in Robson 2002). Going by this classification, the Malaysian study may be said to constitute a fixed design.

3.5 Design techniques

After identifying that this study was to take the form of quantitative descriptive research, came the selection of an appropriate design technique. In general, four basic design techniques may be applied to descriptive research: secondary data, observation, experiment and survey (Rea & Parker 1997; Zikmund 2000). Table 3.3 assesses the survey as a design technique in the context of this study.

Table 3.3 Assessment of design technique for this study

Design Technique	Characteristics/Scope	Relevance to this study
Survey *(selected design technique for this study)*	• Entails the systematic collection of data on a number of units, usually at a single point in time, to gather quantifiable data with a number of variables which are investigated for patterns of association (Bryman 1989 cited in Robson 2002). • Normally associated with the deductive approach, perceived as authoritative and commonly applied to business and management research (Saunders, Lewis & Thornhill 2003). • Appears to be the most common method of generating primary data from a population sample (Zikmund 2000) • Can help reduce data gathering time (Rea & Parker 1997). • Inexpensive, efficient and accurate for evaluating information on the population (Zikmund 2000). • Presents a snapshot of the population (Rea & Parker 1997). • Generates standardised data for easy comparison (Saunders et al. 2003). • Amenable to quantification and computerised statistical analysis (Rea & Parker 1997). • Offers a high degree of replicability (Rea & Parker 1997). • Affords greater control over the research process (Saunders et al. 2003). • Subject to risks of poorly designed questions and poorly conducted surveys (Zikmund 2000).	All the characteristics of the survey technique proved relevant to the scope of this study, with care taken to mitigate the typical risks of surveys, i.e. in the areas of survey design and execution.

(Source: Skadiang 2008; developed for the study)

Application of survey research. From the points outlined in Table 3.3, it was inferred that a survey technique provided the best option for this study. To ensure that the benefits of the survey methodology were not undermined by poorly conducted surveys which could lead to biased samples, badly phrased questions, inappropriately trained interviewers – if surveys are not self-administered – and misinterpreted results (Zikmund 2000), certain appropriate measures were taken. These are addressed in greater detail in section **3.6 Survey methods** and section **3.9 Sources of errors**.

Other compelling reasons for selecting the survey methodology, not mentioned in Table 3.3, include accuracy in documenting the norm, identifying extreme outcomes and delineating associations between variables in a sample (Gable 1994). In addition, students are encouraged to use survey research methods for gathering primary data for original research (Rea & Parker 1997). Furthermore, well designed and implemented surveys contribute to a greater confidence in the generalisability of their results as compared to case studies (Jick 1983 cited in Gable 1994).

3.6 Survey methods

Having determined that a survey was the most appropriate research design technique, the next step was to identify the survey method. Typically, surveys collect three types of data – descriptive data, behavioural data and preferential

data (Rea & Parker 1997). These data may be collected through any of the four main types of survey methods, namely face-to-face survey, telephone survey, conventional mail survey and e-mail survey. The relative benefits and limitations of two survey methods are noted in Table 3.4 to affirm the survey method selected for the Malaysian study.

Table 3.4 **Assessment of survey methods for this study**

Survey Method	Characteristics/Scope	Relevance to this study
Internet/e-mail *(initially selected for this study, but eventually, conventional mail was used)*	• Fast, convenient and offers the cheapest mode and widest simultaneous geographical coverage among all survey methods; reduces paper chase (Zikmund 2000). • Computerised media can provide interactive features, enabling researchers to personalise their messages and apply special effects where necessary (Zikmund 2000). • Disadvantages include the inability of inquiring respondents to receive immediate clarification, vulnerability to technical glitches (Zikmund 2000), and sample bias by excluding potential respondents without Internet access or relevant computer skills (Sekaran 2003; Zikmund 2000).	Despite its disadvantages, an e-mail survey was initially deemed the most cost-effective, efficient survey method for this study. However, this survey method was later "complemented" by the conventional mail survey. See note at the end of section **3.6 Survey Methods** for details.
Conventional mail survey *(used for this study)*	• Comprises self-administered questionnaires; offers geographical flexibility, cost savings, respondent convenience, anonymity and no interviewer-induced bias (Rea & Parker 1997, Zikmund 2000). • Reduces errors from variances in survey administration by interviewers (Churchill 1979). • Self-paced; simultaneously reaches masses of geographically dispersed respondents more cost-effectively than face-to-face or telephone surveys (Sekaran 2003; Zikmund 2000). • Has a relatively low response rate (Rea & Parker 1997) of about 15 percent if the questionnaire is poorly designed, compared to 80 to 90 percent response rate of personal interviews (Zikmund 2000). • No control over the return of questionnaires once sent out (Saunders et al. 2003). • Does not enable respondents to clarify doubts immediately; not suitable for research on rapidly changing phenomenon; may solicit responses from proxies instead of legitimate respondents; if the survey is long, it discourages responses (Zikmund 2000).	When the initial e-mail survey yielded poor response, a conventional mail survey was done to complement the former. See note at the end of section **3.6 Survey Methods** for further explanation.

(Source: Skadiang 2008; developed for the study)

Note: Although the e-mail survey was originally selected for this study and was initiated on 30 January 2007, it generated only five responses after six weeks. As a result, the survey was repeated on 2 April 2007 using conventional mail.

3.7 Research procedure

In the previous section, numerous research paradigms, types of business research, research designs, design techniques and survey methods were evaluated for their relevance to this study. Table 3.5 presents an overview of the selected characteristics of this study, depicted in bold and underlined font.

Table 3.5 **Characteristics of this study**

Research Paradigm	Type of Business Research	Research Design	Design Technique	Survey Method
• Constructivism • Positivism • **Post-positivism** • Realism • Relativism	• **Descriptive** • Emancipatory • Explanatory/Causal • Exploratory	• Action • Qualitative • **Quantitative**	• Experiment • Observation • Secondary data • **Survey**	• Face-to-face • Telephone • Conventional mail • **Internet/e-mail**

(Source: Skadiang 2008; developed for the study)

In the next section, an overview of the population and sample are submitted, including sampling techniques, sampling frame and population characteristics.

3.7.1 Population and sampling techniques

A population or universe is an entire group of members who share some common characteristics while a sample is a subgroup of the population (Sekaran 2003; Zikmund 2000). There are two main alternative sampling plans, namely non-probability sampling and probability sampling (Sekaran 2003). Non-probability sampling occurs when the probability of any member of the population being chosen is unknown because its selection is arbitrary, relying on personal judgment and convenience (Sekaran 2003; Zikmund 2000). In addition, non-probability sampling consists of convenience sampling including judgment or purposive sampling, quota sampling and snowball sampling (Berenson et al. 2002). The non-probability sampling technique is not relevant to this study mainly because a reliable, accessible sampling frame can been identified.

On the other hand, probability sampling or random sampling occurs when every member of the population has a known non-zero probability of being selected (Sekaran 2003; Zikmund 2000). Probability sampling may be further distinguished as simple random sampling and complex random sampling; the latter consists of systematic sampling, stratified sampling, cluster sampling and double sampling (Saunders et al. 2003). This study will apply probability sampling in which questionnaires will be distributed to the entire target population and all replies received are purely random, free from any intervention by the researcher to improve response rates from specific individuals in the population.

3.7.2 Sampling frame

The sampling frame or working population is "the list of elements from which the sample may be drawn" (Zikmund 2000, p. 344). For this study, the sampling frame comprised the list of all registered and 'active' members of the Malaysian Institute of Management (MIM) under the categories of 'Ordinary member' and 'Fellow member' only, as of 27 January 2007 in the MIM Membership database obtained from the MIM headquarters currently hosted in Kuala Lumpur. 'Active' in this context refers to members who are regular in submitting their annual subscription fee.

Based on the abovementioned criteria, the size of the study's selected population was 1740, which was made up of 1701 Ordinary members and 39 Fellow members. Unlike some sampling frames which are incomplete and thus have sampling frame error (Zikmund 2000), the MIM Membership database is regularly updated.

3.7.3 Target population and characteristics

The target population refers to "the specific, complete group relevant to the research project" (Zikmund 2000, p. 342). In this study, the selected target population comprised all individual members, as opposed to corporate body members, of the MIM. The two main reasons for selecting the MIM as the target population were as follows: First, the research was aimed at managers of organisations in Malaysia, and there is no other professional body in Malaysia apart from MIM which formally represents managers in the country. Second was the issue of data accessibility. Under normal circumstances, MIM does not permit independent researchers to target their members. However, the researcher has built goodwill with the management of the organisation and has thus received special permission to do so.

Population characteristics. The selected population consisted of MIM Ordinary members and Fellow members only, excluding the 'lower' categories of Affiliate members and Associate members. In this context, the lower categories of membership typically comprise members who are undergraduates, fresh graduates, postgraduate students (usually MBA students) or members who do not have enough management or work experience to apply for higher levels of membership. Nevertheless, it is possible that some Affiliate or Associate members possess the relevant credentials but have opted not to upgrade their membership status. Only Ordinary members and Fellow members are allowed to use the designated initials of MMIM and FMIM, respectively, after their names. In general, Ordinary members have, but are not limited to, 10 to 30 years of management-related experience while Fellow members are admitted by invitation only. Ordinary members tend to be above 35 years of age, whereas all Fellow members are above 40 years of age, with many above 55. A special category of MIM membership, the Honorary Fellowship, is reserved for selected royalty and national leaders, but this category is not relevant to this study.

3.8 Scales

This section presents an assessment of the different types of numerical scales and attitude scales, and their relevance to this study. Numerical data may be distinguished into four measurement levels according to their so-called numerical strength, namely – from the strongest to the weakest – ratio data, interval data, ordinal data and nominal data (Kvanli 1988) which correspond to the ratio scale, interval scale, ordinal scale and nominal scale, respectively (Daniel & Terrell 1989). Table 3.6 outlines an assessment of two types of scales.

Table 3.6 **Assessment of numerical scale for this study**

Scale	Scope	Relevance to this study
Ordinal *(selected for this study)*	• Applied when needed to rank data in order of their magnitude where (Kvanli 1988). • Sequence of values is important but not their difference (Kvanli 1988; Daniel & Terrell 1989).	Relevant to this study to express the magnitude of respondents' agreement or disagreement to specific statements using non-numeric values represented by numbers 1 to 7.
Nominal	• Not truly numerical, merely assigned values (Kvanli 1988). • Used when objects or events measured differ from one another (Daniel & Terrell 1989). • Assigning data with numerical codes enable computer input. Average value of nominal data may be computed as a number with decimal points; though the number in itself is meaningless, it shows the proportion of one set of data to another (Kvanli 1988).	Relevant to this study only to the extent that demographic data solicited from survey respondents are converted into nominal data for computer input and analysis.

(Source: Skadiang 2008; developed for the study)

Ordinal data is applied when there is a need to rank data in order of their magnitude where the sequence of the values is important but not their difference (Kvanli 1988) since the difference between 1 and 2 is not equal to the difference between 2 and 3 (Daniel & Terrell 1989). For this study, an *ordinal scale* was used in the questionnaire, requiring respondents to express the magnitude of their agreement or disagreement to specific statements using non-numeric values represented by the numbers 1 to 7.

Since this study involved managers' assessment of the extent of OKM practice at their workplace, it was a form of *attitudinal measurement*. According to Zikmund (2000), attitude comprises three components, namely affective – general feelings and emotions toward an object; cognitive – awareness and knowledge of an object; and behavioural – intentions and behavioural expectations which reflect a predisposition to action. As such, there are three main errors in rating attitudes, namely central tendency error – where respondents dare not display extreme views; leniency – where 'easy raters' tend to give favourable ratings while 'hard raters' display negative leniency; and the

halo effect – where responses are favourable because of a positive bias (Cooper & Schindler 2003).

Attitudes may be measured indirectly through qualitative techniques, exploratory techniques or obtaining verbal statements from respondents by asking respondents to rank, rate, sort, choose or compare (Zikmund 2000). This study used a Likert scale because it allows respondents to express the degree of agreement/favourableness (Cooper & Schindler 2003), provides very wide range of attitudes from very positive to very negative (Zikmund 2000) and can compare the respondents' scores with those from a well-defined sample group, before and after an event or change to assess the event's effectiveness (Cooper & Schindler 2003). For this study, a seven-point Likert scale was administered for two main reasons. Firstly, the survey sought to discover the extent of OKM through the respondent's perception or attitude, for which the Likert scale was deemed most relevant. Secondly, the Likert scale is universally popular and has been reliably used in many types of research (Zikmund 2000).

Since a main advantage of the Likert scale is its ability to compare the attitudes of employees before and after an event, the scale is useful in assessing the effectiveness of an organisational change (Cooper & Schindler 2003). Likewise, studies applying the same KM scale before and after specific OKM initiatives could help assess whether there was any improvement in OKM practice.

3.9 Sources of errors

This section discusses possible sources of errors in research and how they were addressed in order to enhance the rigour of this study. Sellitz, Wrightsman and Cook (1976 cited in Churchill 1979) note that any score by respondents in a marketing survey constitute both systematic and random types of errors. However, many, if not all, of those errors are also prevalent in research on other areas besides marketing (Dillman 1999; Zikmund 2000).

According to the American Statistical Association (ASA), survey problems lead to either bias or variance in survey results, thus strategies to handle survey problems include prevention of the problem, adjustment of survey data and measurement of the effect of the problem on survey findings. Thus abiding by the first recommended strategy of the ASA – prevention of the problem – the possible sources of errors in this study were addressed in an attempt to not only mitigate the errors, but also prevent their occurrence in the first place.

The summary below outlines the researcher's approach to mitigate the four main sources of errors, as identified by Dillman (1999), namely sampling error, coverage error, measurement error and non-response error. In addition, the summary describes non-sampling error, margin of error in surveys and miscellaneous sources of errors, as well as how these anticipated errors were addressed in this study.

3.9.1 Summary of approaches to prevent or mitigate errors

Sampling error. Handling sampling errors is the cornerstone of conducting quality surveys (Groves 1989 cited in Dillman 1999; Salant & Dillman 1994 cited in Dillman 1999). Two main causes of sampling error are chance, i.e. the pure coincidence of untypical choices, and sampling bias, i.e. a tendency to favour the selection of units with certain characteristics due to poor sampling plan (Mugo circa 1995). The American Statistical Association (ASA) attributes sampling error to an unrepresentative sample of the population, which is more likely to occur when using purposive sampling or non-random sampling (Sproull 1995 cited in McPhail 2001). In this study, sampling error was minimised through the application of probability sampling on a good sampling frame, i.e. the MIM Membership database, where all respondents were notified of the survey through exactly the same medium and for the same number of times.

Coverage error. When the list from which the sample is drawn does not include all elements of the population, coverage error occurs (Dillman 1999). To avoid coverage error in this study, the complete list of MIM Fellow and Ordinary members was used as the sampling frame for the target population of all managers in Malaysia.

Measurement error. This type of error arises when an answer is inaccurate, imprecise or cannot be compared in any useful manner to other respondents' answers, and it is often the result of poor questionnaire construction and question phrasing; (Dillman 1999). A small degree of measurement error might be expected due to differing levels of language proficiency in a country where English is a second language although widely used in business and academic circles. Nonetheless the error, even if present, was minimal since all MIM members are proficient in English as it is the official medium of communication among members.

Non-response error. In self-administered surveys, there is the strong possibility of self-selection bias where only those with extreme views tend to respond (McPhail 2001). To address non-response bias, everyone in the sampling frame was contacted through exactly the same medium and for the same number of times. Even when the response was poor after the initial e-mail survey followed by an e-mail reminder, no attempt was made to encourage 'friendly' members or members known personally to the researcher. The same principle was applied to the conventional mail survey which followed thereafter. In addition, a major characteristic of the population, i.e. gender ratio, was compared to that of the sample. This is to help ensure that the sample is representative of the population under study (Sekaran 2003; Zikmund 2000).

Non-sampling error. According to the ASA, non-sampling error happens when respondents mislead about their own preferences and when surveys are answered by those who are not supposed to do so (Mugo circa 1995). Its causes include inaccurate measurements or poor procedures, and biased observation due to the interviewer effect, respondent effect and induced bias or personal prejudice of either the design or data collection (Mugo circa 1995). The use of e-mail questionnaires in this study reduced the chances of someone other than the

intended respondent, completing the questionnaire. Furthermore, the self-administered survey removed any possibility of biases related to interviewer-respondent interaction.

Margin of error. The ASA states that a survey's margin of error refers to the quantified uncertainty about a survey's results. According to calculations, a sample size of 100 will produce a margin of error not exceeding 10 percent of the sample whereas a sample size of 300 will produce a margin of error not exceeding 4.3 percent. Increasing the sample size to 1,000 will yield a margin of error of not more than 3 percent and to 4,000 will yield a margin of not more than 1.5 percent. These figures attest to so-called diminishing returns, much more obvious when the sample size is increased from 300 to 1,000 and from 1,000 to 4,000. Moreover, the ASA attests that population size has little influence on the margin of error, for example, a sample size of 100 in a population of 10,000 will have almost the same margin of error as a sample of 1000 in a population of 10 million.

Where this study was concerned, the resulting sample amounted to 153. Thus applying the aforementioned information from ASA, this translated to a margin of error between 4.3 and 10 percent.

Miscellaneous sources of error. To counter these sources of error, the use of a self-administered survey in this study enabled respondents to complete the questionnaire at their own pace and convenience whenever they are more relaxed or in a more conducive environment, thereby eliminating the error of variations in administration while potentially minimising errors related to transient personal factors and situational factors, respectively.

In general, the use of the Tailored Design paradigm is recommended to reduce errors caused by sampling of items, lack of clarity and mechanical factors (Dillman 1999). Further, the use of multi-item scales (Churchill 1979; McPhail 2001) increases the accuracy of the measure sought, especially by minimising errors in the sampling of items. Moreover, an exploratory design and pilot test would help reduce errors arising from a lack of clarity in the questionnaire (McPhail 2001; Zikmund 2000). Although the Tailored Design paradigm was not consciously applied to this study, the original multi-item KM scale for this study had been pre-tested in a pilot study among postgraduate students enrolled in the Faculty of Business at USQ. More details are provided in section **3.13 Pilot study**.

3.10 Reliability, Validity and Sensitivity

This section discusses the issues concerning reliability, validity and sensitivity, which were considered in the study.

3.10.1   Assessment of reliability

There are three main criteria in evaluating whether the measurement is good, namely reliability, validity and sensitivity (Zikmund 2000). Reliability refers to the "stability or consistency with which we measure something" (Robson 2002, p. 101) or "the degree to which measures are free from error and therefore yield consistent results" (Zikmund 2000, p. 280). This implies that the measure has to be reliable, otherwise it is not valid. However, while reliability is necessary for validity, reliability does not automatically ensure validity (Zikmund 2000; Robson 2002).

High reliability of survey data may be achieved by presenting all respondents with the same set of standardised questions, cautiously phrased after a pilot or pre-test to avoid observer bias, participant bias and participant error (Robson 2002). As a self-administered survey with standardised questions was employed for this study, no observer bias and or significant participant bias were expected. Moreover, participant error was minimised as the original survey had been pre-tested among MBA students in the Faculty of Business, USQ. Apart from the above, two other considerations of reliability, i.e. repeatability and internal consistency, are discussed as follows.

Internal consistency/Inter-item consistency. This concerns the uniformity of the measure and may be approached in two possible ways, namely multiple-item measure and split-half method (Berenson et al. 2002). In multi-item measure, there must be at least two comparable sets of measures tapping the same construct in the same instrument but not told to respondents (Churchill 1979; McPhail 2001).

Internal consistency within the instrument is confirmed by evaluating respondents' answers using the Cronbach's coefficient alpha (Petersen 1994). Where there are many items in the scale, the split-half method may be conducted by splitting all items into two parts comprising odd-numbered and even-numbered items; then respondents' answers from each part are analysed and their results compared to assess reliability (Zikmund 2000).

In this study, Cronbach's coefficient alpha was computed to verify internal consistency. Additionally, the split-half method was applied although the number of items was not particularly large at 16. Table 3.7 summarises how concerns of reliability were addressed in this study.

Table 3.7 Addressing reliability issues

Approach	Description/Scope	Relevance to this study
General reliability	High reliability of survey data may be achieved by giving all respondents the same set of standardised questions, with questions cautiously phrased after a pilot or pre-test to avoid participant error, participant bias and participant error (Robson 2002).	This study employed a self-administered survey with identical, standardised questions, thus minimising participant error, participant bias and observer bias.
Repeatability/ Test-retest reliability	This means administering the same scale to the same respondents on two separate occasions under similar conditions. If both occasions yield similar results, this implies the measure is reliable (Zikmund 2000).	The need to repeat the survey on the same subjects was not considered crucial for this study.
Internal consistency/ Inter-item consistency	A research instrument's internal consistency is confirmed by evaluating respondents' answers using the Cronbach's coefficient alpha (Petersen 1994). The uniformity of the measure may be approached in two ways: multiple-item measure and split-half method (Berenson et al. 2002). In multi-item measure, there must be at least two comparable sets of measures tapping the same construct in the same instrument but not told to respondents (Churchill 1979, McPhail 2001). If there are many items in the scale, the split-half method may be conducted by splitting all items into two parts comprising odd-numbered and even-numbered items; then respondents' answers from each part are analysed and their results compared to assess reliability (Zikmund 2000).	In this study, Cronbach's coefficient alpha was used to check internal consistency. Multi-item measures were applied in the survey instrument. The split-half method was applied to this study although the number of items was not very large, i.e. 16.
Parallel-form reliability/ Equivalent-form reliability	This involves giving two different instruments, which have been designed to be as equivalent as possible, to the same subjects. If those two instruments show a high correlation, then the measure is considered reliable (Zikmund 2000).	This study did not employ the use of two different instruments.

(Source: Skadiang 2008; developed for the study)

3.10.2 Assessment of validity

Validity is concerned with whether the findings are really about what they appear to be about (Robson 2002). It is related to "the ability of a scale or measuring instrument to measure what is intended to be measured" (Zikmund 2000, p. 281). There are different forms of validity, classified in different ways – firstly, according to Zikmund (2000) there are content validity, criterion validity (further distinguished as concurrent validity and predictive validity) and construct validity (further distinguished as convergent validity and discriminant validity), or secondly, according to Robson (2002) there are construct validity,

internal validity and external validity. The different forms of validity listed above which are relevant to this study are described as follows.

