KNOWLEDGE SHARING APPROACHES IN MALAYSIAN CONSTRUCTION ORGANISATIONS FOR IMPROVED PERFORMANCE

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Table of Content

List of Figures

List of Tables

List of Abbreviation

CCD   Contractor Continuous Development

CIDB   Construction Industry Development Board, Malaysia

CIMP   Construction Industry Master Plan (2006-2015), Malaysia

CSFs   Critical success factors

DOSM   The Department of Statistic Malaysia

MCIEA   Malaysia Construction Industry Excellent Award

NSDC   National SME Development Council, Malaysia

SCM   The Security Commission Malaysia

SMEs   Small and medium enterprises

SMIDEC   Small, Medium Industries Development Corporation, Malaysia

List of Appendices

Declaration

The researcher declares that the work presented in this thesis, to the best of her knowledge is original and his own work. Also neither the thesis in its entirely nor any portion of it has been submitted for application for another academic degree or qualification in another university or institution of learning. Other sources of information used in the study have been well acknowledged and referenced.

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Abstract

Construction organisations have often been criticised for resistance to change and for failing to adopt innovative approaches to improve future business performance. Thus, the aims of this research is to improve knowledge-sharing approaches in construction organisations in Malaysia for improved performance, and the development of a conceptual model to support the implementation and embedding of appropriate knowledge-sharing approaches. It is anticipated that this will aid the implementation of knowledge-sharing approaches within Malaysia construction organisations and ultimately contribute to an improvement in organisation performance. This research employed both quantitative and qualitative approaches. Using random sampling, 1000 questionnaires were distributed to managers of small, medium and large construction organisations in Malaysia. Of these, 384 were useful for data analyses, a 38% valid response rate. To complement the questionnaire survey, 49 semi-structured interviews were conducted with top, mid and junior level managers of these organisations. Content analysis was used to analyse the information obtained through these interviews, whilst descriptive and inferential statistics were used to analyse the questionnaire survey.

The results suggest that internet technologies as the most used formal approaches to knowledge sharing, and face to face social interactions as the most used informal approaches to knowledge sharing that are presently employed in Malaysian construction organisations. There is no significant difference in formal and informal approaches to knowledge sharing employed across different sizes and different managerial level of Malaysian construction organisations. In particular developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach was regarded as the most challenging aspect in setting up knowledge-sharing approaches. Choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance have found as the main challenges in implementing knowledge-sharing approaches by the construction organisations.

The research further revealed that providing a conducive workplace setting, and providing training for education, personal and team development for effective knowledge sharing as most ready to setup and implement knowledge-sharing approaches. Furthermore this research has also recognised that the construction

organisations can benefit from knowledge-sharing approaches in different ways to different size of organisation. The findings also indicate that the three top contributions of knowledge-sharing approaches to organisation performance are: increases efficient operations and reduces costs, improves better decision-making, and improves project and services delivery to the market.

There is also conclude that no one knowledge sharing approaches that is likely to lead to successful outcomes in all organisations, but there are certain issues worthy of consideration in developing knowledge-sharing initiatives that offers potential for success. The realisation of this success will, however, depend on a host of factors, including organisational culture, structure and human resource practices. The findings from the research were then used to develop a conceptual model for the successful implementation of knowledge sharing in organisations and validated using a validation questionnaire survey within a range of SMEs and large construction organisations. The model presents a holistic way of accounting the key factors that impact upon the successful implementation of knowledge sharing in construction organisations. Such knowledge is essential to the management of construction organisations for achieving meaningful improvement in their approach to foster knowledge sharing.

CHAPTER 1.   INTRODUCTION

1.1. Introduction

This chapter discusses the background of the study and justifies the rationale for the research. Following this, the research questions are presented and the research aims and objectives are established. The chapter also provided a brief summary of the methodology adopted, the contributions of the study and finishing with a descriptive outline of the structure of the thesis.

1.2. Background of the study

Construction industry plays an important role in the economic development for both developing and developed countries. The construction products provide the necessary public infrastructure and private physical structures for many productive activities such as services, commerce, utilities and other industries. The industry is not only important for its finished product, but it also employs a large number of people (directly and indirectly) and therefore has an effect on the economy of a country/region during the actual construction processes. Because of their importance towards the economy development, construction industry need to seek better ways to improve their performance (Department for Business, Innovation and Skills, 2013; Ofori, 2012; Ling and Shan, 2010; Cain, 2004). Numerous attempts have been made by governments around the world aimed at improving the performance of the industry. The idea is to make fundamental changes in how business is done, in order to help cope with a new and more challenging market environment. One of the initiatives to improve the performance of construction industry and its contractors is to improve knowledge-sharing approaches.