Face validity/Content validity. This is normally achieved by getting professional or expert advice in assessing whether the instrument provides adequate coverage of a concept to accurately reflect what it professes to measure (Zikmund 2000). For this study, the original KM scale in the pilot study was developed by a team of senior researchers who put together theoretically derived items generated from various literature and industry sources. Moreover, subject matter experts were consulted for the survey design. These included key informants from two universities apart from USQ namely the University of Technology Sydney (UTS) and University of the Sunshine Coast (USC). Field interviews were also conducted with knowledge management experts in Australian public and private sector organisations (Queensland Railways, Deloitte Touche, Ernst & Young, BDO Kendalls Lend Lease, PFD Savills Aust. Pty Ltd).

The subject matter experts also analysed the item pool and commented on the items to assure face validity and some content validity. Following this, items in the pool were edited, reduced and refined to incorporate the subject matter experts' input. In addition, the researchers performed an exploratory factor analysis during the original KM scale's construction.

Criterion validity. More rigorous than face validity, this refers to the ability of the measure to correlate with other measures for similar constructs (Zikmund 2000), for example the use of IQ tests as an acceptable measure of intelligence. To approach concurrent validity of the measure in this study, the researcher has selected the Likert scale since it is a time-tested, reliable measure that has been used in much academic research (Zikmund 2000; McPhail 2001). Also, the original KM scale in the pilot study was scrutinised by experts from Standards Australia, American Productivity and Quality Center, and Arthur Andersen.

Internal validity. Internal validity in experiments refers to validity that is established by whether or not an experimental treatment was the only cause of changes in a dependent variable (Zikmund 2000). Incomprehensible or ambiguous survey questions indicate that the measure has problems with internal validity (Robson 2002). Internal validity might not pose much of a problem to this study as the survey is self-administered (hence there are no risks of experimenter bias and experimental mortality) and is conducted one-off (so there are no risks of regression to the mean, repeated testing and maturation). In addition, experience from the pilot test run in Australia can pre-empt some internal validity concerns such as ambiguous survey questions.

External validity. This refers to the ability of the experiment to generalise its results (Zikmund 2000). If sampling is faulty, then the generalisability of the results would be in doubt, thus affecting the study's external validity (Robson 2002). Another threat to external validity is when respondents are not truthful (Hanson 1980 cited in Robson 2002). To address external validity concerns, probability sampling was applied to this study wherein the MIM members who voluntarily responded to the survey were not subjected to any non-random

criterion. Besides, no personally identifiable information (e.g. full name or membership number) was solicited from the respondents.

3.10.3 Sensitivity

Sensitivity refers to "an instrument's ability to accurately measure variability in stimuli or responses" (Zikmund 2000, p. 284). Some surveys such as marketing surveys offer only a snapshot of the situation (Gable 1994) as they are influenced by diverse factors including technological progress, economic conditions and consumer behaviour (Zikmund 2000), and are hence sensitive to time.

In contrast, the findings of this study scale are more stable and less sensitive to time. Nevertheless, should there arise a need to check its sensitivity to time or other factors, it should be possible to conduct parallel or longitudinal studies as this study is replicable. Table 3.8 summarises how concerns of validity and sensitivity were addressed in this study.

Table 3.8 **Addressing validity and sensitivity issues**

Approach	Description/Scope	Relevance to this study
Face validity/ Content validity source	Normally achieved by getting professional or expert advice in assessing whether the instrument provides adequate coverage of a concept to accurately reflect what it professes to measure (Zikmund 2000).	Original KM scale was developed by team of senior researchers who put together theoretically derived items generated from various sources. Subject matter experts were consulted for the survey design. Field interviews were conducted with members of Australian public and private sector companies. Subject matter experts analysed the item pool and items in the pool were edited, reduced and refined to incorporate the subject matter experts' input. Researchers performed exploratory factor analysis during scale construction.
Criterion validity source	Refers to the ability of the measure to correlate with other measures for similar constructs (Zikmund 2000), e.g. the use of IQ tests to gauge intelligence.	This study employed the Likert scale due to its time-tested and reliable record, and wide use in academic research (Zikmund 2000; McPhail 2001). Further, the KM scale used in this study had been scrutinised by experts from Standards Australia, American Productivity and Quality Center, and Arthur Andersen before its pilot test.
Internal validity source	Refers to validity established by whether or not an experimental treatment was the only cause of changes in a dependent variable (Zikmund 2000). Ambiguous or incompre-hensible survey questions indicate internal validity problems (Robson 2002).	This survey was self-administered; hence there were no risks of experimenter bias and experimental mortality. It was conducted one-off; hence there were no risks of regression to the mean, repeated testing and maturation. Experience from a pilot test run in Australia pre-empted some internal validity concerns such as ambiguous survey questions.

Table 3.8 Addressing validity and sensitivity issues
(continued)

Approach	Description/Scope	Relevance to this study
External validity	Refers to the ability of the study to generalise its results (Zikmund 2000); faulty sampling jeopardises the generalisability (Robson 2002).	In this study, simple random sampling was applied.
	External validity is also threatened when respondents are not truthful (Hanson 1980 cited in Robson 2002).	To encourage truthful responses, respondents had the option to remain anonymous.
Sensitivity	Refers to the instrument's ability to accurately measure variability in responses, which may be affected by time-related factors such as economic conditions, technology and consumer behaviour (Zikmund 2000).	Parallel or longitudinal studies are possible in the future, since this study is replicable.

(Source: Skadiang 2008; developed for the study)

3.11 Instrument design

Overview. The instrument used in the Malaysian study was a self-administered 16-item KM scale known as the USQ KMS-16 (see Appendix A). It had evolved from a 103-item KM scale named the USQ KMS-103 (see Appendix B) that was developed by USQ researchers, then tested in a pilot study in Australia and further refined as part of the pilot test. Details of the instrument development are discussed in section **3.12 Background of KM scale** and section **3.13 Pilot study.** The discussion is preceded by a consideration of the attributes of a well-designed survey questionnaire in terms of questionnaire length, question characteristics and question sequence.

Length. The complexity of a self-administered questionnaire should be kept to a minimum (Robson 2002); complexity may be related to questionnaire length. Although it is commonly believed that long questionnaires should be avoided, short questionnaires may give the impression that the questionnaire is unimportant, whereas a length of between four and eight pages of A4 paper is widely acceptable for self-administered surveys within the organisation (deVaus 2002 cited in Saunders et al. 2003). In addition, Zikmund (2000) recommends that questionnaires should not exceed six pages. Nonetheless, researchers should neither make questionnaires longer than necessary nor be too preoccupied with questionnaire length (deVaus 2002 cited in Saunders et al. 2003). In this study, the length of the USQ KMS-16 was only four A4 pages.

Characteristics of questions. Questions should not be ambiguous, filled with jargon (deVaus 1991 cited in Robson 2002), leading (Ticehurst & Veal 2000) or burdensome to respondents' memory (Zikmund 2000). Moreover, double-barrelled questions should be avoided (deVaus 1991 cited in Robson 2002), meaning that each question should only measure one variable at a time. Loaded questions, either biased with emotion or suggestive of socially-desirable answers, should be averted (Zikmund 2000). As items in this study's scale have been edited and refined as well as pre-tested in a pilot study, such problems did not pose an obstacle.

Question sequence. Question sequence is very important because of the possibility of order bias where the answer to a previous question may affect the answer to a subsequent question. To minimise this, researchers may randomise the sequence of questions (Zikmund 2000). Additionally, the funnel technique of asking more general questions before specific ones can solicit more unbiased responses (Zikmund 2000), while placing easy and interesting questions first can improve response rates (Robson 2002).

In this study, the issue of question sequence was not significant considering that there were only 16 questions (excluding eight questions soliciting demographic information) in the survey. Moreover, the questions were neither long nor complicated, with 15 words in the longest question and seven in the shortest. The knowledge management experts had already commented on the original content and clarity of the remaining questions.

Typically, the survey questionnaire consists of closed-ended questions whose responses can be quantified and statistically analysed (Zikmund 2000). From among six possible formats of close-ended or fixed-alternative questions (Youngman 1986 cited in Saunders et al. 2003, Cooper & Schindler 2003), this study's survey instrument employed a Likert scale where respondents could mark a given point on a continuum of seven options ranging from one extreme to the other. More details about the different types of measurement scales in the context of their appropriateness to this study have been presented previously in section **3.8 Scales**.

Development of instrument. The questions in the current study's USQ KMS-16 reflect the multidimensional nature of OKM, which was determined from extensive literature review and interviews. Three dimensions were identified for the study: OKM strategy, OKM culture, OKM process/technology.

Although not explicitly stated on the OKM questionnaire, each of the 16 questions corresponds to one of the three dimensions. The breakdown of the questions and three OKM dimensions are as follows:

Question 1 to Question 4   : OKM Strategy
Question 5 to Question 10   : OKM Culture
Question 11 to Question 16 : OKM Process/Technology

In addition to the abovementioned 16 questions, another eight questions solicited demographic information about the respondents.

3.12   Background of KM scale

As noted in the literature review in Chapter 2, there is a scarcity of studies on KM scales. Although some consulting firms have successfully customised various instruments for their clients, these tend to be too customer-specific to become a standard tool.

The USQ research team that developed the original KM scale investigated a number of sources including a list of 1146 refereed journal articles available on the 2004 AMOS website (http://amosdevelopment.com/AmosCitations.htm) containing studies from US, Australian and European journals in psychology, marketing, IS, sociology, health, nursing, education and organisational behaviour. They found only one study by Mohrman, Finegold and Mohrman (2003) in an engineering journal that referred to testing an empirical model of the organisation knowledge system in new product development firms   In addition, the researchers identified a pool of potential questions and items for the scale, but only came across one questionnaire from productivity and quality management sources.

The pool of questions or items were categorised under the dimensions of organisational strategy, culture and process/technology. The questions placed at the end of each category also reflected constructs and items that might resemble those in some existing organisational scales measuring strategy, culture or process/technology. Instead of relying solely on existing measures of strategy, culture and process/technology, the research team also undertook an extensive literature search to gain perspectives from researchers at other universities, and conducted interviews with practitioners in public and private sectors to seek and evaluate the pool of existing and new items for a trans-disciplinary multidimensional scale that could be applied both nationally and internationally.

Eventually, 103 items were identified for the instrument, USQ KMS-103, which was used for a pilot study in Australia. Following the pilot test, a rigorous item reduction process decreased the 103 items to 17, leading to the creation of a 17-item KM scale known as the USQ KMS-17. However, due to an administrative error, only 16 items were communicated to the researcher for the study in Malaysia, giving rise to another version of the scale, USQ KMS-16. The item that was originally included in the USQ KMS-17 but omitted in the USQ KMS-16 pertained to OKM Culture, as follows: "A climate of trust permeates the work group." More details about the item reduction process are described in the ensuing section **3.13 Pilot study**.

3.13   Pilot study

A pilot study using the USQ KMS-103 was conducted by USQ researchers on a convenience sample of MBA students at the University of Southern Queensland, Australia (Erwee et al. 2007). Although a student sample might be interpreted as unreliable for industry-based research, it must be reiterated here that the student sample consisted of mature age managers in Australia and Asia Pacific countries. On the other hand, the study in Malaysia involved 1740 Ordinary and

Fellow members of MIM who are typically, but not necessarily, aged 35 and 40 years and above, respectively, and have, but are not limited to, 10 to 30 years of management-related experience (see **3.7.3 Sampling frame** and subsection **3.7.4 Target population and characteristics**.)

Sample. The convenience sample in the pilot study comprised 137 postgraduate students undertaking coursework at USQ, who are managers from public and private sector organisations in Australia and Asia-Pacific countries, and tend to be representative of the population of managers in national and international companies.

Method. Respondents were asked to complete the USQ KMS-103 scale online, which permitted anonymity.

Scale refinement. Efforts by Dr Ray Gordon, a member of the USQ research team that developed USQ KMS-103 and conducted the Australian pilot study, resulted in a reduction of 103 items to 17 items for future usage and testing of the scale. As the USQ research pilot study had a small sample of 137, Gordon could only perform exploratory analysis for item reduction. The results of factor analysis and scale reliability are shown in Appendix C, where Factor 1 included the aspects of organisational knowledge *process* as well as organisational knowledge *culture*; Factor 2 covered aspects of organisational knowledge *culture*; Factor 3 focused on the competitive environment in which knowledge is a strategically important resource; and Factor 4 included aspects of organisational knowledge s*trategy* (Erwee, R. 2008, pers. comm., 11 November).

3.14   Data analysis

This section, including all its component subsections, discusses the way data analysis was approached and conducted on the Malaysian OKM study. However, results of the data analysis are not stated here but are instead discussed in Chapter 4.

Introduction. Data analysis is commonly divided into two broad categories, namely exploratory – where data is investigated to learn what it tells, and confirmatory – where analysis aims to establish if what is expected has been found (Robson 2002). In flexible design or qualitative research, data analysis can begin even in the middle of the enquiry but in fixed design or quantitative research, data analysis and interpretation begin only after all data has been collected (Robson 2002). For this quantitative study, the researcher commenced confirmatory data analysis about two months after the stipulated deadline, which was about nine weeks after all questionnaires had been mailed out on 2 April 2007. The survey was officially closed on 31 May 2007, although questionnaires from a few latecomers trickled in over the following weeks.

Missing answers/Blank responses. Ideally, there should be no missing data at all (Youngman 1979 cited in Robson 2002). If respondents leave out a few questions, the entire questionnaire need not be rejected, but if about 25 percent

of a questionnaire has been unanswered, then it is wise to exclude that questionnaire from data analysis (Sekaran 2003). Furthermore, there are a few techniques to handle missing answers or blank responses. In this study, the researcher elected to assign the midpoint of the scale as a default which is considered to be one of the two most common ways of dealing with the problem (Sekaran 2003).

Helberg (1997) warns of the three broad classes of statistical pitfalls during data analysis – sources of bias, error in methodology and interpretation of results, of which the first two originate at stages much earlier than the data analysis stage discussed at this point. As such, sources of bias and error in methodology have already been addressed in previous sections of this chapter. Thus this section merely covers an overview of data analysis techniques proposed by the researcher for more accurate interpretation of the research results.

3.14.1 Statistical analysis

Tests for statistical significance. Tests for statistical significance may be further classified as parametric or nonparametric. The former assumes that the population from which the sample is taken is normally distributed and is used only for interval or ratio data, whereas the latter makes no such explicit assumption about the population distribution and are usually, but not necessarily always, used for nominal or ordinal data (Sekaran 2003).

3.14.2 Choice of statistical techniques

There are three categories of statistical techniques namely descriptive, relational and inferential statistics (Christensen 2003). Descriptive statistics are also called summary statistics which refer to ways of representing important aspects of a set of data with a single number (Robson 2002). For this study, descriptive statistics showing the mean and standard deviation for each of the demographic and questionnaire items in the survey instrument were computed.

On the other hand, relational statistics investigate the nature of relationships among variables, comprising univariate, bivariate and multivariate analyses. Bivariate analysis attempts to investigate the correlation between two variables whereas multivariate analysis investigates multiple correlations among more than two variables (Christensen 2003). This study explored, amongst other matters, whether there was any correlation between the extent of OKM practice and the characteristics of the organisation. The different characteristics of organisations that came under investigation included size, number of employees, public or private sector, local or multinational, profit or non-profit and industry sector.

Last but not least, inferential statistics make an inference about a population from a given sample (Zikmund 2000). Inferential statistics may be categorised into two: firstly, difference of means which includes hypothesis tests, and

secondly, tests for statistical significance (Christensen 2003). In this study, both hypothesis tests and tests for statistical significance were applied.

Exploratory factor analysis. Another exploratory factor analysis was performed to establish if the 16 items again clustered into the expected factors.

Reliability tests. New reliability tests were conducted for stability of the revised measure and to determine its internal consistency, i.e. the split-half reliability test and the inter-item consistency reliability test using Cronbach's coefficient alpha.

Choice of statistical tool. The Statistical Package for the Social Sciences (SPSS) version 15 was used to conduct relevant statistical analysis of the survey results, and was selected mainly because of its proven track record as a highly popular software tool for statistical analysis in social sciences (Robson 2002) as well as other research areas.

3.14.3 Generalisability

Shadish, Cook and Campbell (2002 cited in Yates 2007, p. 40) posit that generalisable studies result from researchers applying five principles: i) assess surface similarity between study operations and target generalisation; ii) rule out irrelevancies that do not change a generalisation; ii) make discriminations that limit generalisations; iv) interpolate within samples and extrapolate beyond samples; and v) develop and test causal theories about the target of generalisation. To establish a causal effect and to generalise that causal effect, four categories of validity threats need to be addressed: statistical conclusion validity, internal validity, construct validity and external validity (Cook & Campbell 1979; Cronbach 1982; Shadish, Cook & Campbell 2002; all cited in Briggs 2007). Nevertheless, a model that attempts to concurrently solve all four issues of statistical conclusion validity, internal validity, construct validity and external validity is "laudably ambitious but perhaps unrealistic in expectations – it is not clear that any real experiment could ever succeed in being fully valid in all these many senses simultaneously." (Shadish 2002, p. 10).

It is beyond the scope of this study to make causal inferences since the study was conducted in the context of the managers' natural organisational environment, i.e. the non-contrived settings of field research, as opposed to the contrived or controlled lab settings of a typical causality study (Sekaran 2003). Nevertheless, this study has identified a correlation between the three different dimensions of OKM, as well as a correlation between some demographic characteristics and OKM dimensions. To establish causality would warrant further research.

3.15 Hypothesis testing and miscellaneous analyses

The second research issue required the testing of three hypotheses on the interrelation of the three OKM dimensions. Details about these three hypotheses were provided in section 2.6 while results of the tests will be reported in Chapter

4. In addition, miscellaneous correlation analyses were conducted to investigate the third research issue on which demographic factors affect the extent of OKM practice.

3.16   Research project plan

The main stages of this study are documented as a multi-phased project, as follows:

Phase 1 – Pre-data collection: This stage comprised the identification of the research area, conduct of literature review, articulation of the research objective, design of the research methodology and plan of the research project. In this case, a standard pre-developed instrument was used for this study. The activities of this initial stage of research started in 2003 (Reynolds 2003; Skadiang 2004), after which the research progress was suspended for about 14 months from October 2005 to December 2006 during the transition period of a changeover from the former CEO to the present one at MIM. During this phase, the pilot study in Australia using USQ KMS-103 and the subsequent reduction of items by Dr Ray Gordon to generate the USQ KMS-17 was conducted (Erwee et al. 2007).

Phase 2 – Data collection: After securing the relevant approval from MIM Malaysia, two cover letters were prepared, one by the CEO of MIM Malaysia and the other by the researcher. The e-mail blast was conducted on 30 January 2007 to all MIM members. The stipulated deadline for returning all questionnaires was 10 March 2007, i.e. almost six weeks later, with some discretionary flexibility. This timeframe was consistent with the recommendation by Zikmund (2000) that the duration between dissemination of all questionnaires and closing date for completed questionnaires should be about six to eight weeks. All completed questionnaires received were printed and stored in an appropriate cabinet for safekeeping, awaiting analysis at the next stage. Unfortunately, the initial response rate was low, i.e. only five responses after six weeks. Hence, an e-mail reminder was sent in March 2007. However, the researcher then decided to send the questionnaires through conventional mail instead, which was executed on 2 April 2007. The deadline was specified as 31 May 2007 but the researcher's cut-off date to stop accepting late completed questionnaires in order to begin data analysis was approximately two months after the stipulated deadline.

The total number of completed questionnaires received was 153. All questionnaires were usable. Although some respondents did not answer a few of the questions – mainly questions pertaining to demographics – this did not warrant an outright rejection of the entire questionnaire. With the population size being 1740 (Fellow members and Ordinary members only, excluding Associate and Affiliate members), this meant the response rate was close to 8.8 percent.

Phase 3: Data analysis

This phase consisted of the completeness check; consistent check and recoding; and data entry. During this phase, hard copies of all completed questionnaires received were sorted according to date received, followed by a completeness check. Questionnaires that were at least 25 percent incomplete were entirely rejected. Otherwise, partially complete questionnaires were processed and the blank answers given a midpoint score.

Following this, responses from each questionnaire were verified for consistency and where necessary, some responses were recoded for greater accuracy, for example where respondents ticked more than one industry classification, the first response was selected and the others ignored. However, for multiple responses by a single respondent in 'highest educational qualification completed' the researcher selected only the highest qualification.

Subsequently, data obtained from the survey was keyed into the computer system for analysis. Confidentiality and data integrity were maintained as all computer data entry was conscientiously performed by a data entry professional as the researcher did not own a copy of SPSS. Analysis and interpretation of survey data are discussed in greater detail in Chapter 4.

The data analysis stage was unexpectedly prolonged due to a fall-out, totally unrelated to the researcher, between MIM and the third party that had initially agreed to undertake data entry and analysis. It took considerable time to engage a substitute who was a freelancer with a full-time day job and numerous commitments, and was thus unable to respond on a timely basis. However, the risk of engaging another party for the second time at this stage of the research was deemed to present even greater risks; hence the option was eventually not pursued.

3.17   Limitations of the study

Limitations persist in research despite all the best attempts to remain as rigorous as possible. The limitations outlined in this section had been identified prior to the study, with precautionary action taken in advance to alleviate them. On the other hand, in Chapter 5 another set of limitations will be presented, but these pertain to limitations that had arisen only in the course of conducting the research.

Firstly, the literature review carried out for this study included only materials written in the English language. As such, literature in other languages which have no English translation, have been excluded. Moreover, as this study was targeted at individual MIM members rather than corporate members, there might have been instances where respondents represented the same organisation or that some organisations were over-represented. However, this fact could not be established since respondents were not asked for their organisation names in a bid to preserve anonymity.

Furthermore, although the MIM membership database offers a logical and reliable sampling frame, there could be some doubt on how representative it is of the country's managers. This is because many Malaysian managers are not yet MIM members. Amid a population of almost 28 million and a workforce of an estimated 12 million (http://www.ipsnews.net/news.asp?idnews=36733) in the country, the number of MIM individual members (as opposed to Corporate or Group members) hover around 7,000. By comparison, the Malaysian Institute of Accountants boasts a membership of 22,943, excluding student members, as of 28 July 2006 (www.mia.org.my).

3.18 Ethical issues

Ethics constitute rules of conduct which usually come in the form of a code of principles (Reynolds 1979 cited in Robson 2002) adhered to by groups of people including employees in an organisation and members of a professional body. With no general consensus among philosophers on what is ethical or not, the rights and obligations of individuals are generally dictated by societal norms (Zikmund 2000). Nevertheless, while researchers have certain ethical responsibilities, this does not make them a privileged judge of what represents ethical behaviour in others (Robson 2002).

Privacy and confidentiality was preserved in this study by the sole researcher with negligible probability of information leak or breach of ethical standards. In the first place, the OKM questionnaire did not solicit much personal data, unlike typical surveys in Malaysia which seek information such as an identification or membership number, ethnicity, religion, marital status and salary or household income, among others. Respondents of this study were assured that the survey was not about gaining personalised information with ulterior motives. Besides, respondents were welcome to seek clarification on any matter of doubt, through e-mail. Whatever limited personal data that was solicited in the OKM questionnaire was neither revealed in the tabulated results nor were the attitudinal responses used for purposes other than the ones clearly outlined on the cover note to respondents.

Moreover, no form of deception or pretence was necessary in this study, an issue more prevalent in social research (Robson 2002; Cooper & Schindler 2003). There was also no attempt to offer any inducement, monetary or otherwise, in the hopes of gaining a higher response rate. Last but not least, the returned questionnaires have been securely retained by the researcher and will remain in safekeeping for up to the next six years in case of any academic enquiry.

3.19 Chapter summary

The first section of this chapter comprised an introduction outlining the nature of the research question and the research objective. This was followed by a brief assessment of the different possible types of research paradigm that might apply to this study. Thereafter, sections 3.3, 3.4, 3.5 and 3.6 discussed the following in the light of their relevance to this study: types of business research, research

design strategies, design techniques and survey methods, respectively. Subsequently, section 3.7 presented the research procedure where the sampling technique, sampling frame and population characteristics were described.

Section 3.8 offered an assessment of the different types of measurement scales, leading to the researcher's choice and rationale for the selected scale. Next, section 3.9 addressed the possible sources of errors in this study, followed by section 3.10 covering issues of reliability, validity and sensitivity; section 3.11 outlining the instrument design, section 3.12 providing some background to the KM scale used in this study and section 3.13 summarising the pilot study. This led to a discussion in section 3.14 on the major forms of data analysis including statistical techniques to be applied to primary data accumulated throughout the data collection period.

Following the above, this study project plan was submitted in section 3.15. In section 3.16, limitations of the study were highlighted. Section 3.17 articulated the ethical considerations pertinent to the research, preceding section 3.18, a summary of the whole chapter's contents.

CHAPTER 4   **DATA ANALYSIS AND FINDINGS**

The main purpose of this chapter is to report the data collected and to present the outcome of the data analysis. Sections in this chapter cover areas including descriptive statistics, reliability analysis, hypothesis testing and summary of findings.

To recap, the research problem addressed by the study was articulated as follows: ***What is the extent of KM practice in organisations in Malaysia?***

The study also investigated three research issues that arose from the research problem:

- **RI 1:** *What is the extent of KM practice in organisations in Malaysia as perceived by managers at their workplace?*

- **RI 2:** *What are the relationships between the dimensions of OKM?*

- **RI 3:** *What are the relationships between demographic characteristics and the managers' perceptions of the three dimensions of OKM?*

4.4 Demographic profile of the sample

Table 4.1a provides an overview of the demographic profile of the sample.

Table 4.1a   **Demographic Profile: Descriptive statistics**

Variable	Response	Frequency	Valid %
Gender	Male	130	84.97
	Female	16	10.46
	No Response	7	4.58
Organisational occupational role	Manager/Administrator	103	67.32
	Professional	44	28.76
	Associate professional	4	2.61
	Tradesperson or related worker	1	0.65
	Advanced clerical or service worker	0	0
	Intermediate clerical, sales or service worker	0	0
	Intermediate production or transport worker	0	0
	Elementary clerical, sales or service worker	0	0
	Labourer or related worker	1	0.65
Years of service with the organisation	Less than one year	9	5.88
	One or more, but less than three	16	10.46
	Three or more, but less than five	15	9.80
	Five or more, but less than ten	16	10.46
	Ten or more years	97	63.40
Years of service in current position	Less than one year	12	7.84
	One or more, but less than three	26	16.99
	Three or more, but less than five	20	13.07
	Five or more, but less than ten	33	21.57
	Ten or more years	61	39.87
	No Response	1	0.65
Highest educational qualification completed	High School – Below Year 12 or Equivalent	1	0.65
	High School – Year 12 (Matriculation)	1	0.65
	Technical trade training/Apprenticeship	1	0.65
	Certificate/Graduate certificate	9	5.88
	Bachelor degree	40	26.14
	Masters degree	70	45.75
	Doctoral degree	14	9.15
	Other	17	11.11
Age	31 – 35 years	4	2.61
	36 – 40 years	12	7.84
	41 – 45 years	24	15.69
	46+ years	112	73.20
	No Response	1	0.65
Approx. number of persons employed on full-time basis	Less than ten	25	16.34
	11 – 49	28	18.30
	50 – 99	16	10.46
	100 – 149	9	5.88
	150 – 199	7	4.58
	200 – 499	21	13.73
	500 – 999	11	7.19
	1000+	36	23.53

Variable	Response	Frequency	Valid %
Industry Classification	Agriculture, forestry, fishing and/or hunting	8	5.23
	Mining	2	1.31
	Manufacturing	38	24.84
	Electricity, gas and/or water supply	2	1.31
	Construction	8	5.23
	Wholesale trade	6	3.92
	Retail trade	7	4.58
	Accommodation, cafes and restaurants	3	1.96
	Transport and/or storage	5	3.27
	Communication service	4	2.61
	Finance and insurance	11	7.19
	Property and/or business services	4	2.61
	Government administration and/or defence	4	2.61
	Education	12	7.84
	Health and/or community service	4	2.61
	Cultural and/or recreational services	0	0
	Personal and other services	2	1.31
	Others	28	18.30
	No Response	5	3.27

Gender. The MIM membership database of Ordinary members and Fellow members consists of 91 percent males, whereas in this study, 85 percent of the respondents were male. This suggests that the sample is fairly representative of the target population, with a slight bias towards the female gender. Almost 5 percent of the sample did not reveal their gender, but if these respondents were male, then the sample would amount to 90 percent male.

Organisational occupational role. The demographic profile of survey respondents summarised in Table 4.1a shows that 67 percent of the 153 respondents come from the 'Manager/Administrator' category, whereas 29 percent belong to 'Professional'. Furthermore, only a few respondents in this study fall under other categories of 'Associate Professional', 'Tradesperson' and 'Labourer or Related Worker'. The remaining four unrepresented groups are 'Advanced Clerical', 'Intermediate Clerical', 'Intermediate Production or Transport Worker', and 'Elementary Clerical'. This is not surprising considering that the survey questionnaires were sent to only Ordinary members and Fellow members of the national management organisation in Malaysia, who are unlikely to hold clerical positions, whereas the questions soliciting demographic data in the questionnaire were meant to be applicable to generic sampling frames.

Years of service in the organisation. The sample consists of 74 percent of Malaysian managers who have served for at least five years in the organisation (five years but less than ten years: 11 percent; ten years or more: 63 percent). As long-serving staff possess greater stores of corporate history and institutional memory, their high representation in the sample suggests better reliability of the responses elicited.

Years of service in current position. A majority of the Malaysian managers surveyed (61 percent) have held their current positions for at least five years (five but less than ten years: 22 percent; ten years or more: 40 percent). This provides a good indication that the survey respondents possess adequate experience in their current role to convey a fairly accurate view on the state of KM practice at their workplace, especially among the immediate circle of colleagues or associates they presently interact with.

Education level. The Malaysian managers in the sample are relatively well educated with 81 percent of them having completed at least a degree (Bachelor degree: 26 percent; Masters degree: 46 percent and Doctoral degree: 9 percent).

Age. A large percentage of the survey respondents are 31 years or above, with almost 16 percent from 41-45 years of age, and 77 percent of them 46 years old and above. The maturity of the sample augurs well for the insight demonstrated in the survey responses received.

Number of full-time employees. The number of full-time employees gives an indication of company size. From the demographic data gathered in Table 4.3a, the representation of different company sizes appears to be quite fairly distributed, with 56 percent of companies having less than 200 full-time employees. According to the definition by the Small and Medium Industries Development Corporation or SMIDEC of Malaysia, small and medium enterprises (SMEs) are defined as companies with not more than 150 full-time employees OR less than RM25 million of annual sales turnover in Manufacturing-related Services and Agro-based Industries, and companies with not more than 50 full-time employees OR less than RM5 million of annual sales turnover in the Services, Primary Agriculture and Information & Communications Technology (ICT) sectors (www.smidec.gov.my).

In addition, 21 percent of the organisations represented in this study hire 200-999 full-time employees, whereas 24 percent of organisations represented in the sample have over 1000 full-time employees. These figures indicate that the distribution of organisations represented is not skewed towards a particular category of organisation size, although, according to the *2008 Malaysian Capability Index* report, SMEs account for 99.2 percent of the 518,996 establishments in Malaysia.

Industry classification. This also appears to be quite fairly distributed with one quarter of the survey respondents coming from the manufacturing sector (25 percent).

Crosstabulation. To gain a more detailed picture of the survey respondents, crosstabulation between 'Organisational Occupational Role' and 'Age', and between 'Organisational Occupational Role' and 'Years of Service in the Organisation' were done (see Appendix D and Appendix E, respectively).

Table 4.1b shows the end results of the crosstabulation between 'Organisational Occupational Role' and 'Age' in terms of the frequencies occurred. Only five subcategories are displayed as none of the survey respondents belong to the

other four subcategories. The diverse age groups of the various occupational roles imply that a particular role was not dominated by a particular age group, which augurs well for diversity. The majority of the sample is made up of mature age managers and professionals in the age categories 41 to 45 and 46 or more years of age (136 out of 152 respondents, or 89 percent).

Table 4.1b **Outcome of Crosstabulation between 'Organisational Occupational Role' and 'Age' (Frequencies)**

Count		Age				Total
		31-35 years	36-40 years	41-45 years	46+ years	
Organisational Occupational Role	MANAGER/ ADMINISTRATOR	2	7	14	79	102
	PROFESSIONAL	2	4	9	29	44
	ASSOCIATE PROFESSIONAL	0	1	1	2	4
	TRADESPERSON	0	0	0	1	1
	LABOURER OR RELATED WORKER	0	0	0	1	1
Total		4	12	24	112	152

Table 4.1c shows the outcome of the crosstabulation between 'Organisational Occupational Role' and 'Years of Service with the Organisation' expressed in terms of frequencies. Once again, only five subcategories are shown because no survey respondent is represented in the remaining four subcategories. The majority of the sample is comprised of managers and professionals who have been in their companies for at least ten years.

Table 4.1c **Outcome of Crosstabulation between 'Organisational Occupational Role' and 'Years of Service with the Organisation' (Frequencies)**

Count		Years of service in the organisation					Total
		Less than 1 year	One or more but less than 3 years	Three or more but less than 5 years	Five or more but less than 10 years	Ten or more years	
Organisational Occupational Role	MANAGER/ ADMINISTRATOR	6	10	10	9	68	103
	PROFESSIONAL	2	5	4	7	26	44
	ASSOCIATE PROFESSIONAL	1	1	1	0	1	4
	TRADESPERSON	0	0	0	0	1	1
	LABOURER OR RELATED WORKER	0	0	0	0	1	1
Total		9	16	15	16	97	153

4.2 Construct validity and reliability of USQ KMS-16

4.2.1 Construct validity

The USQ KMS-16 used in the Malaysian study was subjected to factor analysis to establish evidence of construct validity. The results of factor analysis using the principal component analysis extraction method and varimax rotation with Kaiser normalisation are depicted in Appendix F, including the Kaiser-Meyer-Olkin (KMO) measure, total variance explained and scree plot. In this study, the KMO value was 0.908, i.e. greater than .6, implying sampling adequacy. Although the Kaiser rule is to drop all components with eigenvalues below 1.0, it is not recommended as the sole cut-off criterion for estimating the number of factors (Garson 2009). The outcome of factor analysis indicates three components, with one component having an eigenvalue of 0.963, slightly less than 1.0.

4.2.2 Reliability analysis

The USQ KM-16 was also subjected to a reliability analysis for this sample. Table 4.2a below shows the results of the reliability test based on Cronbach's Alpha. All three subscales have acceptable reliabilities (0.804 and above).

Table 4.2a **Reliability (Cronbach's Alpha coefficient)**

Scale	Item Number	Cronbach's Alpha
OKM Strategy	4	0.804
OKM Culture	6	0.893
OKM Process	6	0.897

Following this, Table 4.2b displays the results of further reliability analysis using the split half approach and these are also acceptable reliabilities.

Table 4.2b   **Results of reliability analysis (Split method)**

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (S P L I T)

1. QUESTION11   Acknowledged subject matter 'experts' among employees are rewarded by the organisation for their expertise.
2. QUESTION10   Employees actively use new ideas to improve organisational performance.
3. QUESTION7   Employees are actively encouraged to look for new ideas internally.
4. QUESTION5   Employees are actively encouraged to make contributions to the organisation's knowledge.
5. QUESTION6   Employees are actively encouraged to use the organisation's knowledge.
6. QUESTION2   In managing knowledge, goals that improve organisational performance are purposely identified.
7. QUESTION1   Managing knowledge is a core part of the organisation's strategy.
8. QUESTION16   Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation.
9. QUESTION3   Priorities are established for addressing goals that improve organisational performance.
10. QUESTION8   The organisation actively supports the formation of close working relationships among employees.
11. QUESTION13   The organisation deliberately identifies optimal external practices.
12. QUESTION9   The organisation has a strong culture of performing work to a high standard.
13. QUESTION4   The organisation has strategies to implement its KM capabilities externally.
14. QUESTION12   The organisation invests resources to ensure that its information can be trusted.
15. QUESTION15   The organisation measures employees' contributions to its knowledge resources.
16. QUESTION14   Transferring optimal practices among employees is a formalised process in the organisation.

Reliability Coefficients

N of Cases = 149.0	N of Items = 16
Correlation between forms = .8840	Equal-length Spearman-Brown = .9384
Guttman Split-half = .9384	Unequal-length Spearman-Brown = .9384
8 Items in part 1	8 Items in part 2
Alpha for part 1 = .8820	Alpha for part 2 = .8869

4.3 Results

In this section, the three research issues within the research question will be addressed in subsections **4.3.1 Responses towards extent of OKM practice**, **4.3.2 Correlation of OKM dimensions** and **4.3.3 Impact of demographic characteristics on OKM practice**, respectively.

4.3.1 Responses towards extent of OKM practice

Research Issue 1: What is the extent of KM practice in organisations in Malaysia as perceived by managers at their workplace?

To address the abovementioned research issue, a one-sample t-test was contemplated to find out if the mean in the current study sample has the same mean as the population. Unfortunately, the population mean was not known; hence, it was assumed to be 4 (corresponding to a neutral response on the 7-

point Likert scale of the survey instrument). The results in Table 4.2c indicate that there is a significance in the high value of t obtained, implying that the mean in the sample varies from the population mean. The attempt at computing the t-value yielded an inconclusive outcome as the population mean was not verifiable. Further research is recommended to establish a more reliable population mean for OKM perception among Malaysian managers.

Table 4.2c   T-test for the study sample

One-sample statistics

	N	Mean	Std. Deviation	Std. Error Mean
OKM Strategy	153	5.4967	.97585	.07889
OKM Culture	153	5.5166	.98068	.07928
OKM Process/ Technology	153	4.8425	1.14342	.09244
OKM	153	5.2853	.92042	.07441

One-sample test

	Test value = 4					
	t	df	Sig. (2-tailed)	Mean difference	95% Confidence Interval of the Difference	
					Lower	Upper
OKM Strategy	18.972	152	.000	1.49673	1.3409	1.6526
OKM Culture	19.128	152	.000	1.51656	1.3599	1.6732
OKM Process/ Technology	9.114	152	.000	.84248	.6599	1.0251
OKM	17.272	152	.000	1.28526	1.1382	1.4323

In addition to the above, responses from the sample of Malaysian managers have been summarised in Tables 4.3a1, 4.3b1 and 4.3c1, showing the frequencies and percentages of their responses towards OKM strategy (four issues/items), OKM culture (six issues/items) and OKM process/technology (six issues/items), respectively. In addition, Tables 4.3a2, 4.3b2 and 4.3c2 outline the mean and standard deviation values of the respondents' perceptions on the extent of OKM strategy, OKM culture and OKM process/technology, respectively, at their workplace. A narrative of the results is provided under the subsections of **Extent of OKM strategy**, **Extent of OKM culture** and **Extent of OKM process/technology**.

Extent of OKM strategy. Table 4.3a1 shows that over 87 percent of Malaysian managers acknowledge KM to be a core part of their organisational strategy (Q1), while over 88 percent recognise the purposeful identification of goals which improve organisational performance (Q2). In addition, almost 91 percent of survey respondents affirm the establishment of priorities for goals which improve organisational performance (Q3).

In contrast, the least affirmed OKM strategy issue pertains to Malaysian managers' perception on their organisation's ownership of strategies for the

implementation of external KM capabilities (Q4), securing only about 64 percent of the respondents' agreement. This marks a wide gap between the highest and lowest percentage values, where the highest (i.e. almost 91 percent for Q3) is over 42 percent more than the lowest (i.e. about 64 percent for Q4).

Table 4.3a1 **Frequency of responses to OKM Strategy issues/Items**

OKM Strategy issues/items	N	1-Strongly disagree; 2-Disagree; 3-Somewhat disagree; 4-Neither agree nor disagree; 5-Somewhat agree; 6-Agree; 7-Strongly agree						
		1	**2**	**3**	**4**	**5**	**6**	**7**
Q1. Managing knowledge is a core part of the organisation's strategy.	153	2 1.31%	1 0.65%	11 7.19%	5 3.27%	28 18.30%	56 36.60%	50 32.68%
		9.15% disagree			3.27% neutral	87.58% agree		
Q2. In managing knowledge, goals that improve organisational performance are purposely identified.	153	1 0.65%	1 0.65%	8 5.23%	8 5.23%	33 21.57%	73 47.71%	29 18.96%
		6.53% disagree			5.23% neutral	88.24% agree		
Q3. Priorities are established for addressing goals that improve organisational performance.	153	0 0%	0 0%	7 4.58%	7 4.58%	30 19.61%	60 39.21%	49 32.02%
		4.58% disagree			4.58% neutral	90.84% agree		
Q4. The organisation has strategies to implement its KM capabilities externally.	153	5 3.27%	11 7.19%	11 7.19%	28 18.30%	57 37.25%	30 19.61%	11 7.19%
		17.65% disagree			18.30% neutral	64.05% agree		

Besides being the OKM strategy-related issue that garnered the lowest percentage of 'agree' responses, Q4 also generated a relatively high rate of neutral responses (over 18 percent) compared to the amount of neutral responses received from the other questions (around 3 to 5 percent). A neutral response corresponds to "neither agree nor disagree", that is, the respondent either could not answer with certainty or did not wish to do so.

Table 4.3a2 Mean score for responses to OKM Strategy

OKM Strategy issue/item	N	Minimum	Maximum	Mean	Standard Deviation
Q1. Managing knowledge is a core part of the organisation's strategy.	153	1	7	5.77	1.30
Q2. In managing knowledge, goals that improve organisational performance are purposely identified.	153	1	7	5.65	1.11
Q3. Priorities are established for addressing goals that improve organisational performance.	153	3	7	5.90	1.05
Q4. The organisation has strategies to implement its KM capabilities externally.	153	1	7	4.67	1.42

While Table 4.3a1 had earlier exhibited the frequency and percentage of Malaysian managers' responses towards OKM strategy issues, Table 4.3a2 displays the mean score of those responses. Based on the former, the ranking of questions from the highest to the lowest percentage of 'agree' responses would be Q3 (90.84%), Q2 (88.24%), Q1 (87.58%) and Q4 (61.05%).

On the other hand, if rated according to their *mean scores*, then the ranking of the same questions would be Q3 (x = 5.90), Q1 (x = 77), Q2 (x = 65) and Q4 (x = 67). This means that although Q2 attracted a higher percentage of respondents who 'agree' with the issue, Q1 raked in a higher average rating on the seven-point Likert scale compared to that of Q2.

Other than the slight discrepancy in ranking by the different tables, Table 4.3a2 corroborates with the results of Table 4.3a1 in that, out of the four issues investigated under OKM strategy, the strongest issue Malaysian managers perceive at their workplace is Q3 - "*Priorities are established for addressing goals that improve organisational performance*", whereas the weakest KM issue is Q4 - "The organisation has strategies to implement its KM capabilities externally".

Extent of OKM culture. The results in Table 4.3b1 demonstrate that a large majority of survey respondents agree that six of the researched elements of OKM culture are present at their workplace. Over 80 percent believe that their organisations encourage them to make contributions to the organisation's knowledge (Q5) while more than 86 percent are aware of the corporate call to use the organisation's knowledge (Q6).

In addition, over 80 percent of Malaysian managers are able to discern their organisations' exhortation for employees to look for new ideas internally (Q7) whereas an excess of 86 percent perceive the organisation's endeavour to foster close employee-employee working relationships (Q8). Furthermore, almost 90 percent of the respondents affirm the organisation's strong culture of high work standards (Q9).

On the other hand, a slightly smaller number of Malaysian managers, i.e. almost 78 percent, agree that employees at their workplace actively use new ideas for

improving organisational performance (Q10). Even though 78 percent is not a low figure, Q10 constitutes the lowest scoring issue among the six culture-related items investigated.

Table 4.3b1 **Frequency of responses to OKM Culture issues/Items**

OKM Culture issues/items	N	1-Strongly disagree; 2-Disagree; 3-Somewhat disagree; 4-Neither agree nor disagree; 5-Somewhat agree; 6-Agree; 7-Strongly agree						
		1	**2**	**3**	**4**	**5**	**6**	**7**
Q5. Employees are actively encouraged to make contributions to the organisation's knowledge.	153	1 0.65%	5 3.27%	10 6.54%	14 9.15%	34 22.22%	52 33.99%	37 24.18%
		10.46% disagree			9.15% neutral	80.39% agree		
Q6. Employees are actively encouraged to use the organisation's knowledge.	153	0 0%	1 0.65%	9 5.88%	11 7.19%	44 28.76%	59 38.56%	29 18.96%
		6.53% disagree			7.19% neutral	86.28% agree		
Q7. Employees are actively encouraged to look for new ideas internally.	152	1 0.66%	6 3.95%	5 3.28%	18 11.84%	39 25.66%	64 42.11%	19 12.5%
		7.89% disagree			11.84% neutral	80.27% agree		
Q8. The organisation actively supports the formation of close working relationships among employees.	153	2 1.31%	2 1.31%	7 4.58%	10 6.54%	25 16.34%	66 43.14%	41 26.79%
		7.20% disagree			6.54% neutral	86.27% agree		
Q9. The organisation has a strong culture of performing work to a high standard.	152	1 0.66%	2 1.32%	5 3.28%	8 5.26%	33 21.71%	62 40.79%	41 26.98%
		5.26% disagree			5.26% neutral	89.48% agree		
Q10. Employees actively use new ideas to improve organisational performance.	152	0 0%	5 3.28%	11 7.24%	18 11.84%	44 28.95%	57 37.50%	17 11.19%
		10.52% disagree			11.84% neutral	77.64% agree		

It might be worthwhile at this juncture, to compare the responses between Q7 - "*Employees are actively encouraged to look for new ideas internally*" and Q10 - "*Employees actively use new ideas to improve organisational performance*". The total number of responses for these two questions are equal (N = 152) as well as the number of neutral answers received (n = 18; 11.84%). It is quite likely that these 18 non-committal respondents had noted the relationship between the two questions, and since they were unclear about the status of their organisational practice in relation to Q7, they were likewise uncertain about Q10.

In terms of whether a statistically significant correlation exists between questions 7 and 10, Table 4.3h in a later subsection of this chapter reveals the

correlation value to be 0.516, which is statistically significant at the 0.01 level (1-tailed). However, the other respondents who answered both questions 7 and 10 seemed to have perceived the difference between being "actively encouraged to <u>look for</u> new ideas" and "actively <u>use</u> new ideas" as the way they answered both questions were not similar. Overall, these respondents' agreement to Q7 (n = 122; 80.27%) was slightly higher than their agreement to Q10 (n = 118; 77.64%).

Table 4.3b2 **Mean score for responses to OKM Culture**

OKM Culture issue/item	N	Minimum	Maximum	Mean	Standard Deviation
Q5. Employees are actively encouraged to make contributions to the organisation's knowledge.	153	1	7	5.48	1.36
Q6. Employees are actively encouraged to use the organisation's knowledge.	153	2	7	5.56	1.10
Q7. Employees are actively encouraged to look for new ideas internally.	152	1	7	5.34	1.23
Q8. The organisation actively supports the formation of close working relationships among employees.	153	1	7	5.72	1.25
Q9. The organisation has a strong culture of performing work to a high standard.	152	1	7	5.76	1.15
Q10. Employees actively use new ideas to improve organisational performance.	152	2	7	5.24	1.22

Based on Table 4.3b1, the ranking of questions from the highest to the lowest percentage of 'agree' responses would be Q9 (89.48%), Q6 (86.28%), Q8 (86.27%), Q5 (80.39%), Q7 (80.27%) and Q10 (77.67%). However, if ranked according to their mean scores on the Likert scale, then the order of ranking would alter slightly as follows: Q9 (x = 76), Q8 (x = 72), Q6 (x = 56), Q5 (x = 48), Q7 (x = 34) and Q10 (x = 24). This means that although a higher number of respondents agree to the issue in Q6, the respondents generally put a higher Likert score for Q8 compared to Q6.

Apart from that minor variation in rankings, the results of Table 4.3b1 and Table 4.3b2 agree with each other in depicting that Malaysian managers perceive their OKM culture to be strong, with all the six issues investigated scoring a mean above 5, i.e. from the lowest at 5.24 to the highest at 5.76. Both tables also identify the weakest issue to be Q10 - *"Employees actively use new ideas to improve organisational performance"* and the strongest issue as Q9 - *"The organisation has a strong culture of performing work to a high standard"*.

Extent of OKM process/technology. Figures in Table 4.3c1 reveal a relatively low percentage of agreement among Malaysian managers towards the six OKM process/technology issues surveyed (between 58 percent and 75 percent). This is

in comparison to the findings for OKM strategy and OKM culture issues which produce affirmative response rates that are mostly in excess of 80 percent.

Less than 59 percent of Malaysian managers agree that their organisations assess the employees' contribution to knowledge resources (Q15), while again less than 59 percent think their organisations periodically conduct quality reviews of knowledge resources (Q16).

In addition, a consistently higher rate of neutral responses is noted for all the questions on OKM process/technology (14 percent to over 22 percent) compared to the neutral response rates for many of the questions on OKM strategy and OKM culture, which generally hovered below 10 percent.

Table 4.3c1 **Frequency of responses to OKM Process/Technology issues/Items**

OKM Process/Technology issues/items	N	1-Strongly disagree; 2-Disagree; 3-Somewhat disagree; 4-Neither agree nor disagree; 5-Somewhat agree; 6-Agree; 7-Strongly agree						
		1	2	3	4	5	6	7
Q11. Acknowledged subject matter 'experts' among employees are rewarded by the organisation for their expertise.	153	2 1.31%	7 4.58%	13 8.50%	23 15.03%	34 22.22%	59 38.56%	15 9.80%
		14.39% disagree			15.03% neutral	70.58% agree		
Q12. The organisation invests resources to ensure that its information can be trusted.	153	2 1.31%	7 4.58%	8 5.23%	22 14.38%	46 30.06%	53 34.64%	15 9.80%
		11.12% disagree			14.38% neutral	74.50% agree		
Q13. The organisation deliberately identifies optimal external practices.	152	1 0.66%	7 4.61%	14 9.21%	34 22.37%	42 27.63%	43 28.29%	11 7.23%
		14.48% disagree			22.37% neutral	63.15% agree		
Q14. Transferring optimal practices among employees is a formalised process in the organisation.	153	0 0%	11 7.19%	17 11.11%	30 19.61%	41 26.79%	44 28.76%	10 6.54%
		18.30% disagree			19.61% neutral	62.09% agree		
Q15. The organisation measures employees' contributions to its knowledge resources.	153	2 1.31%	13 8.50%	24 15.69%	24 15.69%	41 26.79%	37 24.18%	12 7.84%
		25.50% disagree			15.69% neutral	58.81% agree		
Q16. Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation.	153	5 3.27%	18 11.76%	14 9.15%	26 16.99%	35 22.88%	41 26.80%	14 9.15%
		24.18% disagree			16.99% neutral	58.83% agree		

Other OKM process/technology issues that yielded relatively low percentages of agreement include Q13 on the deliberate identification of optimal external practices (above 63 percent), and Q14 on the formal transfer of optimal practices among employees (slightly above 62 percent).

OKM process/technology issues that garnered relatively high affirmative scores were Q11 on the rewarding of acknowledged subject matter experts (over 70 percent), and Q12 on the investment of resources to ensure the reliability of organisational knowledge sources (over 74 percent).

Table 4.3c2 **Mean score for responses to OKM Process/Technology**

OKM Process/Technology issue/item	N	Minimum	Maximum	Mean	Standard Deviation
Q11. Acknowledged subject matter 'experts' among employees are rewarded by the organisation for their expertise.	153	1	7	5.07	1.38
Q12. The organisation invests resources to ensure that its information can be trusted.	153	1	7	5.10	1.31
Q13. The organisation deliberately identifies optimal external practices.	152	1	7	4.86	1.29
Q14. Transferring optimal practices among employees is a formalised process in the organisation.	153	2	7	4.78	1.34
Q15. The organisation measures employees' contributions to its knowledge resources.	153	1	7	4.62	1.48
Q16. Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation.	153	1	7	4.61	1.62

Using the criteria in Table 4.3c2, the ranking of OKM process/technology issues from the highest to the lowest attitudinal mean scores would thus be as follows: Q12 (x = 5.10), Q11 (x = 5.07), Q13 (x = 4.86), Q14 (x = 4.78), Q15 (x = 4.62) and Q16 (4.61). Compare this with the ranking according to the criterion in Table 4.3c1 earlier, which was based on the percentage of respondents' agreement to each issue: Q12 (74.50%), Q11 (70.58%), Q13 (63.15%), Q14 (62.09%), Q16 (58.83%) and Q15 (58.81%). It reveals that although more respondents agree with the issue in Q16 compared to the issue in Q15, yet respondents generated a higher attitudinal mean score for Q15 as compared to Q16.

Despite the small disparity in rankings, both tables show that, overall, the six issues investigated under OKM process/technology have weaker attitudinal mean scores ranging from 4.61 to 5.10, relative to the issues for OKM strategy and OKM culture,. Both Tables 4.3c1 and Table 4.3c2 confirm that the weakest perceived issue is Q16 - "*Periodically reviewing the quality of its knowledge*

resources is a formalised process in the organisation", while the highest is Q12 - "*The organisation invests resources to ensure that its information can be trusted*". Finishing a close second lowest is Q15 - "*The organisation measures employees' contributions to its knowledge resources*".

Range of survey responses. Overall, the results of the survey indicate a wide range of perceptions. Responses from 1 to 7 were received for all the KM issues except for issues number 3, 6, 10 and 14 which had a response range from 3 to 7 or 2 to 7. It may therefore be inferred that Malaysian organisations are in various stages of OKM practice, as reflected in the broad span of responses.

Nevertheless Q3 - "*Priorities are established for addressing goals that improve organisational performance*" is strongly subscribed to with a response range from 3 to 7, with only seven respondents answering "3 – somewhat disagree", another seven feeling neutral about the issue and the remaining 139 agreeing to the issue. The issue in Q3 also stands as having the strongest mean score among the 16 issues in the whole questionnaire.

Strongest OKM issues. The five OKM issues with the highest mean scores, as rated by Malaysian managers on the USQ-KMS-16, are as follows:

1) "*Priorities are established for addressing goals that improve organisational performance.*" (Q3; x = 5.90)
2) "*Managing knowledge is a core part of the organisation's strategy.*" (Q1; x = 5.77)
3) "*The organisation has a strong culture of performing work to a high standard.*" (Q9; x = 5.76)
4) "*The organisation actively supports the formation of close working relationships among employees.*" (Q8; x = 5.72)
5) "*In managing knowledge, goals that improve organisational performance are purposely identified.*" (Q2; x = 5.65)

Furthermore, two out of the five strong KM issues arise from OKM culture, corresponding to one-third of the six OKM culture issues being studied. Moreover, the mean scores of all the six items under OKM culture exceed 5, signifying that the culture of sharing and using knowledge at the workplace is quite prevalent among Malaysian managers. The additional fact that no OKM culture issue appears on the list of the five weakest OKM issues, lends further credence that Malaysian organisations have a fairly strong culture of KM.

Weakest OKM issues. The five OKM issues with the lowest mean scores, as rated by Malaysian managers on the USQ-KMS-16, are as follows:

1) "*Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation.*" (Q16; x = 4.61)
2) "*The organisation measures employees' contributions to its knowledge resources.*" (Q15; x = 4.62)
3) "*The organisation has strategies to implement its KM capabilities externally.*"
(Q4; x = 4.67)

4) *"Transferring optimal practices among employees is a formalised process in the organisation."* (Q14; x = 4.78)
5) *"The organisation deliberately identifies optimal external practices."* (Q13; x = 4.86)

Out of the abovementioned five lowest scoring items, four of them fall under OKM process/technology, accounting for two-thirds of the six OKM process/technology issues. Although Malaysian managers perceive that their organisations invest in resources to ensure that their information pool could be trusted (Q12), organisations in Malaysia appear to be lacking in two issues that were studied: the institutionalisation of formalised processes such as periodically reviewing the quality of their knowledge resources (Q16) and the measurement of employees' contributions to their knowledge resources (Q15).

Table 4.3d **Aggregated mean scores for responses to OKM dimensions**

Issue	N (Aggregated)	Minimum (Aggregated)	Maximum (Aggregated)	Mean (Aggregated)	Standard Deviation (Aggregated)
OKM Strategy	153	1.75	7	5.50	0.98
OKM Culture	153	2	7	5.52	0.98
OKM Process/ Technology	153	2	7	4.84	1.14

Table 4.3d shows that the aggregated mean scores for Malaysian managers' responses towards OKM strategy and OKM culture are very close, i.e. 5.50 and 5.52, respectively. On the other hand, the aggregated mean score for OKM process/technology trails at 4.84. The readings suggest that OKM process/technology is not as sufficiently established in Malaysian organisations as OKM strategy and OKM culture. Implications for the aforementioned findings will be discussed in Chapter 5.

4.3.2   Correlation of OKM dimensions

Research Issue 2: What are the relationships between the dimensions of OKM?

To address the abovementioned research issue, the following three hypotheses were formulated:

H1   :   There is a statistically significant positive relationship between OKM strategy and OKM culture.

H2   :   There is a statistically significant positive relationship between OKM strategy and OKM process/technology.

H3 : There is a statistically significant positive relationship between OKM culture and OKM process/technology.

The testing for these three hypotheses required the computation of the Pearson correlation values between the OKM dimensions (OKM strategy, OKM culture, OKM process/technology), as shown in Table 4.3e.

Table 4.3e Correlation among OKM dimensions

	OKM Strategy	OKM Culture	OKM Process/Tech
OKM Strategy	1	0.657	0.635
OKM Culture		1	0.771
OKM Process/Tech			1

The results of the hypothesis tests may be explained as follows:

H1 : There is a statistically significant positive relationship between OKM strategy and OKM culture.

Result: The Pearson correlation value was 0.657, i.e. significant at the 0.01 level (1-tailed). Therefore, H1 was accepted.

H2 : There is a statistically significant positive relationship between OKM strategy and OKM process/technology.

Result: The Pearson correlation value was 0.635, i.e. significant at the 0.01 level (1-tailed). Therefore, H2 was accepted.

H3 : There is a statistically significant positive relationship between OKM culture and OKM process/technology.

Result: The Pearson correlation value was 0.771, i.e. significant at the 0.01 level (1-tailed). Therefore, H3 was accepted.

In summary, the correlations between OKM strategy and OKM culture, OKM strategy and OKM process/technology, and OKM culture and OKM process/technology are established.

4.3.3 Impact of demographic characteristics on OKM practice

Research Issue 3: What are the relationships between managers' demographic characteristics and their perceptions of the three dimensions of OKM?

The aforementioned research issue sought to identify which among the eight demographic characteristics solicited from survey respondents have an impact on their perceptions of their organisation's OKM practice. To address the

research issue, Table 4.3f containing the Pearson correlation values of the eight demographic characteristics and three OKM dimensions, was constructed. From the raw data in Table 4.3f, only three out of the 24 possible correlations are found to be statistically significant. The three significant correlations are outlined, as follows:

Years of service in the organisation and OKM strategy. The Pearson correlation value between these two factors is 0.148, which is significant at the 0.05 level (1-tailed). Therefore, the number of years a manager has worked in an organisation has an impact on his or her perception of its OKM strategy.

The other seven demographic factors namely, gender, occupational role, years in current position, highest education completed, age, number of full-time employees in the organisation and industry classification of the organisation, do not display any correlation with OKM strategy.

Years of service in the organisation and OKM culture. The Pearson correlation value for these two factors is 0.200, which is significant at the 0.01 level (1-tailed). Therefore, the number of years a manager has worked in an organisation has an impact on his or her perception of its OKM culture.

Table 4.3f Correlation between demographic characteristics and OKM dimensions

		Gender	Organisa-tional occupa-tional role	Years of service with organisa-tion	Years of service in current position	Highest education completed	Age	No. of persons employed	Industry classifi-cation	OKM strategy	OKM culture	OKM process/ tech.
Gender	Pearson	1	.005	-.157*	-.151	-.166*	-.189*	.046	.191*	-.030	-.029	-.008
	Sig.		.475	.029	.035	.023	.011	.290	.012	.361	.365	.462
	N	146	146	146	145	146	145	146	141	146	146	146
Organisa-tional occupational role	Pearson	.005	1	-.015	-.096	-.276**	-.044	-.087	.207**	.082	.044	.082
	Sig.	.475		.427	.120	.000	.297	.143	.006	.157	.296	.158
	N	146	153	153	152	153	152	153	148	153	153	153
Years of service with organisation	Pearson	-.157*	-.015	1	.625**	-.082	.190**	.002	-.120	.148*	.200**	.077
	Sig.	.029	.427		.000	.157	.010	.489	.073	.034	.007	.171
	N	146	153	153	152	153	152	153	148	153	153	153
Years of service in current position	Pearson	-.151*	-.096	.625**	1	.135*	.218**	-.222**	-.105	.095	.174*	.063
	Sig.	.035	.120	.000		.049	.004	.003	.102	.123	.016	.222
	N	145	152	152	152	152	151	152	147	152	152	152
Highest education completed	Pearson	-.166*	-.276**	-.082	.135*	1	.086	-.118	.103	-.072	-.014	-.100
	Sig.	.023	.000	.157	.049		.146	.072	.107	.190	.431	.110
	N	146	153	153	152	153	152	153	148	153	153	153
Age	Pearson	-.189*	-.044	.190**	.218**	.086	1	.063	-.130	-.016	.019	-.079
	Sig.	.011	.297	.010	.004	.146		.220	.057	.421	.407	.167
	N	145	152	152	151	152	152	152	148	152	152	152
No. of persons employed	Pearson	.046	-.087	.002	-.222**	-.118	.063	1	-.158*	-.024	-.070	-.070
	Sig.	.290	.143	.489	.003	.072	.220		.027	.384	.194	.196
	N	146	153	153	152	153	152	153	148	153	153	153
Industry classification	Pearson	.191*	.207**	-.120	-.105	.103	-.130	-.158*	1	.104	.078	.080
	Sig.	.012	.006	.073	.102	.107	.057	.027		.105	.174	.166
	N	141	148	148	147	148	148	148	148	148	148	148
OKM strategy	Pearson	-.030	.082	.148*	.095	-.072	-.016	-.024	.104	1	.657**	.635**
	Sig.	.361	.157	.034	.123	.190	.421	.384	.105		.000	.000
	N	146	153	153	152	153	152	153	148	153	153	153
OKM culture	Pearson	-.029	.044	.200**	.174*	-.014	.019	-.070	.078	.657**	1	.771**
	Sig.	.365	.296	.007	.016	.431	.407	.194	.174	.000		.000
	N	146	153	153	152	153	152	153	148	153	153	153
OKM process/tech.	Pearson	-.008	.082	.077	.063	-.100	-.079	-.070	.080	.635**	.771**	1
	Sig.	.462	.158	.171	.222	.110	.167	.196	.166	.000	.000	
	N	146	153	153	152	153	152	153	148	153	153	153

*Correlation is significant at the 0.05 level (1-tailed)
**Correlation is significant at the 0.01 level (1-tailed)

Years in current position and OKM culture. The Pearson correlation value for these two factors is 0.174, which is significant at the 0.05 level (1-tailed). Therefore, the number of years a manager has held his or her current position has an impact on OKM culture. The other six factors namely, gender, occupational role, highest education completed, age, number of full-time employees in the organisation and industry classification of the organisation, do not show any correlation with OKM culture.

Correlation between demographics and OKM process/technology. None of the eight demographic factors – gender, occupational role, years of service in the organisation, years in current position, highest education completed, age, number of full-time employees in the organisation and industry classification of the organisation – exhibit any correlation with OKM process/technology.

4.3.4   Additional analyses

Besides the correlation analyses described in the previous subsections which were conducted in order to answer the research question/issues, other analyses were also made to see if any interesting trends or findings might emerge.

Correlation between demographic characteristics. To investigate the possibility of any meaningful correlation among the eight demographic characteristics, the Pearson correlation values for these eight factors were tabulated against one another. Table 4.3g shows the 28 possible correlation values among these eight demographic factors.

Out of these, three statistically significant correlations are observed. Firstly, the correlation between a manager's years of service with the organisation and his or her years in the current position is 0.625, which is highly statistically significant at the 0.01 level (1-tailed). Secondly, the correlation between the manager's years of service in the organisation and his or her age is 0.190, which is significant at the 0.01 level (1-tailed). Thirdly, the correlation between the number of years in the manager's current position and his or her age is 0.218, which is also significant at the 0.01 level (1-tailed).

Apart from the three aforementioned correlations, there does not appear to be any other statistically significant correlation between the demographic characteristics.

Table 4.3g   Correlation between demographic characteristics
(extracted from Table 4.3f)

	Gender	Organisational occupational role	Years of service with organisation	Years of service in current position	Highest education completed	Age	No. of persons employed	Industry classifi-cation
Gender	1	0.005	-0.157	-0.151	-0.166	-0.189	0.046	0.191
Organisational occupational role		1	-0.015	-0.096	-0.276	-0.043	-0.087	0.207
Years of service with organisation			1	0.625	-0.082	0.190	0.002	-0.120
Years of service in current position				1	0.135	0.218	-0.222	-0.105
Highest education completed					1	0.086	-0.118	0.103
Age						1	0.063	-0.130
Number of persons employed							1	-0.158
Industry classification								1

Correlation between KM issues/items. Having tested and shown that OKM strategy is related to OKM culture, OKM strategy is related to OKM process/technology and OKM culture is related to OKM process/technology, then more specifically, which of the issues are related to which other? Table 4.3h shows the outcome of the correlation analysis between all the KM issues in the 16-question research instrument. All the questions appear to be correlated with one another at a statistically significant level. However, only items which have correlation values of above 0.550 have been highlighted in blue for special attention, if warranted.

The high correlation values between questions 13 and 14 (R = 0.620), questions 13 and 15 (R = 0.583), questions 14 and 15 (R = 0.685), questions 14 and 16 (R = 0.701), and between questions 15 and 16 (R = 0.701) might partly account for why questions 13, 14, 15 and 16 were among the four questions in the 16-item questionnaire that consistently garnered low scores from survey respondents.

On the other hand, the high correlation values between questions 1 and 2 (R = 0.784), between questions 1 and 3 (R = 0.581), between questions 2 and 3 (R = 0.698), as well as between questions 8 and 9 (R = 0.628) might explain in part why questions 1, 2, 3, 8 and 9 were the five highest-scoring questions in the 16-question survey instrument.

Table 4.3h Correlation between KM issues/items
(Nos. 1 to 16)

1	1.000	0.784	0.581	0.433	0.496	0.404	0.233	0.394	0.416	0.401	0.330	0.464	0.429	0.460	0.563	0.466
2		1.000	0.698	0.371	0.480	0.470	0.296	0.415	0.453	0.431	0.368	0.413	0.360	0.434	0.535	0.480
3			1.000	0.310	0.473	0.579	0.366	0.436	0.511	0.355	0.364	0.428	0.381	0.422	0.431	0.389
4				1.000	0.532	0.384	0.380	0.412	0.360	0.473	0.301	0.432	0.472	0.365	0.405	0.266
5					1.000	0.689	0.659	0.644	0.538	0.675	0.481	0.486	0.441	0.573	0.569	0.512
6						1.000	0.556	0.591	0.627	0.419	0.477	0.481	0.483	0.568	0.495	0.531
7							1.000	0.552	0.457	0.516	0.496	0.441	0.436	0.498	0.498	0.419
8								1.000	0.628	0.538	0.572	0.463	0.467	0.534	0.546	0.449
9									1.000	0.549	0.476	0.571	0.580	0.512	0.538	0.493
10										1.000	0.583	0.583	0.483	0.541	0.513	0.468
11											1.000	0.689	0.473	0.592	0.537	0.479
12												1.000	0.653	0.646	0.609	0.529
13													1.000	0.620	0.583	0.456
14														1.000	0.685	0.706
15															1.000	0.706
16																1.000

KM Issue/Item (corresponding to questions in survey instrument)

OKM Strategy

No. 1: Managing knowledge is a core part of the organisation's strategy.
No. 2: In managing knowledge, goals that improve organisational performance are purposely identified.
No. 3: Priorities are established for addressing goals that improve organisational performance.
No. 4: The organisation has strategies to implement its KM capabilities externally.

OKM Culture

No. 5: Employees are actively encouraged to make contributions to the organisation's knowledge.
No. 6: Employees are actively encouraged to use the organisation's knowledge.
No. 7: Employees are actively encouraged to look for new ideas internally.
No. 8: The organisation actively supports the formation of close working relationships among employees.
No. 9: The organisation has a strong culture of performing work to a high standard.
No. 10: Employees actively use new ideas to improve organisational performance.

No. 11: Acknowledged subject matter 'experts' among employees are rewarded by the organisation for their expertise.
No. 12: The organisation invests resources to ensure its information can be trusted.
No. 13: The organisation deliberately identifies optimal external practices.
No. 14: Transferring optimal practices among employees is a formalised process in the organisation.
No. 15: The organisation measures employees' contributions to its knowledge resources.
No. 16: Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation.

Relationship between organisational occupational role and age, highest education completed, years of service and gender. Table 4.3i shows the regression analysis of 'Organisational Occupational Role' in relation to age, years of service with the organisation, highest education completed, and age. The results point towards a non-linear relationship observed between organisational occupational role (constant) and the four aforementioned demographic factors (independent variables) comprising age ($x1$), highest education completed ($x2$), years of service ($x3$) and gender ($x4$). This is reflective of the fact that the organisations represented in the survey appear to have fairly taken into consideration a broad range of factors when appointing a specific candidate for the organisational role.

Table 4.3i Regression (ANOVA) – Organisational Occupational Role

Model	Sum of squares	Degrees of freedom (df)	Mean square	F-statistic	Significance
Regression	8.957	4	2.239	3.248	0.014
Residual	96.532	140	0.690		
Total	105.490	144			

Regression coefficients of the sharing regression model

	B	Std Error	Beta	T-statistic	Significance
Constant	2.992	0.827		3.617	0.000
Gender	-0.124	0.237	-0.044	-0.523	0.602
Years of service with organisation	-0.025	0.055	-0.039	-0.460	0.646
Highest education completed	-0.214	0.060	-0.296	-3.579	0.000
Age	-0.10	0.096	-0.009	-0.105	0.916

Table 4.3j shows the regression analysis of the perceptions on OKM between groups (i.e. the subcategories under 'Organisational Occupational Role').

Table 4.3j1   Regression (ANOVA) – Perceptions on OKM between different groups of 'Organisational Occupational Role'

		Sum of Squares	df	Mean Square	F	Sig.
OKM Strategy	Between Groups	1.371	4	0.343	0.354	0.841
	Within Groups	143.378	148	0.969		
	Total	144.748	152			
OKM Culture	Between Groups	.952	4	0.238	0.243	0.914
	Within Groups	145.233	148	0.981		
	Total	146.185	152			
OKM Process/ Technology	Between Groups	3.889	4	0.972	0.739	0.567
	Within Groups	194.836	148	1.316		
	Total	198.725	152			
OKM (all three dimensions)	Between Groups	1.644	4	0.411	0.478	0.751
	Within Groups	127.126	148	0.859		
	Total	128.770	152			

In Table 4.3j1, the groups represented under 'Organisational Occupational Role' are 'Manager/Administrator', 'Professional', 'Associate Professional', 'Tradesperson' and 'Labourer/Related Worker'. The remaining four groups namely, 'Advanced Clerical/Service Worker', 'Intermediate Clerk, Sales or Service Worker', 'Intermediate Production or Transport Worker' and 'Elementary Clerical, Sales or Service Worker' are not represented in this study.

The insignificant F-ratios in Table 4.3j1 reveal that there is no difference in how survey respondents from the five different occupational groups perceive OKM – whether OKM strategy only, OKM culture only, OKM process/technology only or all the three OKM dimensions collectively.

Table 4.3j2   Regression (ANOVA) – Perceptions on OKM between groups having different 'Years of Service with the Organisation'

		Sum of Squares	df	Mean Square	F	Sig.
OKM (all three dimensions)	Between Groups	5.1703292	4	1.292582302	1.547761557	0.191388018
	Within Groups	123.59926	148	0.835130125		
	Total	128.76959	152			

From the figures in Table 4.3j2, there appears to be no significant difference in how respondents possessing different 'Years of Service with the Organisation' perceive OKM at their workplace.

Table 4.3j3 Regression (ANOVA) – Perceptions on OKM between groups with different 'Years of Service in the Current Position'

		Sum of Squares	df	Mean Square	F	Sig.
OKM (all three dimensions)	Between Groups	4.3889912	4	1.097247804	1.303293024	0.271516162
	Within Groups	123.75991	147	0.841904149		
	Total	128.1489	151			

The results from Table 4.3j3 indicate no significant difference in how respondents with different 'Years of Service in the Current Position' perceive OKM at their workplace.

Table 4.3j4 Regression (ANOVA) – Perceptions on OKM between groups of different 'Age'

		Sum of Squares	df	Mean Square	F	Sig.
OKM (all three dimensions)	Between Groups	0.261804	3	0.087268001	0.100718483	0.959488914
	Within Groups	128.23529	148	0.866454682		
	Total	128.4971	151			

The computation in Table 4.3j4 reveals no evidence of any significant difference in how respondents from different 'Age' groups perceive OKM.

Table 4.3j5 Regression (ANOVA) – Perceptions on OKM between groups with different 'Highest Educational Qualification'

		Sum of Squares	df	Mean Square	F	Sig.
OKM (all three dimensions)	Between Groups	3.8510429	7	0.550148989	0.638588959	0.723372939
	Within Groups	124.91854	145	0.861507205		
	Total	128.76959	152			

Similarly, the results from Table 4.3j5 show no significant difference in how respondents with different 'Highest Educational Qualification' perceive OKM.

Impact of company size on extent of OKM practice. Table 4.3k1 shows the correlation between company size and the extent of OKM practice segregated according to the individual dimensions of OKM strategy, OKM culture and OKM process/technology. The results do not provide evidence for statistically significant correlations between the size of a company and the extent of its OKM practice, whether in OKM strategy, culture or process/technology. The size of their organisation is categorised according to the following criteria:

Small   : Less than 50 full-time employees
Medium   : From 50 to 149 full-time employees
Large   : From 150 and above full-time employees

The rationale of delineating large companies as those with at least 150 full-time employees is based on the definition by the Malaysian Small and Medium Industries Development Corporation (SMIDEC) that SMEs refer to companies with less than 150 full-time employees (www.smidec.gov.my).

Table 4.3k1 Correlation of Company Size with extent of OKM

		Company Size
OKM Strategy	Pearson Correlation	-0.035
	Sig. (2-tailed)	0.669
	N	153
OKM Culture	Pearson Correlation	-0.047
	Sig. (2-tailed)	0.563
	N	153
OKM Process/Technology	Pearson Correlation	-0.074
	Sig. (2-tailed)	0.361
	N	153

Next, Table 4.3k2, contains the mean scores of survey respondents, which have been tabulated according to the size of their organisations.

Table 4.3k2 **Mean scores of responses by Company Size**

OKM issue	Small			Medium			Large		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Q1-Managing knowledge is a core part of the organisation's strategy.	53	5.83	1.17	25	5.72	1.43	75	5.75	1.35
Q2-In managing knowledge, goals that improve organisational performance are purposely identified.	53	5.83	1.05	25	5.44	1.26	75	5.60	1.10
Q3-Priorities are established for addressing goals that improve organisational performance.	53	6.02	1.17	25	5.68	0.80	75	5.88	1.04
Q4-The organisation has strategies to implement its KM capabilities externally.	53	4.57	1.70	25	4.80	1.26	75	4.69	1.26
Q5-Employees are actively encouraged to make contributions to the organisation's knowledge.	53	5.60	1.51	25	5.40	1.41	75	5.41	1.23
Q6-Employees are actively encouraged to use the organisation's knowledge.	53	5.68	1.12	25	5.48	1.19	75	5.49	1.06
Q7-Employees are actively encouraged to look for new ideas internally.	52	5.50	1.48	25	4.92	1.55	75	5.37	0.87
Q8-The organisation actively supports the formation of close working relationships among employees.	53	5.85	1.18	25	5.52	1.48	75	5.69	1.23
Q9-The organisation has a strong culture of performing work to a high standard.	53	5.77	1.34	25	5.48	1.29	74	5.85	0.93
Q10-Employees actively use new ideas to improve organisational performance.	53	5.30	1.37	25	5.16	1.31	74	5.22	1.08
Q11-Acknowledged subject matter 'experts' among employees are rewarded by the organisation for their expertise.	53	5.36	1.33	25	4.88	1.36	75	4.93	1.40
Q12-The organisation invests resources to ensure that its information can be trusted.	53	5.15	1.49	25	4.92	1.29	75	5.13	1.19
Q13-The organisation deliberately identifies optimal external practices.	53	4.91	1.52	24	4.54	1.25	75	4.92	1.12
Q14-Transferring optimal practices among employees is a formalised process in the organisation.	53	4.91	1.50	25	4.80	1.41	75	4.69	1.21
Q15-The organisation measures employees' contributions to its knowledge resources.	53	4.83	1.54	25	4.32	1.70	75	4.57	1.35
Q16-Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation.	53	4.81	1.73	25	4.52	1.83	75	4.51	1.46

Extracting the relevant figures from Table 4.3k2, Table 4.3k3 shows the aggregated mean scores of respondents from companies of different size, segregated according to OKM strategy, OKM culture and OKM process/technology.

Table 4.3k3 **Mean scores of responses by Company Size and OKM dimensions** *(extracted from Table 4.3k1)*

OKM issue	Small (N = 53)		Medium (N = 25)		Large (N = 75)	
	Aggregated Mean	Averaged Mean	Aggregated Mean	Averaged Mean	Aggregated Mean	Averaged Mean
OKM Strategy	22.25	5.56	21.64	5.41	21.92	5.48
OKM Culture	33.70	5.62	31.96	5.33	33.03	5.51
OKM Process/ Technology	25.06	4.18	27.98	4.66	28.75	4.79

Despite the lack of correlation noted in the previous Table 4.3k1, the results in Table 4.3k3 suggest otherwise. Using the mean scores of respondents' answers, the extent of OKM process/technology shows a proportionate increase with company size. On the other hand, OKM strategy and OKM culture appears consistently high among respondents from all companies regardless of size.

4.4 Summary of findings

Apart from the discussion of findings on the extent on OKM practice at the Malaysian workplace which was presented in section 4.3 earlier, this section provides a summary of the other findings in this research. Here, Table 4.4a shows an overview of the primary findings which arose from the accepted hypothesis tests conducted, whereas Table 4.4b shows some of the secondary or incidental findings from the study. The implications of the main findings are discussed in Chapter 5.

Table 4.4a **Summary of research findings (primary)**

Issue investigated	Value of Test Statistic	Inference
Research Issue 1: Extent of OKM in Malaysia What are the strongest OKM factors among managers in Malaysia?	Q3; x=5.90 Q1; x=5.77 Q9; x=5.76 Q8; x=5.72 Q2; x=5.65	*Five strongest OKM factors:* Q3: Priorities for addressing goals that improve organisational performance Q1: Core part of organisation's strategy Q9: Strong culture of performing work to a high standard Q8: Formation of close working relationships among employees Q2: Goals for organisational performance purposely identified
What are the weakest OKM factors among managers in Malaysia?	Q16; x=4.61 Q15; x=4.62 Q4; x=4.67 Q14; x=4.78 Q13; x=4.86	*Five weakest OKM factors:* Q16: Periodic review of quality Q15: Measures contributions Q4: Strategies to implement KM capabilities externally Q14: Transfers optimal practices Q13: Identifies optimal external practices
Research Issue 2a: Is OKM strategy correlated to OKM culture?	R=0.657**	OKM strategy is strongly related to OKM culture at the 1% level.
Research Issue 2b: Is OKM strategy correlated to OKM process/technology?	R=0.635**	OKM strategy is strongly correlated to OKM process/technology at the 1% level.
Research Issue 2c: Is OKM culture correlated to OKM process/technology?	R=0.771**	OKM culture is strongly correlated to OKM process/technology at the 1% level.
Research Issue 3: Which among the eight demographic characteristics solicited from survey respondents have a correlation with: • OKM strategy • OKM culture • OKM process/technology?	R=0.148*	Years of service with the organisation is correlated to OKM strategy at the 5% level.
	R=0.200**	Years of service with the organisation is strongly correlated to OKM culture at the 1% level.
	R= 0.174*	Years of service in one's current position is correlated to OKM culture at the 5% level.

Table 4.4b **Summary of additional analyses**

Issue concerned	Value of Test Statistic	P-Value	Inference
Is there any correlation between any two of the eight demographic characteristics solicited from survey respondents?	R=0.625**	0.01	Years of service in the organisation and years in one's current position are related. [Refer to Table 4.3g.]
	R=0.190**	0.01	Years of service in the organisation and one's age are related. [Refer to Table 4.3g.]
	R=0.218**	0.01	Years of service in the organisation and one's highest education completed are related. [Refer to Table 4.3g.]
Is there any relationship between organisational occupational role (Y) and the independent variables: age (x1), highest education completed (x2), years of service (x3) and gender (x4)?	F=3.248 R=0.291 R^2=0.085 t=3.617	0.014	There is a non-linear relationship between them, i.e. organisational occupational role is dependent on one's age, years of service, education and gender collectively. [Refer to Table 4.3i.]
Any difference in how groups of different 'Organisational Occupational Role' perceive OKM strategy?	F=0.354	0.841	No difference in how groups of different 'Organisational Occupational Role' perceive OKM strategy. [Refer to Table 4.3j1.]
Any difference in how groups of different 'Organisational Occupational Role' perceive OKM culture?	F=0.243	0.914	No difference in how groups of different 'Organisational Occupational Role' perceive OKM culture. [Refer to Table 4.3j1.]
Any difference in how groups of different 'Organisational Occupational Role' perceive OKM process/technology?	F=0.739	0.567	No difference in how groups of different 'Organisational Occupational Role' perceive OKM process/technology. [Refer to Table 4.3j1.]
Any difference in how groups of different 'Organisational Occupational Role' perceive OKM dimensions collectively?	F=0.478	0.751	No difference in how groups of different 'Organisational Occupational Role' perceive OKM (i.e. all 3 dimensions)? [Refer to Table 4.3j1.]
Any difference in how groups of different 'Years of Service with the Organisation' perceive OKM?	F=1.548	0.191	No difference in how groups of different 'Years of Service with the Organisation' perceive OKM. [Refer to Table 4.3j2.]

Issue concerned	Value of Test Statistic	P-Value	Inference
Any difference in how groups of different 'Years of Service in the Current Position' perceive OKM?	F=1.303	0.271	No difference in how groups of different 'Years of Service in the Current Position' perceive OKM. [Refer to Table 4.3j3.]
Any difference in how different 'Age' groups perceive OKM?	F=0.101	0.959	No difference in how different 'Age' groups perceive OKM. [Refer to Table 4.3j4.]
Any difference in how groups of different 'Highest Educational Qualification' perceive OKM?	F=0.639	0.723	No difference in how groups of different 'Highest Educational Qualification' perceive OKM. [Refer to Table 4.3j5.]
Is there any correlation between company size and extent of OKM strategy?	R=-0.035	0.669	No correlation emerged from the computation, but an observation of the mean scores shows a proportionate increase of company size with OKM process/technology. [Refer to Tables 4.3k1, 4.3k2 and 4.3k3.]
Is there any correlation between company size and extent of OKM culture?	R=-0.047	0.563	
Is there any correlation between company size and extent of OKM process/technology?	R=-0.074	0.361	

4.5 Chapter summary

Chapter 4 began with section **4.1 Demographic profile of the sample** which outlined the profile of respondents according to their gender, organisational occupational role, years of service in the organisation, years in current position, highest educational qualification completed, age, number of full-time employees in organisation and industry classification.

Next, section **4.2 Construct validity and reliability of USQ KMS-16** showed the results of factor analysis as well as the outcome of reliability tests using the Cronbach's Alpha coefficient and the split half approach, both of which yielded high reliability values exceeding 0.8. Following this, section **4.3 Results** explained the results of the survey in relation to the three research issues, namely **4.3.1 Extent of OKM practice**, **4.3.2 Correlation of OKM dimensions** and **4.3.3 Impact of demographic characteristics on OKM practice.** Additional analyses that were secondary to the research issues investigated were also computed and explained in section **4.3.4 Additional analyses.**

Finally, an overview of the study's data analysis was presented in section **4.4 Summary of findings**. Besides the main or primary findings of the research, some additional findings were also documented. Implications of the findings were not discussed in this chapter but relegated to Chapter 5.

CHAPTER 5   DISCUSSION AND CONCLUSIONS

The research problem addressed by this study was as follows:

What is the extent of KM practice in organisations in Malaysia?

In relation to the research problem, three research issues were analysed:

RI 1: *What is the extent of KM practice in organisations in Malaysia as perceived by managers at their workplace?*

RI 2: *What are the relationships between the dimensions of OKM?*

RI 3: *What are the relationships between demographic characteristics and the managers' perceptions of the three dimensions of OKM?*

The theoretical framework for this study was based on organisational knowledge management theory and the proposition that OKM is a multidimensional construct which can be defined by three components namely strategy, culture and process/technology.

The purpose of this chapter is to discuss and integrate the research findings from the Results chapter, and then discusses the implications of the study in terms of its contributions to theory, policy and practice. The chapter rounds off with some suggestions for further research in the future.

5.1   Contributions to theory

As the primary purpose of this study was to investigate the extent of KM practice in Malaysia, research question consisted of three key research issues: Firstly, the extent of OKM practice as perceived by managers, using a multidimensional KM scale that assesses OKM strategy, culture and process/technology; secondly, the relationships between the dimensions of OKM strategy, culture and process/technology; and thirdly, the relationships between the demographic characteristics of managers and their perceptions of their organisations' KM strategy, KM culture and KM process/technology. The following sections present a review of the implications of the study's findings, the extent to which other research have been confirmed and the identification of new insights into OKM.

5.1.1   Extent of OKM practice and its implications

Extent of OKM strategy. The results of this study confirm that managers acknowledge KM to be a core part of their organisational strategy, recognise the purposeful identification of goals which improve organisational performance and affirm the establishment of priorities for goals which improve organisational performance. These findings concur with extant literature which positions

knowledge as a strategic resource (Clarke 2001) and knowledge sharing as a strategic tool (Skyrme 1997), and which contends that KM initiatives need to be integrated with business strategy in order to succeed (Clarke 2001) or that for KM to be really effective, knowledge sharing has to be made a direct part of the organisation's business strategy (McDermott & O'Dell 2001).

On some strategy questions, the managers' neutral responses imply that certain aspects of organisational practice might not have been made clear to employees or that particular practices had not been formalised in the organisation, but the managers had given the organisation the benefit of the doubt. Such a scenario is not surprising in the Malaysian context, amid a culture of conflict-avoidance where people prefer to avoid confrontation and would rather overlook or accept a problematic area than to raise it up and cause conflict and other repercussions (Asma 1996). In addition, a respect for authority in the Malaysian culture of high power distance index (Hofstede 2003) tend to make employees reluctant to highlight what could be perceived as the shortcomings of their superiors or leaders.

The results of the survey also indicate that while organisations in Malaysia have an OKM strategy in place, their OKM strategy tends to be more inward-looking and might therefore lack the element of collaboration or fostering strategic KM alliances with external parties that could further enhance their KM capabilities. Organisations in Malaysia should address their shortcomings in the area of external collaboration which can, for instance through electronic linkages to external resources, enable employees to access new ideas, information and expertise not available internally or locally (Wasko & Faraj 2005). Not enabling external collaboration may isolate employees from valuable knowledge flows and reduce their efficacy (Anand, Manz & Glick 2002 cited in Wasko & Faraj 2005).

Extent of OKM culture. This study finds that Malaysian managers perceive their OKM culture to be strong. These mature age managers and professionals in Malaysian organisations confirm that their organisations a) encourage them to make contributions to the organisation's knowledge, b) use the organisation's knowledge, c) look for new ideas internally, d) foster close employee-employee working relationships, e) have a strong culture of high work standards and that f) employees at their workplace actively use new ideas for improving organisational performance. These results vouch that a strong, positive organisational culture which promotes learning, development and the sharing of skills, resources and knowledge (Bollinger & Smith 2001) is a key component of OKM. The survey findings also affirm the dynamics of other OKM elements pertaining to culture, namely the process of socialisation (Nonaka & Takeuchi 1995), the sharing of knowledge as a natural, on-going part of work (Cothrell & Parcell 2006) and the synergy and collaborative efforts of employees (Sveiby & Simons 2002).

From this study, it is seen that although a large number of organisations in Malaysia espouse the solicitation of new ideas as a policy, when it comes to practice or application, there are fewer actual instances of employees actively using those new ideas. However, the difference between the former and the latter

instances is this sample is only about 3 percent. Nevertheless, further research is recommended if there is interest in investigating the possible causes or moderating factors of this phenomenon of the inability to use new ideas although ideas have been generated. It concerns the area of organisational learning capability, where sometimes idea generation fails to progress to idea generalisation, i.e. diffusing generated ideas throughout the organisation and applying them, due to the organisation's learning disabilities (Yeung, Ulrich, Nason & Von Glinow 1999).

Although it is recognised that a knowledge sharing culture needs to be considered with organisational culture as well as the people's culture (Lichtenstein & Brain 2006 cited in Liebowitz 2008), the USQ KMS-16 did not directly assess national culture or the subcultures that exist in a multiethnic society like Malaysia, but rather the instrument assessed OKM Culture as a complex construct. Further, the survey instrument did not explicitly assess whether communities of practice (Cothrel & Williams 1999; Wenger, McDermott & Snyder 2002) operated in these companies or whether virtual teams were used (Behrend & Erwee 2007). In addition, after-action reviews (Baird & Henderson 2001; Gurteen 2004) were also not explicitly identified in the survey instrument to assess the specific approach in knowledge sharing. Also absent in the Malaysian study was the articulation of whether the networks that facilitated sharing were formal or informal (Awazu 2004; Handzic & Chaimungkalnont 2004). Nevertheless, these items offer potential for future research.

Extent of OKM process/technology. There is less agreement among Malaysian managers and professionals about OKM process/technology issues. However there were certain positive practices, namely the rewarding of acknowledged subject matter experts and investment of resources to ensure the reliability of organisational knowledge sources.

In general, Malaysian managers are concerned that organisations do not regularly assess the employees' contribution to knowledge resources or conduct quality reviews of knowledge resources. Instead, corporate boards should perform formal reviews of their organisations' approaches towards managing intellectual capital, formulate proactive strategies for generating greater value from it and have in place appropriate incentive systems (Coulson-Thomas 2006 cited in www.prweb.com). As a corollary, if there is no formal periodic review on the organisation's knowledge resources, then any existing practice of contributing to the organisation's knowledge might backfire instead, resulting in a collection of knowledge whose authenticity or reliability is not subject to checks and controls.

It is not clear whether Malaysian organisations implement best practices in OKM process/technology as exhorted by Bollinger and Smith (2001), Gurteen (2004) and Hansen et al. (2000). Although the survey questions pertaining to these issues garnered low affirmation by the respondents, the questions were phrased in such a way that it might still be possible that Malaysian organisations widely implement best practices, but on an informal basis. Nevertheless, the lack of formality in implementing best practices is of concern in this study as casual

or ad-hoc implementation does not assure reliability and intelligent application (Blackman, Connelly & Henderson 2004). A curious observation is that while subject matter experts are acknowledged and rewarded, there is no measurement of employees' contribution to knowledge resources. So the following questions arise: Why is it that only acknowledged subject matter experts are rewarded and other employees are not? On what basis does the organisation disburse rewards if no measurement of contribution is performed?

Overall, the results show a relatively high rate of neutral or non-committal responses. This suggests that OKM process/technology issues might not have been explicitly shared with employees and hence, their uncertainty of whether such a practice or policy existed. Another interpretation could be that such a practice did not yet exist in the organisation but the respondents were hesitant to divulge this perceived weakness, as is typical of the 'face-saving' mentality prevalent in the Malaysian culture (Asma 1996).

Summary of OKM in Malaysia. Organisations in Malaysia are in various stages of their OKM practice. While KM is widely recognised and practised in Malaysia, the results suggest that OKM process/technology is not as sufficiently established in Malaysian organisations as OKM strategy and OKM culture. These findings corroborate with those of another Malaysian survey conducted on 1,813 companies across 10 manufacturing sectors and eight service industries to assess each organisation's level of knowledge content, based on 21 high-powered variables which reflect knowledge enablers and actions (Ida 2008). The results of that 2003 study showed that Malaysian organisations performed well in knowledge utilisation, moderately well for knowledge sharing and knowledge acquisition, though they were relatively weaker in knowledge generation.

A summary of both the five strongest and the five weakest KM issues perceived by Malaysian managers in the current study will be discussed here. To begin, the five strongest KM issues identified at the workplace are as follows:

i)   Priorities for addressing goals that improve organisational performance (OKM Strategy issue);
ii) Managing knowledge as a core part of organisational strategy (OKM Strategy issue);
iii) Strong culture of performing work to high standards (OKM Culture issue);
iv) Active organisational support for formation of close working relationships among employees (OKM Culture issue); and
v)   Purposeful identification of goals that improve organisational performance (OKM Strategy issue).

Out of the five strongest OKM issues identified, three of them pertain to OKM strategy, accounting for three-quarters of the four OKM strategy issues. The strategic drive towards becoming a knowledge-based society in Malaysia was initiated in 1996, a move that was marked by the establishment of the Multimedia Super Corridor, better known as the MSC, and which is managed by the Multimedia Development Corporation or MDec (Ida 2008).

Furthermore, the areas of strengths revealed in this study are not surprising, given the Malaysian spirit of *gotong-royong* (communal cooperation) which is entrenched in the local culture. In addition, the spirit of *muhibbah* (racial harmony) – evident in the Malaysian custom of celebrating festive occasions which unifies the country's diverse ethnic groups – naturally cultivates close rapport among groups through social interaction or socialisation, and is hence extended in the corporate context, requiring no external coercion. The different cultural dimensions in a community have been found to moderate employee attitudes or work behaviour (Kirkman, Lowe & Gibson 2006); hence, employees' values and cultural preferences have been found to significantly affect the success of a KM system in a specific region or country (Ardichvili, Maurer, Li, Wentling & Stuedmann 2006 cited in Liebowitz 2008), in that business performance tends to be better when management practices are in line with national culture (Newman & Nollen 1996).

The five weakest KM issues perceived by Malaysian managers at their workplace are as follows:

i) Formalised periodic review of the quality of organisational knowledge resources (OKM Process/Technology issue);
ii) Measurement of employees' contributions to organisational knowledge resources (OKM Process/Technology issue);
iii) Organisational strategies to implement KM capabilities externally (OKM Strategy);
iv) Formal transfer of optimal practices among employees; (OKM Process/Technology issue) and
v) Deliberate identification of optimal external practices (OKM Process/Technology issue).

A striking observation is that four-fifths of the weakest KM issues correspond to two-thirds of the 'OKM Process/Technology' issues. Despite demonstrating adequate elements of OKM strategy and OKM culture, organisations in Malaysia generally lack formalised processes and/or the supporting technology in their KM initiatives.

To explore if the perceived prevalence of a marked weakness in OKM process/technology among Malaysian organisations had any implications, a comparison was made with an earlier study by Chong (2006 cited in Ida 2008). In Chong's survey, middle-level managers of ICT companies in Malaysia's MSC were asked to assess the importance of KM in relation to the implementation of KM factors such as KM leadership, performance management et cetera. The outcome of that 2006 study was the identification of a significant gap between the perceived importance of KM and degree of implementation of KM factors. In other words, there was a gap between 'knowing' and 'doing'. The implication is that Malaysians managers are good at 'knowing' the organisation's business and performance objectives (OKM strategy), but that there exists a general lack in the 'doing' part which needs to be driven by the employer or top management level (OKM process/technology). As for OKM culture, it is also about 'doing' but it is more closely associated with 'doing' which is mainly sustained by the employees themselves. This observation is

supported by the findings in a survey on Malaysian public sector agencies, where 60 percent of the 38 responding agencies reported the lack of a policy to encourage knowledge dissemination although 53 percent of them acknowledged there was management support for disseminating knowledge (Tan, Mohammad & Abdul Razak 2005).

The conclusion is that organisations in Malaysia need to take greater ownership of KM rather than merely cascade the strategy downwards and pass the day-to-day responsibility of knowledge sharing and knowledge dissemination largely, if not solely, to employees to drive it. Instead, the management or the employer must support the employees' efforts through institutionalised initiatives comprising enforceable, formal processes backed by enabling technological resources, where relevant. Although building a KM culture requires allowing employees to enjoy a certain level of informality to enable the free exchange of knowledge (Skyrme 1997), this must not be confused with <u>not</u> having formal processes in place. Moreover, when employees serendipitously discover a better way of getting something done in the course of their work, the reliable process deserves formal acknowledgement and standing in the organisation, otherwise it will remain an accidentally true belief (Blackman, Connelly & Henderson 2004) that might not receive the rightful attention it warrants.

Furthermore, it is possible for an organisation to have many good practices being adhered to, without the organisation having formalised those practices. So the identification of weak OKM process/technology by Malaysian managers is not necessary an allegation that their organisations do not <u>know</u> about those processes, but rather it is about not formalising them. Organisations must understand that processes which connect people should be firmly in place in order to prevent the loss of tacit knowledge and the costs associated with that loss, when an employee leaves the company (Barth 2000; Biren, Dutta & van Wassenhove 2000; Skyrme 1997). On the other hand, when employees do leave the company, new employees should be inducted to jumpstart their learning curve instead of expecting them to solely depend on information systems which cannot effectively transfer the premium value of knowledge (Prusak 2001).

5.1.2 Interrelations of OKM dimensions and its implications

An investigation of the second research issue in the current study shows that OKM strategy, OKM culture and OKM process/technology are all correlated. To illustrate the study's finding on the correlation between the three dimensions of OKM is the Tripartite OKM Model in Figure 5.1, as follows:

Figure 5.1   **Relationship between OKM Strategy, OKM Culture and OKM Process/Technology: The Tripartite OKM Model**
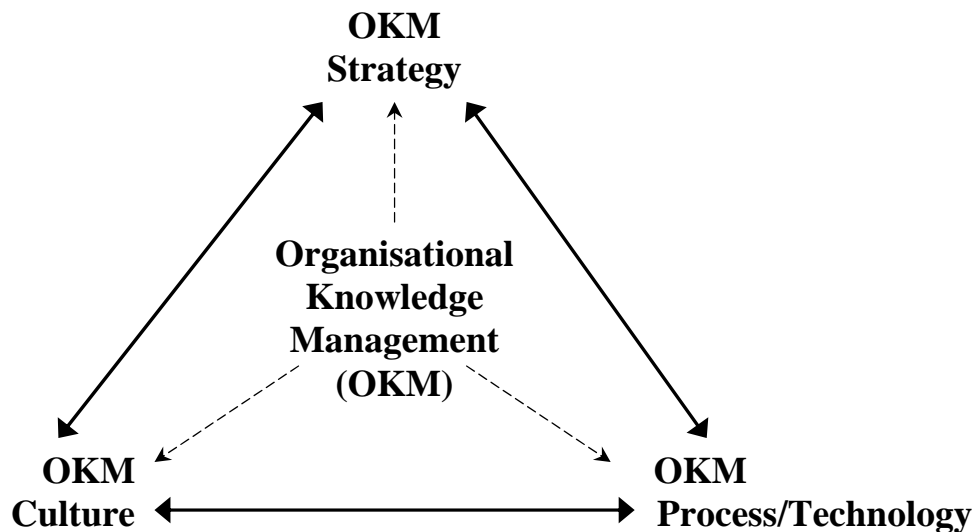
Legend

⟶   represents "has an impact on", according to the direction of the arrow

--------→   represents "is made up of", according to the direction of the arrow

(Source: Skadiang 2008; developed for the study)

The correlations between OKM strategy, OKM culture and OKM process/technology demonstrate that the three dimensions of OKM are not mutually exclusive as contended by Erwee et al (2007), Reynolds (2003) and Skadiang (2004). It also corroborates a case study finding by Lichtenstein and Brain (2006 cited in Liebowitz 2008) that a knowledge sharing culture cannot be contemplated remotely from organisational culture, organisational strategy and organisational structure. Further support comes from Bhatt (2001) who asserts that it is the interaction of different elements rather than an individual element per se which impacts KM, although Bhatt discerns those elements differently, as people, technology and techniques. This confirms that the USQ OKM survey measures a multidimensional construct where each dimension has the potential to affect the others.

However, although two of those dimensions, OKM strategy and OKM culture, show evidence of being in place within Malaysian organisations, the third dimension, OKM process/technology, is perceived as weak and must be judiciously addressed according to the nature of the organisation's business, to avoid a strain on the other two dimensions. Where the business is of non-routine nature, organisations should implement more effective personalisation strategies to establish processes that connect the right people for better knowledge transfer (e.g. apprenticeship, brainstorming sessions, one-on-one conversations and shadowing of managers) with less emphasis on sophisticated technology;

whereas if the business is routine in nature with frequent reuse of knowledge, then it warrants greater technological support (e.g. knowledge objects and linked databases), for the codification of organisational knowledge (Hansen et al. 2000). Overall, the practical implication is that when organisations implement a KM initiative, they need to holistically address the dimensions of strategy, culture and process/technology rather than tackle the issues piecemeal. For instance, organisations should not narrowly focus on investing in state-of-the-art IT infrastructure and neglect the people or cultural factor.

5.1.3 Relationships between demographic characteristics and perceptions of OKM practice and implications

Years of service in organisation and OKM strategy/culture. An analysis of the demographic factors solicited in this study on OKM practice, reveals that the number of years of a manager's service with the organisation has a positive impact on its OKM strategy and OKM culture. This means that a longer serving manager at a particular organisation is better poised to discern, appreciate and implement its OKM strategy and culture, since knowledge is not a standalone object but rather work-in-progress that is associated with both its current and historical context and processes (Maaninen-Olsson, Wismén & Carlsson 2008).

Although the aforementioned findings might appear intuitive, it is important to confirm through formal research that in Malaysia, managers with greater years of service are more attuned towards their organisation's OKM strategy and OKM culture. Where OKM strategy is concerned, this might be attributed to the managers' lengthier tenure at their organisations, which predisposes them to be more adept at strategic KM practices such as capturing knowledge, adding value to accumulated knowledge and setting up mechanisms for the use and re-use of beneficial knowledge (Perez & de Pablos 2003). Where OKM culture is concerned, it could be due to these longer serving managers' familiarity with organisational matters (Figallo & Rhine 2002; Orlikowski 1993; Valley et al. 1995 cited in Williams et al. 1998), the trust nurtured among colleagues and associates (Appelbaum et al. 2000 cited in Pfeffer & Hinds 2001; Behrend & Erwee 2007; Bollinger & Smith 2001; Figallo & Rhine 2002; Lake & Erwee 2005) and the social networks (Awazu 2004; Behrend & Erwee 2007; Lake & Erwee 2005; Malhotra 1999) built over the years that facilitate collaboration and synergy (Sveiby & Simons 2002). These findings also lend credence to one of HR's best practices, that organisations should endeavour to retain their talent, to which KM literature also attests that a huge part of the corporation's tacit knowledge resides in its workers (Biren, Dutta & van Wassenhove 2000; Barth 2000).

Years of service in current position and OKM culture. The number of years a manager has spent in his or her current position positively impacts OKM culture. The implication is that a manager with greater experience in a specific on-going organisational role would have honed greater competence and expertise over the years to effectively contribute towards the knowledge sharing culture (Amabile 1999; Collison & Parcell 2006; Tampoe 1993 cited in Myers 1996). Longer tenure among department colleagues also cultivates greater

homogeneity (Orlikowski 1993), elicits better sensitivity towards subcultures within specific teams or units (McDermott & O'Dell 2001) and nurture relationship-specific knowledge sharing (Ballantyne 2004). These findings also substantiate the contention of Wasko and Faraj (2005) that a person's individual experience in his or her practice is an important predictor of knowledge contribution. Even though the study by Wasko and Faraj was carried out in the context of electronic networks, the finding is still applicable since a certain degree of knowledge sharing nowadays entail an exchange over electronic networks apart from the conventional face-to-face interaction, especially in larger companies where employees tend to be more physically or geographically dispersed but rely on technology to remain connected.

Company size and extent of OKM. Initially, there was no evidence for significant relationships between the size of a company and the extent of its OKM practice, whether in OKM strategy, culture or process/technology. However, further analyses into OKM process/technology show a proportionate increase with company size. On the other hand, OKM strategy and OKM culture appear consistently highly ranked among respondents from all companies regardless of size. It implies that companies which are larger tend to have a greater capacity to institutionalise OKM processes and to install the supporting technology to enable such an endeavour. Companies of larger size are more likely to have the budget as well as the economies of scale and financial justification to warrant greater investment in OKM initiatives. The aforementioned observation is in line with previous studies which have found that KM investment increases with company size wherein the lack of budget was cited as a hindrance to KM implementation (McAdam & Reid 2001 cited in Ida 2008; Chong 2005 cited in Ida 2008). On the other hand, where OKM strategy and OKM culture are concerned, these involve elements that comprise the more intangible aspects (Sveiby 1996, 2001) of KM, which are more about psychological buy-ins, team spirit and motivation rather than about establishing physical infrastructure that incur substantial costs.

A similar finding on the positive relationship between KM investment and company size was revealed in a report titled *2008 Malaysian Management Capability Index* (MCI), based on a survey conducted by the Malaysian Institute of Management and the Malaysia Productivity Centre on 333 companies in Malaysia. Under "Application of Technology and Knowledge", SMEs lagged behind at 64 percent, behind the national average of 68 percent and behind multinational corporations (75 percent), local large corporations (70 percent) and government agencies (69 percent).

This strongly suggests that small and medium enterprises (SMEs) in Malaysia do not have adequately large budgets for KM which is commonly associated with costly consultancy fees as well as expensive communications infrastructure. The implication is that the SMEs would practise no-budget or low-budget KM which tends to be informal and executed on a voluntary and ad-hoc basis, and which relies heavily on in-house expertise rather than external consultants, and on socialisation rather than codification. This phenomenon could also explain why OKM process/technology appears to lag behind OKM strategy and OKM culture, since many forward-looking Malaysian SMEs lack a formal KM

initiative mainly because of financial constraints. The conclusion is that whatever the extent of KM that is currently in practice in Malaysian SMEs is more often than not, either at an early phase of development and maturity, or is executed rather informally and perhaps even not so systematically; hence, organisational knowledge is usually not (yet) embedded or captured in formal business processes and systems.

Further analyses confirmed that among the sample of Malaysian managers in the study, one's specific occupational role does not affect one's answers in the questionnaire. This non-dependence could be a positive indicator that, regardless of their job status, there was consensus and no bias in the respondents' perceptions when assessing the state of OKM practice at their workplace.

5.2   Contributions to policy and practice

The caveats from the current study collectively offer Malaysian organisations, which need of improvements to their KM policy and practice, a multi-pronged perspective that addresses issues at the macro level (government and organisation), the micro level (organisation and people) and even the personal level (people and self). This section will discuss a number of those learning points, in no particular order of priority. However, it must also be qualified that there is no single master plan, blueprint or one-size-fits-all solution to be recommended. Literature on KM tends to provide a variety of theoretical frameworks subsequent to the authors' studies; the closest the literature gets to being practical is a list of recommended guiding principles which would require a prospective end-user to further interpret and translate into the context of his or her specific organisation.

On the other hand, KM case studies while being specific, offer only selected organisations' narrow but highly customised approaches to their KM initiatives, which are not easily generalisable to other companies, industries, regions or cultures. This is evident, for instance, in the collection of KM articles, including case studies, submitted by national KM experts in Asia in the report journal titled *Knowledge Management in Asia: Experience and Lessons* published by the Asian Productivity Organisation.

Top level support. Overall, OKM strategy and OKM culture in Malaysian organisations appear to be strong in comparison to OKM process/technology. In other words, although the management has successfully impressed upon employees the critical role of KM to enhance business performance and successfully instilled a KM culture among employees to an appreciable degree, the management has given poor support to KM by failing to institutionalise processes and/or set up enabling technology which would ensure the continuity of KM practices, especially when employees have moved on. While self-regulation in KM is desirable (Skyrme 1995), the management or employer must nevertheless take ultimate responsibility for the state of KM in their organisation.

Therefore, the senior management of organisations in Malaysia would benefit from a re-assessment of their current OKM-related processes and technology or lack thereof, to expedite appropriate action according to the nature of their organisation's business. This involves focusing on one of two approaches – personalisation strategy (people-to-people) or codification strategy (people-to-documents) – while simultaneously using the other approach in a supporting role, as opposed to using both approaches on an equal degree (Hansen et al. 2000). Ultimately, it is the top management of an organisation that is primarily responsible for enabling KM at their workplace (Ida 2008). The crucial role of top level support cannot be overemphasized as it is strongly advocated in most of KM literature, for instance the need to promote KM on a national level by KM institutional champions in the Philippines (Talisayon 2008), the promotion of KM initiatives in Singapore through 'leading promoters, champions and lead institutions' which include the Prime Minister's department (Menkhoff 2008), the direct efforts of the government of the Republic of Korea through the KM Research Consortium, KMRC, and the Korea Productivity Centre (Jung 2008), and the setup of the National Knowledge Commission by the government of India (Sharma 2008a).

In the same way that top management support is critical to driving KM in organisations, the government of Malaysia should drive strategic efforts in building a knowledge society. The Government should sustain or even accelerate its efforts with the Knowledge-Based Economy (KBE) Master Plan mooted in 2002, and judiciously lead the continual development of the MSC as a hub not unlike Silicon Valley, for innovative producers and users of multimedia technology, as well as further enhance the MSC's seven flagship applications: Electronic government, Multi-purpose card, Smart schools, Telehealth, R&D clusters, E-business and Technopreneur development (Ida 2008). At the same time, the Government must ensure that these initiatives meet their objectives of moving Malaysia up the value chain, from being a producer to a value-adding, knowledge-based economy. Besides providing an environment that is conducive to KM, whether in the public or private sectors, the Malaysian government must also look beyond mere ICT investments because one observes from the Government's report or list of K-economy initiatives undertaken, that most of them tend to emphasize a lot on ICT acquisition.

In the light of the above, it seems ironical that Malaysian organisations, especially SMEs, lack OKM process/technology capability. The implication here is that the Malaysian government could incentivise local SMEs to adopt KM systems by offering SME subsidies or grants in the same manner that it had done for MRPII/ERP implementation in the 1990s, and for the global promotion of made-in-Malaysia brands in the 2000s. In this way, all the four basic avenues of knowledge creation espoused by Nonaka and Takeuchi (1995) might be optimised by Malaysian organisations, rather than disproportionately relying on socialisation which is vulnerable to high talent mobility (Barth 2000; Biren, Dutta & van Wassenhove 2000; Skyrme 1997) and which is not optimal for businesses relying on frequent or routine re-use of knowledge (Hansen et al. 2000).

Addressing weaknesses. Specific steps are needed to remedy five areas of KM weakness identified in the current study. The following paragraphs in this section will outline what organisations could do to address each of those five areas.

Firstly, to conduct formalised periodic reviews on the quality of knowledge resources (Coulson-Thomas 2006 cited in www.prweb.com), which will become more crucial as increasingly greater amounts of knowledge are acquired and stored, so organisations need to assess their knowledge for accuracy and relative value, which might in turn lead to the need to assess the knowledge contributor, i.e. the contributor's individual competence and expertise in fields (Jung 2008). As different organisations require different kinds of knowledge, the criteria for assessment and the regularity of assessment might differ, so these need to be discussed, agreed upon and made known accordingly.

Secondly, to measure employees' contribution – the traditional approach in profit-making organisation is to tie in contribution to revenue generation, but for a more balanced approach that does not merely assess contribution in monetary terms, organisations could use Kaplan and Norton's Balanced Scorecard (BSC) approach (Jung 2008). Depending on the nature of the employees' work, measurement of employees' knowledge contribution will include the use of KM performance metrics or key performance indicators (KPIs), for instance customer satisfaction (for front-desk support), patents and R&D effectiveness (for research-based units) or competitor intelligence (for sales units).

Thirdly, to establish strategies to implement KM capabilities externally – this requires greater or closer interaction with customers and the external expert community (Jung 2008), for example to gain feedback on what kind of products to innovate that would be commercially viable and marketable, or to gather ideas on how to improve customer support services et cetera. As a case in point, Jung (2008) cites the example of the Samsung Advanced Institute of Technology (SAIT) which collaborates with its communities of practice (COPs) to identify core knowledge that is then shared both within and across SAIT's borders, thus yielding improved knowledge in the knowledge cycle. The process repeats so that the knowledge gets increasingly refined as it undergoes several knowledge cycles. Such knowledge increases the chances of successful commercialisaton of SAIT's products. Typically, organisations in fast-moving industries, such as those associated with rapidly changing technologies, benefit greatly from collaboration with suppliers and buyers who belong outside the organisation (Wenger, McDermott & Snyder 2002).

Fourthly, to formalise transfer of best practices among employees – this can be formalised by the management of organisations as in the case of SCG Paper which stipulates the following KPIs for every employee: to take part in small group activities including QC projects, to provide seven suggestions and to be involved in four problem-solving projects per year (Bunyadigj 2008). A study mentioned earlier by Wasko and Faraj (2005) also showed that people are more likely to contribute knowledge if they perceive it as being able to advance their professional reputation. Granted that the study by Wasko and Faraj was done on users of the electronic network, an organisation would still find it useful to

impress upon its employees that they stand to enhance their professional standing if they share their knowledge. Apprenticeship and the assignment of a well-qualified and experienced mentor to a new employee could also be another way of formally transferring best practices among employees, as in the case of Sunonwealth Electric Machine Industry Co. Ltd in China (Lin 2008).

Fifthly, to clearly identify external best practices – this may be achieved through the organisation's adherence to and certification by an internationally acclaimed standards body such as the International Standards Organisation (ISO). Even if the organisation is unable to participate in a specific certification programme, or apart from ISO, there is the possibility of forming strategic alliances with external parties as Infosys has done in India by getting involved with start-up companies, for instance through a minority investment, in order to gain access to emerging technologies and to internalise and institutionalise the knowledge that it has learnt through all these alliances (Sharma 2008b).

Building strengths. While addressing weak KM issues, Malaysian organisations should continue to build upon their current strengths of a relatively strong OKM strategy and OKM culture. This would entail, but is not limited to, continuously learning and sharing knowledge and evaluating the process.

A study by Weinberger, Stegmann and Fischer (2007) reveals that learners in small groups benefit from collaborative learning to attain significantly different levels, lending support to an even earlier study by Webb et al. (1986 cited in Weinberger et al. 2007). From their study, Weinberger et al. also infer that learners who interact socially and experienced collaborative learning produce greater 'share outcome knowledge' than if the learners are merely exposed to a similar learning environment and materials. This is because, Weinberger et al. (2007) argue, social interaction enables learners to critically debate on their divergent knowledge and then construct shared knowledge together. The above supports the case for social interaction or socialisation which is already in place in many of the Malaysian organisations surveyed, but which needs to be sustained, continuously enhanced and supported by formal organisational processes and relevant technology.

KM audit. The application of a multidimensional KM scale could also help organisations assess the progress or success of a specific KM initiative by measuring the before-and-after perceptions over a period of time. This would enable organisations to monitor if a particular initiative is on track or has achieved its objective. Furthermore, the KM scale could be adapted for use as a tool to do a regular KM audit within departments in organisations. KM audits might include the following: whether the organisation has integrated the KM strategy with KM technology, whether the organisation is using KM procedures to gain benefits and to assess both tangible and intangible benefits, whether the value of organisational knowledge is reported to its stakeholders et cetera (Sharma 2008a).

Monitoring OKM practice for training needs. The availability of a scale, such as the USQ KMS-16, to evaluate the extent of OKM would provide stakeholders with a snapshot of the state of the organisation's KM practice. Thereafter, the

organisation could periodically review their employees' perception of OKM at the workplace. Consequently, the management would be able to formulate strategies and plans to reinforce their OKM efforts according to the outcome of the OKM evaluation. In addition, the KM scale could be adapted accordingly to provide insights into any gaps between perception and execution, followed by a training needs analysis, and where necessary, the HR department would bridge the gaps through the relevant training. A study by Salleh and Goh (2002 cited in Ida 2008) on managers in Malaysian companies found that if a company aspires to be a knowledge-based organisation, it must start with providing its members with quality training.

Affordable access to a standard scale. While Malaysian organisations in the sample appear to be at least moderately 'advanced' in their KM endeavours, there are still many SMEs among the hundred of thousands of SMEs in the country, which might be unfamiliar with the concept and application of OKM and hence, it is most unlikely that they have set aside a budget for KM, or own a customised KM scale for their specific in-house needs. In such situations, a standard instrument such as the USQ KM scale could be used. Although it is not the primary aim of the KM scale, small businesses in Malaysia, which are unfamiliar with KM could refer to the items within the KM scale as a 'checklist' of what KM means, especially its operational aspects. For instance, small businesses, typically family owned, might not have someone on their board of directors or management team who is well-versed in KM, hence they might not even be aware it is necessary that *"The organisation invests resources to ensure that its information can be trusted"*, and that *"Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation"* is an important step in KM. In short, the USQ KM scale affords SMEs in Malaysia a tested multidimensional standard scale that they could immediately use without incurring heavy R&D costs in reinventing the wheel or securing the professional services of consultants to design a scale.

Moreover, the results of the study might have implications for other disciplines besides KM. These disciplines or sub-disciplines include strategic management, organisational behaviour, innovation management, human resource management or talent management in the areas of competitive advantage, innovation, learning and instruction, organisational learning, group theory, communication theory, staff evaluation and motivation.

5.3 Limitations of the study

Apart from the limitations anticipated before the study and outlined in Chapter 4, the following issues had emerged during or after the course of this study.

Firstly, it would be desirable to have secured a larger sample size than the 153 achieved in this study. The response rate of 8.8% was low, but typical of surveys in Asia (Chia, Landau & Ong 2000). Even though the use of probability sampling in the study offered greater generalisability than nonprobability sampling, the resulting low sample size might have implications on the generalisability of the study's findings (Sekaran 2003). On hindsight, the

relatively low number of questionnaires received in the current study could have been mitigated if a larger sampling frame had been selected; although the response rate might still hover at a low percentage, the *total* number of returned questionnaires could have been higher. However, the sampling frame was purposely limited to only two categories of MIM membership with the intention to limit the study to full-fledged managers, namely members within the categories of "Ordinary member" and "Fellow member" as opposed to "Associate member" and "Affiliate member" which consist mainly, but not exclusively, of young graduates or those with less managerial exposure and student members, respectively.

Secondly, as in all self-administered surveys, there might be a certain amount of subjectivity in the responses with the possibility of "phenomenological" effects rather than objective responses (Lee & Low 2008). In this case, there is the possibility, though slim, that respondents who view their organisations in favourable light would tend to give high scores on the Likert scale, whereas respondents who do not think favourably of their employer, might tend to think negatively or be unappreciative of any OKM initiative at their workplace. Nonetheless, in spite of the aforementioned limitations, they do not effectively diminish the findings and contribution of this study but present opportunities or alternatives in future research.

Thirdly, due to an administrative error, only 16 items of the instrument were communicated to the researcher for the study in Malaysia, which led to another version of the scale, USQ KMS-16, as distinct from the 17-item instrument named USQ KMS-17. In future studies, the USQ KMS-17 can be used. In such studies, a confirmatory factor analysis may be conducted.

5.4 Recommendations for future research

Although the objectives of this study have been accomplished, there are opportunities for further research. First of all, future research could be extended to include non-managerial staff and comparisons may be drawn between the perceptions of managerial and non-managerial staff.

Secondly, future research might explore longitudinal studies on the same population using the same survey instrument to investigate whether OKM practice in Malaysia has remained stagnant over time or has changed over time, as perceived by the organisation's staff. Of particular interest would be to what extent OKM practice has increased over time in developing nations such as Malaysia, and if possible, to assess the rate of that increment or progress.

Furthermore, future research might benefit from the inclusion of more demographic factors besides the current ones in this study – age, gender, education, years of service in organisation, years in current position, number of full-time employees and industry classification. Suggested additional factors include years of working experience, years of experience in current industry and years of experience overseas. In addition, further studies might also take into account the nature of the organisation, for instance whether it is a large local

company (LLC), government-linked corporation (GLC), public-listed company (PLC) or multinational corporation (MNC), or whether it is family owned or professionally managed, to observe if such factors have any impact on the extent of OKM practice. Moreover, further research could contemplate applying the survey to, not only across different companies and industries, but also to all employees within one company in order to assess that organisation's extent of OKM practice from the perspective of its entire staff.

On a macro level, the USQ KM scale could be trailed as a benchmark by researchers, industry associations, professional bodies or government agencies to analyse OKM practice across selected industries. The Management Capability Index (MCI) scale that was designed by the New Zealand Institute of Management (NZIM) is now used on a yearly or bi-yearly basis in a number of Asian countries by the country's national management institution, including the Malaysian Institute of Management (MIM) in collaboration with the Malaysia Productivity Centre, to assess their local managers in areas such as "Organisation Capability", "People Leadership", "Application of Technology and Knowledge" and "Performance Leadership". The USQ KM scale may be used in conjunction with the MCI scale to establish the interrelationships between the scales and to what extent the USQ KM scale measures similar or different dimensions. Similarly, the KM scale can also be successfully applied to organisations in other geo-political regions, though it adds on to the small number of standardised KM scales currently in use. At the same time, the KM scale enables other researchers to draw from it by providing some groundwork for future scales.

Last but not least, the instrument could be modified slightly to assess if there exists a gap between what the organisation is doing in terms of OKM practice, and to what extent the respondent feels that the initiative has achieved its objectives. Currently, the instrument merely assesses the former. Alternatively, future research could also consider adding supplementary questions to the instrument to address the items that were not specifically highlighted in the USQ KM questionnaire. As indicated in Chapter 4, the scale had acceptable reliabilities. Hence, in many of the uses that the researcher has envisaged such as KM audits, monitoring OKM practice for training needs and even instrument augmentation for studies on selected industries or highly specific research issues, the scale's test-retest reliabilities can be assessed.

5.5   Concluding remarks

In today's increasingly competitive environment of incessant change and unprecedented challenges, business organisations are hard pressed for profitability and sustainability amid escalating costs and signs of regional economic distress. One recourse appears to be exploiting whatever resources are already at hand, which means relying greatly on the timely optimisation of one's current talent pool of living knowledge resources, through synergy-generating enablers that exponentially increase organisations' intangible assets.

Nevertheless, KM is only as good as the people it involves. People need to be nurtured and encouraged within organisational teams, hence the importance of formally and objectively monitoring the 'OKM health' among employees with instruments such as the USQ KM scale. The role of assessment tools is to uncover areas of need while identifying areas of strength and potential contribution, as expressed in the adage that "What we cannot measure, we cannot control; what we cannot control we cannot improve."

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APPENDIX A

USQ KMS-16

SURVEY: ORGANISATIONAL KNOWLEDGE MAPPING (KM)

Background:

This questionnaire seeks your honest perceptions of your organisation's **implementation** of **knowledge management** (KM) within in your country's context. KM adopts a multi-disciplined approach involving social, as well as technological, processes to promote the use and application of knowledge for the achievement of organisational and stakeholders' objectives. **It can be applied in large, medium and small companies.**

Domains of interest in this study include organisation strategies, culture, process and technologies, and how current practices and policies that **are enacted—not merely supported in principle—**by your organisation; affect you as an employee in your personal and professional development.

Your input will be treated as strictly **confidential**. In other words, excluding the researcher, survey results will NOT be presented to any organisation in a way that will allow any individual or organisation to be identified. The aims of the study can only be achieved with the honest contribution of a wide range of people. You are entirely free to choose whether or not to participate in this survey; however, your participation is strongly requested. At the end of this study, a copy of the survey summary results may be made available to you upon request.

This questionnaire takes about 15 minutes to complete. The sections below seek your response to a series of statements about you and your workplace. There are **no 'right' or 'wrong' answers** to the questions, only your perception of **the most appropriate response** according to your personal experiences and beliefs. Please **score** your opinions on a scale of **1** to **7** by crossing ('X') the most relevant box adjacent to each question as follows:

> Score **1** if you *'strongly disagree'* with the statement made.
> Score **2** if you *' disagree'* with the statement made.
> Score **3** if you *'somewhat disagree'* with the statement made.
> Score **4** if you *'neither agree nor disagree'* with the statement made.
> Score **5** if you *'somewhat agree'* with the statement made
> Score **6** if you *' agree'* with the statement made
> Score **7** if you *'strongly agree'* with the statement made.

Questionnaire

Issue	1 Strongly Disagree	2 Disagree	3 Somewhat disagree	4 Neither agree nor disagree	5 Somewhat agree	6 Agree	7 Strongly agree
1. Managing knowledge is a core part of the organisation's strategy	❏	❏	❏	❏	❏	❏	❏
2. In managing knowledge, goals that improve organisational performance are purposely identified	❏	❏	❏	❏	❏	❏	❏
3. Priorities are established for addressing goals that improve organisational performance	❏	❏	❏	❏	❏	❏	❏
4. The organisation has strategies to implement its KM capabilities externally	❏	❏	❏	❏	❏	❏	❏
5. Employees are actively encouraged to make contributions to the organisation's knowledge	❏	❏	❏	❏	❏	❏	❏
6. Employees are actively encouraged to use the organisation's knowledge	❏	❏	❏	❏	❏	❏	❏
7. Employees are actively encouraged to look for new ideas internally	❏	❏	❏	❏	❏	❏	❏
8. The organisation actively supports the formation of close working relationships among employees	❏	❏	❏	❏	❏	❏	❏
9. The organisation has a strong culture of performing work to a high standard	❏	❏	❏	❏	❏	❏	❏

Issue	1 *Strongly Disagree*	2 *Disagree*	3 *Somewhat disagree*	4 *Neither agree nor disagree*	5 *Somewhat agree*	6 *Agree*	7 *Strongly agree*
10. Employees actively use new ideas to improve organisational performance	❏	❏	❏	❏	❏	❏	❏
11. Acknowledge subject matter 'experts' among employees are rewarded by the organisation for their expertise	❏	❏	❏	❏	❏	❏	❏
12. The organisation invests resources to ensure that its information can be trusted	❏	❏	❏	❏	❏	❏	❏
13. The organisation deliberately identifies optimal external practices	❏	❏	❏	❏	❏	❏	❏
14. Transferring optimal practices among employees is a formalised process in the organisation	❏	❏	❏	❏	❏	❏	❏
15. The organisation measures employees' contributions to its knowledge resources	❏	❏	❏	❏	❏	❏	❏
16. Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation	❏	❏	❏	❏	❏	❏	❏

Respondent demographic information:

Gender: Male ❏   Female ❏

Organisational Occupational Role (select box that *best describes* your principal (that is, predominant day-to-day) employment responsibilities:

1. Manager/administrator (generalist, specialist (e.g. sales or marketing), Farm, etc. ❏	6. Intermediate clerical, sales or service worker (keyboard operators, receptionists, recording and despatch clerks, hospitality, carers, etc. ❏
2. Professional (science, business, IT, health, education, social or arts, etc. ❏	7. Intermediate production or transport worker (plant and machinery operators, etc.) ❏
3. Associate professional (technical officers, dealers, brokers, sales or service supervisors, etc.) ❏	8. Elementary clerical, sales or service workers (registry, sorting, messenger, trainees, etc.) ❏
4. Tradesperson or related worker (mechanical, electrical, automotive, food, etc.) ❏	9. Labourer or related worker (product, process, service, etc.) ❏
5. Advanced clerical or service worker (secretarial, personal and administrative assistants, etc.) ❏	

Years of service with the organisation:

Less than one year ❏   One or more, but less than three years ❏

Three or more, but less than five years ❏   Five or more, but less than ten years ❏

Ten or more years ❏

Years of service in your *current* position

Less than one year	❐	One or more, but less than three years	❐
Three or more, but less than five years	❐	Five or more, but less than ten years	❐
Ten or more years	❐		

Highest educational qualification *completed*

High school—below Year 12 or equivalent ❐

High school—Year 12 (matriculation) ❐

Technical trade training or apprenticeship (specify) ❐
_____

Certificate/Graduate Certificate (specify discipline) ❐
_____

Bachelor degree (specify discipline) ❐
_____

Masters degree (specify discipline) ❐
_____

Doctoral degree (specify discipline) ❐
_____

Other qualification (specify nature) ❐
_____

Age

16-20 years	❐	21-25 years	❐	26-30 years	❐	31-35 years	❐
36-40 years	❐	41-45 years	❐	46+ years	❐		

Approximate number of persons employed on a full-time basis by your organisation (i.e. not casual, part-time or contract staff.

Less than ten	❐	100-149	❐	500-999	❐
11-49	❐	150-199	❐	1000+	❐
50-99	❐	200-499	❐		

Industry classification of your organisation

Agriculture, forestry, fishing and/or hunting	❏
Mining	❏
Manufacturing	❏
Electricity, gas and/or water supply	❏
Construction	❏
Wholesale trade	❏
Retail trade	❏
Accommodation, cafes and/or restaurants	❏
Transport and/or storage	❏
Communication services	❏
Finance and/or insurance	❏
Property and/or business services	❏
Government administration and/or defence	❏
Education	❏
Health and/or community service	❏
Cultural and/or recreational services	❏
Personal and/or other services	❏
Other (please specify)_____	❏

Sources: Adapted by author from American Productivity and Quality Centre Questionnaire developed in conjunction with Arthur Andersen, as cited in O'Dell C. & Grayson Jr., CJ, 1998, If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice, The Free Press, New York, pp. 227-30; Maister, DH, 2001 Practice What You Preach: What Managers Must Do To Achieve a High Achievement Culture, The Free Press, New York, pp. 213-216; Hammer, M 2001, The Agenda: What Every Business Must Do to Dominate the Decade, Random House Group Limited, UK, pp.51-78; Nonaka, I 1999, 'The Dynamics of Knowledge Creation', in R Ruggles & D Holthouse (eds), The Knowledge Advantage, Capstone US, pp.63-87; and Hamel, G & Prahalad CK 1994, Competing for the Future, Harvard Business School Press, Boston, Massachusetts, pp. 2-3., AS5037(Int) - 2003, Mr Garry Whiting (Queensland Railways), Mr Phil Lloyd (Deloitte Touche), Mr Brian Bailey (Ernst & Young), Dr Kate Andrews (BDO Kendalls), Mr Garry Cullen (Lend Lease), Ms Sue Halbwirth (University of Technology Sydney), Dr Lesley Wilcoxson (University of Sunshine Coast), Prof Ed Fitzgerald (University of Sunshine Coast), Mr Stephen Weaver (FPD Savills Aust Pty Ltd).)

Thank you for your participation

APPENDIX B

USQ KMS-103

SURVEY: ORGANISATIONAL KNOWLEDGE MANAGEMENT ('KM')

Section 1.0 Background

This questionnaire seeks your honest perceptions of your organisation's **implementation** of **knowledge management** (KM) practices within a Malaysian context. KM adopts a multi-disciplined approach involving social as well as technological processes to promote the use and application of knowledge for the achievement of organisation and stakeholders? objectives. It can be applied in large, medium and small companies.

Domains of interest in this study include organisation strategies, culture, processes and technologies, and how current practices and policies that **are enacted ? not merely supported in principle** - by your organisation, affect you as an employee in your personal and professional development.

Your input will be treated as strictly **confidential**. In other words, excluding the researcher, survey results will NOT be presented to any organisation in a way that will allow any individual or organisation to be identified. The aims of the study can only be achieved with the honest contribution of a wide range of people. You are entirely free to choose whether or not to participate in this survey; however, your participation is strongly requested. At the end of this study, a copy of the survey summary results may be made available to you upon request.

Sections 2 to 5 below seek your response to a series of statements about you and your workplace. There are **no right or wrong answers** to the questions, only your perception of **the most appropriate response** according to your personal experiences and beliefs. Please **score** your opinions on a scale of **1** to **7** by crossing ("X") the most relevant box adjacent to each question as follows:

Score **1** if you *"strongly disagree"* with the statement made.
Score **2** if you *"disagree"* with the statement made.
Score **3** if you *"somewhat disagree"* with the statement made.
Score **4** if you *"neither agree nor disagree"* with the statement made.
Score **5** if you *"somewhat agree"* with the statement made.
Score **6** if you *"agree"* with the statement made
Score **7** if you *"strongly agree"* with the statement made.

Item	Issue	N/A or do not know	1 Strongly Disagree	2 Disagree	3 Somewhat Disagree	4 Neither Agree nor Disagree	5 Somewhat Agree	6 Agree	7 Strongly Agree
Section 2.0: Organisation Strategy									
2.1	Managing knowledge is a core part of the organisation's strategy	☐	☐	☐	☐	☐	☐	☐	☐
2.2	In managing knowledge, goals that improve organisational performance are purposely identified	☐	☐	☐	☐	☐	☐	☐	☐
2.3	Priorities are established for addressing goals that improve organisational performance	☐	☐	☐	☐	☐	☐	☐	☐
2.4	Employees understand what the organisation's KM strategy is trying to achieve	☐	☐	☐	☐	☐	☐	☐	☐
2.5	My manager or supervisor discusses with me the organisation's KM activities	☐	☐	☐	☐	☐	☐	☐	☐
2.5A	My manager or supervisor discusses with me how we improve the management of our knowledge	☐	☐	☐	☐	☐	☐	☐	☐
2.6	I discuss with my peers the achievements we are making with the organisation's KM activities	☐	☐	☐	☐	☐	☐	☐	☐
2.6A	I discuss with my peers how we improve the management of our knowledge	☐	☐	☐	☐	☐	☐	☐	☐
2.7	I discuss with my subordinates the achievements we are making with the	☐	☐	☐	☐	☐	☐	☐	☐

#	Statement								
	organisation's KM activities								
2.7A	I discuss with my subordinates how we improve the management of our knowledge	( )	( )	( )	( )	( )	( )		
2.8	Employees feel a sense of involvement with improvement in managing knowledge across the organisation	( )	( )	( )	( )	( )	( )	( )	( )
2.9	The organisation's KM strategy has been set up in response to competitors' actions rather than through its own initiatives	( )	( )	( )	( )	( )	( )	( )	( )
2.9A	The organisation's KM strategy has been set up in response to clients' actions rather than through its own initiatives	( )	( )	( )	( )	( )	( )	( )	( )
2.10	Impetus for the organisation's KM strategy is usually generated internally	( )	( )	( )	( )	( )	( )	( )	( )
2.11	Impetus for the organisation's KM strategy is usually generated in response to client demands	( )	( )	( )	( )	( )	( )	( )	( )
2.12	Clients view the organisation as one that builds new knowledge to take advantage over its competitors	( )	( )	( )	( )	( )	( )	( )	( )
2.13	Competitors view the organisation as one that focuses on catching-up on new knowledge that has been developed by its competitors	( )	( )	( )	( )	( )	( )	( )	( )
2.14	The organisation is good at leveraging its knowledge to create new business	( )	( )	( )	( )	( )	( )	( )	( )
2.15	The organisation has strategies to implement its KM capabilities internally	( )	( )	( )	( )	( )	( )	( )	(•)
2.16	The organisation has strategies to implement its KM capabilities externally	( )	( )	( )	( )	( )	( )	( )	( )

Section 3.0: Organisation Culture

#	Statement								
3.1	Individuals are hired for their attitude towards applying knowledge in their roles	( )	( )	( )	( )	( )	( )	( )	( )
3.2	Individuals are hired for their willingness to share knowledge	( )	( )	( )	( )	( )	( )	( )	( )
3.3	Employees feel a sense of common purpose with the need to improve how knowledge is managed across the organisation	( )	( )	( )	( )	( )	( )	( )	( )
3.4	Employees are actively encouraged to make contributions to the organisation's knowledge	( )	( )	( )	( )	( )	( )	( )	( )
3.5	Employees are actively encouraged to use the organisation's knowledge	( )	( )	( )	( )	( )	( )	( )	( )
3.6	Employees are actively encouraged to look for new ideas internally	( )	( )	( )	( )	( )	( )	( )	( )
3.7	Employees are actively encouraged to look for new ideas externally	( )	( )	( )	( )	( )	( )	( )	( )
3.8	Employees are actively encouraged to build knowledge-relationships with external business parties (for example, suppliers, customers or partners).	( )	( )	( )	( )	( )	( )	( )	( )
3.9	Employees are actively encouraged to identify organisational practices that are no longer relevant	( )	( )	( )	( )	( )	( )	( )	( )
3.10	Employees are actively encouraged to abandon organisational practices that are no longer relevant	( )	( )	( )	( )	( )	( )	( )	( )
3.11	Employee contributions of new ideas are generally rewarded by the organisation	( )	( )	( )	( )	( )	( )	( )	( )
3.12	The formation of work groups that will make contributions to the organisation's knowledge is actively encouraged	( )	( )	( )	( )	( )	( )	( )	( )
3.13	The organisation actively supports the formation of close working relationships among employees	( )	( )	( )	( )	( )	( )	( )	( )
3.14	Employees in this organisation are assisted in pursuing their own learning	( )	( )	( )	( )	( )	( )	( )	( )

3.15	Employees in this organisation are forced to develop their own learning	☐	☐	☐	☐	☐	☐	☐	☐
3.15A	Employees in this organisation assume personal responsibility for their own learning	☐	☐	☐	☐	☐	☐	☐	☐
3.16	The relationship between superior and subordinate in this organisation is best described as one of coach rather than boss	☐	☐	☐	☐	☐	☐	☐	☐
3.17	The organisation has a strong culture of performing work to a high standard	☐	☐	☐	☐	☐	☐	☐	☐
3.18	The organisation actively monitors employee performance standards	☐	☐	☐	☐	☐	☐	☐	☐
3.19	The organisation actively counsels employees whose performance is perceived to be sub-standard	☐	☐	☐	☐	☐	☐	☐	☐
3.20	A climate of trust permeates the organisation	☐	☐	☐	☐	☐	☐	☐	☐
3.21	A climate of trust permeates the work group	☐	☐	☐	☐	☐	☐	☐	☐
3.22	A climate of trust permeates the business unit	☐	☐	☐	☐	☐	☐	☐	☐
3.23	The organisation is successful in fostering employee commitment	☐	☐	☐	☐	☐	☐	☐	☐
3.24	The organisation actively encourages employees to reach their potential	☐	☐	☐	☐	☐	☐	☐	☐
3.25	The organisation actively encourages employees to reach their potential even if this means that they make more mistakes	☐	☐	☐	☐	☐	☐	☐	☐
3.26	The organisation incorporates lessons from mistakes into its practices	☐	☐	☐	☐	☐	☐	☐	☐
3.27	Employees actively use new ideas to improve organisational performance	☐	☐	☐	☐	☐	☐	☐	☐
3.28	The organisation recognises employees who share knowledge	☐	☐	☐	☐	☐	☐	☐	☐
3.29	Employees are rewarded when they share knowledge	☐	☐	☐	☐	☐	☐	☐	☐
3.29A	Employees actively share knowledge that may be relevant to one another's work	☐	☐	☐	☐	☐	☐	☐	☐
3.30	Employees are obliged to observe the procedures in this organisation without deviation	☐	☐	☐	☐	☐	☐	☐	☐
3.30A	Employees can generally decide for themselves the best way to get their work done	☐	☐	☐	☐	☐	☐	☐	☐
3.31	My manager or supervisor discusses with me any concerns that I have about my work	☐	☐	☐	☐	☐	☐	☐	☐
3.32	I discuss with my peers any concerns they may have about their work	☐	☐	☐	☐	☐	☐	☐	☐
3.33	I discuss with my subordinates any concerns they may have about their work	☐	☐	☐	☐	☐	☐	☐	☐
3.34	When necessary, employees willingly put the organisation's needs ahead of their own	☐	☐	☐	☐	☐	☐	☐	☐
3.35	Employees always treat other employees with respect	☐	☐	☐	☐	☐	☐	☐	☐
3.36	Employees openly express their views on issues important to them, even when they know that managers or supervisors may disagree	☐	☐	☐	☐	☐	☐	☐	☐
3.37	In the organisation I feel that I am a member of a well-functioning work group	☐	☐	☐	☐	☐	☐	☐	☐
3.38	Individuals use their own initiatives to create *informal* working relationships with others throughout the organisation	☐	☐	☐	☐	☐	☐	☐	☐
3.39	To solve a work-related issue my *usual* approach is to assume that others have solved the problem before	☐	☐	☐	☐	☐	☐	☐	☐
3.40	To solve a work-related issue my usual approach is to look for a previous solution rather than solve the problem from scratch	☐	☐	☐	☐	☐	☐	☐	☐

3.41	To solve a work-related problem my usual preference is to consult my manager or supervisor	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
3.42	To solve a work related issue my usual preference is to form an initial opinion about the correct solution and then to consult with someone else	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
3.43	To solve a work-related issue my usual preference is to consult my internal networks	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
3.44	To solve a work-related issue my usual preference is to consult my external networks	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
3.45	To solve a work-related issue my usual approach is to search existing organisational knowledge resources	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
3.46	To solve a work-related problem my usual preference is to consult someone I trust who is outside the organisation	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

Section 4: Organisation Process

4.1	Upon joining the organisation, employees are provided with induction so they understand their roles	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.2	Upon joining the organisation, employees are given an explanation of how the organisation conducts its business	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.3	Identifying subject matter 'experts' among employees is a formalised process in the organisation	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.4	In this organisation, employees need to find out for themselves who are the subject matter experts	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.5	In this organisation, subject matter experts readily share their expertise to assist others	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.6	Acknowledged subject matter 'experts' among employees are rewarded by the organisation for their expertise	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.7	A well-defined process is used by the organisation to identify gaps in employee knowledge	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.8	The organisation invests resources in measuring employees' competencies periodically	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.9	The organisation invests resources to ensure that its information can be trusted	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.10	The organisation invests resources in building the know-how of its employees	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.11	The organisation invests resources in building the technological systems used by employees	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.12	The organisation invests resources in building work processes used by employees	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.13	The organisation deliberately identifies optimal internal practices	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.14	The organisation deliberately identifies optimal external practices	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.15	Transferring optimal practices among employees is a formalised process in the organisation	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.16	Shared databases are used effectively to link all members of the organisation with one another	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.17	Technology is used effectively to link all members of the organisation to relevant external parties (such as clients or business units)	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
4.18	Technology is used effectively to capture work-related information/knowledge/documents or databases).	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

No.	Statement							
4.19	Members use technology to effectively collaborate	☐	☐	☐	☐	☐	☐	☐	☐
4.20	Technology is used effectively by all members to gain ready access to the organisation's resources	☐	☐	☐	☐	☐	☐	☐	☐
4.21	Employees are trained appropriately in the use of technology to support closer working relationships with one another	☐	☐	☐	☐	☐	☐	☐	☐
4.22	The organisation measures employees' contributions to its knowledge resources	☐	☐	☐	☐	☐	☐	☐	☐
4.23	Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation	☐	☐	☐	☐	☐	☐	☐	☐
4.24	Periodically reviewing the relevance of its knowledge resources is a formalised process in the organisation	☐	☐	☐	☐	☐	☐	☐	☐
4.25	The organisation has shared databases that anyone can access at any time	☐	☐	☐	☐	☐	☐	☐	☐
4.26	The organisation has developed measures to link individual goal achievement to organisational performance	☐	☐	☐	☐	☐	☐	☐	☐
4.27	The organisation has developed measures to link the know-how of its employees to financial results such as new business development	☐	☐	☐	☐	☐	☐	☐	☐
4.28	The organisation has developed measures to link its technological systems to financial results such as new business development	☐	☐	☐	☐	☐	☐	☐	☐
4.29	The organisation has developed measures to link its work processes to financial results, such as work group innovation	☐	☐	☐	☐	☐	☐	☐	☐
4.30	The organisation measures the outcomes of established KM goals that improve its performance	☐	☐	☐	☐	☐	☐	☐	☐
4.31	The organisation measures the cost-benefit of its KM activities	☐	☐	☐	☐	☐	☐	☐	☐
4.32	The organisation measures work group performance in terms of financial results, such as work group budget achievement	☐	☐	☐	☐	☐	☐	☐	☐
4.33	The organisation measures individual performance in terms of non-financial indicators, such as employee mentoring	☐	☐	☐	☐	☐	☐	☐	☐
4.34	The organisation measures work group performance in terms of non-financial indicators, such as contributions to work group development	☐	☐	☐	☐	☐	☐	☐	☐

Section 5.0 The Strategic Orientation of the KM Program

Please allocate a total of 100% across the following drivers to best describe the strategic orientation of the KM Program:

Driver	Percentage (%)
Competing for clients/business opportunities (to demonstrate competitive advantage through knowledge capabilities)	
Competing for/retaining staff (to improve environment for knowledge exchange and sharing)	
Competing for finance allocation/business resources (to highlight superior application of explicit knowledge)	
Generating growth/sustainability/profitability (to enhance return on knowledge investment)	
Generating process improvement (to foster innovation or knowledge creation through initiatives in operational or service excellence, risk mitigation or cost reduction)	

Respondent Demographic Information

INSTRUCTIONS

This questionnaire takes *about 15 minutes* to complete. **Section 1** below seeks a range of respondent demographic information to assist in profiling postgraduate alumni and their Australian organisations. Please cross (?X?) the most appropriate box under each question in **Section 1**.

1.1 Gender

male ☐

female ☐

1.2 Organisational Occupational Role: Check **one box only** that *best describes* your principal (that is, predominant day-to-day) employment responsibilities:

ITEM	CATEGORY	RESPONSE
1	Manager/Administrator (Generalist, Specialist (eg. Sales or Marketing), Farm, etc.)	☐
2	Professional (Science, Business, I.T., Health, Education, Social or Arts, etc.)	☐
3	Associate Professional (Technical Officers, Dealers, Brokers, Sales or Service Supervisors, etc.)	☐
4	Tradesperson or Related Worker (Mechanical, Electrical, Automotive, Food, etc.)	☐
5	Advanced Clerical or Service Worker (Secretarial, Personal and Administrative Assistants, etc.)	☐
6	Intermediate Clerical, Sales or Service Worker (Keyboard Operators, Receptionists, Recording, and Despatch Clerks, Hospitality, Carers, etc.)	☐
7	Intermediate Production or Transport Worker (Plant and Machine Operators, etc.)	☐
8	Elementary Clerical, Sales or Service Worker (Registry, Sorting, Messenger, Trainees, etc.)	☐
9	Labourer or Related Worker (Product, Process, Service, etc.)	☐

1.3 Years of service with the organisation:

ITEM	CATEGORY	RESPONSE
1	Less than one year	☐
2	One or more, but less than three years	☐
3	Three or more, but less than five years	☐
4	Five or more, but less than ten years	☐
5	Ten or more years	☐

1.4 Years of service in your *current* position:

ITEM	CATEGORY	RESPONSE
1	Less than one year	☐
2	One or more, but less than three years	☐
3	Three or more, but less than five years	☐
4	Five or more, but less than ten years	☐

| 5 | Ten or more years | ⬚ | |

1.5 Highest Educational qualification **completed**:

ITEM	CATEGORY	RESPONSE
1	High School ? below Year 12 or equivalent	⬚
2	High School ? Year 12 (Matriculation)	⬚
3	Technical Trade training or Apprenticeship (Specify)	⬚
4	Certificate/Graduate Certificate (Specify discipline)	⬚
5	Diploma/Graduate Diploma (Specify discipline)	⬚
6	Bachelor Degree (Specify discipline)	⬚
7	Masters Degree (Specify discipline)	⬚
8	Doctoral Degree (Specify discipline)	⬚
9	Other Qualification (Specify Nature	⬚

1.6 Age

ITEM	CATEGORY	RESPONSE
1	16 - 20 years	⬚
2	21 - 25 years	⬚
3	26 - 30 years	⬚
4	31 - 35 years	⬚
5	36 - 40 years	⬚
6	41 - 45 years	⬚
7	46+ years	⬚

1.7 Approximate number of persons employed on a full-time basis by your organisation; i.e. not casual, part-time or contract staff.

ITEM	CATEGORY	RESPONSE
1	Less than ten	⬚
2	11 - 49	⬚
3	50 - 99	⬚
4	100 - 149	⬚
5	150 - 199	⬚
6	200 - 499	⬚

7	500 - 999	☐
8	1000+	☐

1.8 Industry Classification of your organisation

ITEM	CATEGORY	RESPONSE
1	Agriculture, Forestry, Fishing and/or Hunting	☐
2	Mining	☐
3	Manufacturing	☐
4	Electricity, Gas and/or Water Supply	☐
5	Construction	☐
6	Wholesale Trade	☐
7	Retail Trade	☐
8	Accommodation, Cafes and/or Restaurants	☐
9	Transport and/or Storage	☐
10	Communication Services	☐
11	Finance and/or Insurance	☐
12	Property and/or Business Services	☐
13	Government Administration and/or Defence	☐
14	Education	☐
15	Health and/or Community Services	☐
16	Cultural and/or Recreational Services	☐
17	Personal and/or Other Services	☐
18	Other (Specify)	☐

If you consider that any particular statement is "not applicable" to your personal situation, or you simply "do not know" whether or not the statement applies within your organisation, provision has been made for this eventuality and you should cross ("X") the box marked "N/A" or "Do Not Know" accordingly. **Please now proceed to Sections 2 to 4 attached.**

(**Source**: Adapted by author from American Productivity and Quality Centre Questionnaire developed in conjunction with Arthur Andersen, as cited in O?Dell C. & Grayson Jr., CJ, 1998, If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice, The Free Press, New York, pp. 227-30; Maister, DH, 2001 Practice What You Preach: What Managers Must Do To Achieve a High Achievement Culture, The Free Press, New York, pp. 213-216; Hammer, M 2001, The Agenda: What Every Business Must Do to Dominate the Decade, Random House Group Limited, UK, pp.51-78; Nonaka, I 1999, 'The Dynamics of Knowledge Creation', in R Ruggles & D Holthouse (eds), The Knowledge Advantage, Capstone US, pp.63-87; and Hamel, G & Prahalad CK 1994, Competing for the Future, Harvard Business School Press, Boston, Massachusetts, pp. 2-3., AS5037(Int) - 2003, Mr Garry Whiting (Queensland Railways), Mr Phil Lloyd (Deloitte Touche), Mr Brian Bailey (Ernst & Young), Dr Kate Andrews (BDO Kendalls), Mr Garry Cullen (Lend Lease), Ms Sue Halbwirth (University of Technology Sydney), Dr Lesley Wilcoxson (University of Sunshine Coast), Prof Ed Fitzgerald (University of Sunshine Coast), Mr Stephen Weaver (FPD Savills Aust Pty Ltd).)

Thank you for your participation.

APPENDIX C

Factor Analysis and Scale Reliability for Knowledge Management Scale

Factor	Factor Loading	Cronbach's Alpha	C.Alpha if removed
Factor 1			
Database use	.988	.939	.935
Management (process)	.898	.939	.933
Metrics	.814	.939	.936
Use of technology	.784	.939	.936
Optimal practices	.774	.939	.933
Subject matter experts	.635	.939	.935
Performance standards	.609	.939	.934
Work group	.550	.939	.933
Incorporation of mistakes	.524	.939	.933
Trust	.517	.939	.934
Knowledge sharing	.445	.939	.932
Factor 2			
Responsibility to learn	.875	.939	.949
Solutions to workplace problems	-.689	.939	.941
Factor 3			
Competitive environment	.774	.939	.941
Factor 4			
Consultation	.849	.939	.939
KM strategy	.844	.939	.934
Managing KM	.664	.939	.934
Hiring	.628	.939	.936
Encouraged to contribute	.542	.939	.932

(Source: Erwee, Skadiang & Reynolds 2007)

Crosstabulation between
'Organisational Occupational Role' and 'Age'

Q3 - Organisational occupational role * Q7 - Age group Crosstabulation

Q7 - Age	\multicolumn{10}{c}{Q3 – Organisational Occupational Role}									Total	
	MANAGER/ ADMINISTRA-TOR		PROFESSION AL		ASSOCIATE PROFESSIONAL		TRADES-PERSON		LABOURER OR RELATED WORKER		Total	
	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total
31-35	2	1.3%	2	1.3%	0	.0%	0	.0%	0	.0%	4	2.6%
36-40	7	4.6%	4	2.6%	1	.7%	0	.0%	0	.0%	12	7.9%
41-45	14	9.2%	9	5.9%	1	.7%	0	.0%	0	.0%	24	15.8%
46+	79	52.0%	29	19.1%	2	1.3%	1	.7%	1	.7%	112	73.7%
Total	102	67.1%	44	28.9%	4	2.6%	1	.7%	1	.7%	152	100.0%

APPENDIX E

**Crosstabulation between
'Organisational Occupational Role' and
'Years of Service in the Organisation'**

Q3 - Organisational occupational role * Q4 – Years of service in the organisation Crosstabulation

| Q4 – Yrs of service | Q3 – Organisational Occupational Role | | | | | | | | | | | Total | |
| | MANAGER/ ADMINISTRA-TOR | | PROFES-SIONAL | | ASSOCIATE PROFESSIONAL | | TRADES-PERSON | | LABOURER OR RELATED WORKER | | Total | |
	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total
< 1 year	6	3.9%	2	1.3%	1	.7%	0	.0%	0	.0%	9	5.9%
1-3 yrs	10	6.5%	5	3.3%	1	.7%	0	.0%	0	.0%	16	10.5%
3-5 yrs	10	6.5%	4	2.6%	1	.7%	0	.0%	0	.0%	15	9.8%
5-10 yrs	9	5.9%	7	4.6%	0	.0%	0	.0%	0	.0%	16	10.5%
> 10 yrs	68	44.4%	26	17.0%	1	.7%	1	.7%	1	.7%	97	63.4%
Total	103	67.3%	44	28.8%	4	2.6%	1	.7%	1	.7%	153	100.0%

**Results of Factor Analysis: Rotated Component Matrix
(Varimax with Kaiser Normalisation)**

Rotated Component Matrix[a]

	Component 1	Component 2	Component 3
Q14 - Transferring optimal practices among employees is a formalised process in the organisation.	.791	.289	.233
Q16 – Periodically reviewing the quality of its knowledge resources is a formalised process in the organisation.	.784	.103	.331
Q15 – The organisation measures employees' contributions to its knowledge resources.	.720	.260	.363
Q12 – The organisation invests resources to ensure its information can be trusted.	.685	.384	.197
Q11 – Acknowledged subject matter 'experts' among employees are rewarded by the organisation for their expertise.	.647	.436	.049
Q13 – The organisation deliberately identifies optimal external practices.	.607	.381	.192
Q9 – The organisation has a strong culture of performing work to a high standard.	.486	.484	.312
Q5 – Employees are actively encouraged to look for new ideas internally.	.325	.744	.325
Q10 – Employees actively use new ideas to improve organisational performance.	.369	.697	.162
Q7 – Employees are actively encouraged to look for new ideas internally.	.391	.693	.037
Q4 – The organisation has strategies to implement its KM capabilities externally.	.047	.680	.305
Q8 – The organisation actively supports the formation of close working relationships among employees.	.439	.628	.220
Q6 – Employees are actively encouraged to use the organisation's knowledge.	.433	.528	.367
Q2 – In managing knowledge, goals that improve organisational performance are purposely identified.	.247	.192	.869
Q1 – Managing knowledge is a core part of the organisation's strategy.	.257	.185	.841
Q3 – Priorities are established for addressing goals that improve organisational performance.	.208	.287	.745

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalisation
   a.   Rotation converged in 6 iterations.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.908
Bartlett's Test of Sphericity	Approx. Chi-Square	1608.473
	df	120
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.463	52.893	52.893	8.463	52.893	52.893	4.198	26.239	26.239
2	1.354	8.460	61.353	1.354	8.460	61.353	3.689	23.057	49.296
3	.963	6.021	67.374	.963	6.021	67.374	2.893	18.078	67.374
4	.838	5.240	72.614						
5	.720	4.498	77.112						
6	.646	4.035	81.147						
7	.517	3.233	84.380						
8	.434	2.715	87.095						
9	.413	2.578	89.673						
10	.334	2.088	91.762						
11	.309	1.929	93.690						
12	.255	1.595	95.285						
13	.241	1.507	96.792						
14	.210	1.315	98.107						
15	.176	1.099	99.206						
16	.127	.794	100.000						

Extraction Method: Principal Component Analysis.

Scree Plot