Managing knowledge in organisations requires managing several processes of knowledge (Aurum et al., 2007; Probst et al., 2000; Scarborough et al., 1999; Ruggles, 1998; Davenport and Prusak, 1998; Quintas et al., 1997), such as creation, storage, sharing and evaluating. Within this context there is now a general acceptance that the success of knowledge management in an organisation depends on effective knowledge-sharing approaches (Hong et al., 2011; Wang and Noe, 2010; Gupta and Govindarajan, 2000a). Many authors point out that knowledge sharing is the heart of knowledge management

(Hong et al., 2011; Wang and Noe, 2010; Schleimer and Riege, 2009; Issa and Haddad, 2008; Al-Hawamdeh, 2003). Jain et al. (2007) notes that effective knowledge management strategies must emphasize the role of knowledge sharing to achieve maximum results for organisations. The sharing of knowledge between employees and departments in the organisation is necessary to transfer individual and group knowledge into organisational knowledge, which leads to the effective management of knowledge (Islam et al., 2011). As credited by Hidding and Catterall (1998), knowledge has no value unless it has been shared and used in some way. It is through such sharing that improvements are made, new ideas are generated and innovations occur. There is no doubt that knowledge sharing has the potential to generate value. Although a great deal has been discussed about the importance of knowledge sharing for improving organisation performance, there is relatively little empirical evidence (Hsu, 2008; Lin, 2008; Willem, 2003). Therefore, the emphasis of this research is on knowledge sharing.

Much has been written in the last few years on the benefits that can accrue from adequate sharing of knowledge in an organisation (Hsu, 2008; Lin, 2008). It has been argued that organisational knowledge sharing is able to improve organisational performance and competitive advantage (Hsu, 2008; Lin, 2008). However, it is often not undertaken successfully (Hsu, 2008; Hansen et al., 1999). How organisations should encourage and facilitate knowledge sharing to improve organisational performance is still an important research question (Dainty et al., 2005). Although recent studies have attempted to address this gap in the knowledge management literature, few studies have explored how knowledge-sharing approaches could be improved within the construction industry's unique context. This has left construction organisations relatively uninformed as to how they should develop and manage their knowledge-sharing approaches in such a way as to improve their performance. This highlighted the need for continuing knowledge sharing research.

The construction organisations are increasingly recognising knowledge as the most powerful asset in their delivery of 'service-input' (Kasimu et al., 2012; Kant and Singh, 2011; Graham, 2010; Robinson et al., 2001a). As Carrillo et al., (2004) states that "... (The) construction industry began recognising the need to share knowledge, diffuse best practices, provide a quick response to customers and reduce re-work. Despite these efforts, there is still very little understanding of the best ways to foster the sharing of knowledge and less about how to ensure that knowledge is readily available to other individuals,

project teams and organisations (Hsu, 2008; Carrillo et al., 2004). At the same time, construction organisations have often been criticised for resistance to change and failing to adopt innovative approaches to improve future business performance (Ozorhon et al., 2010; Robinson et al., 2005). The research findings from Egbu (2004); Egbu and Botterill, (2001); and Robinson et al. (2001a) draw attention to the importance of the ability of construction organisations to effectively share their knowledge sources and capabilities, which ultimately contributes to their capacity for organisational innovation and performance. However their research did not specify how the organisations should share their knowledge.

Recent studies of knowledge management indicate that the difficulties of sharing knowledge are faced by organisations of all sizes. Vajjhal and Hassan (2013); Riege (2005); Sveiby and Simons (2002) suggested that the size of an organisation influenced the effectiveness of knowledge sharing. Arguably, smaller organisations, with more informal knowledge sharing, are more likely to face a bigger challenge in effective sharing of organisational knowledge, as compared with the formal knowledge sharing in larger organisations. For instance, larger organisations in the construction industry are more likely to have documented knowledge-sharing strategies in place, at various stages of implementation (Robinson et al., 2001a). It could be argued that, the size of an organisation might influence the level of formality involved in knowledge-sharing approaches. Having said that, it is important to recognised the unique nature of small, medium (SMEs) and large construction organisations and the complexities of the organisational context that determine which knowledge-sharing approaches are chosen, and the extent to which they are used and formalised. Therefore the currently employed knowledge-sharing approaches by Malaysian contractors are investigated for their effectiveness and the need for appropriate knowledge-sharing approaches that are fit for purpose will be established.

Knowledge exists and is shared at different levels in organisations, within and between business functions, in formal and informal approaches, and in two main delivery methods: tacit and explicit (Riege, 2005). Review of literature shows that only a few studies have investigated a small number of managerial levels in relation to knowledge-sharing approaches (exception of Kruger and Johnson, 2013; Sarenko et al., 2007). The way it is shared within the organisation is essential and central not only to the success of organisations but also among those who share it, since those who take part in the

knowledge-sharing approaches also benefit from it. Study done by Kruger and Johnson (2013) on South African companies concludes that there is a symbiotic relationship between diffusion of knowledge management between managerial levels and organisational sizes and that the two should not be studied in isolation. Since managers have an important position within the organisation and play a significant role in the knowledge-sharing approaches this study also focuses on the knowledge sharing of those managers' who work in SME and large construction organisations. This study will provide the construction industry with insights into how different sizes of organisations and different level of managers share their knowledge and how potential failures can be prevented.

Knowledge has become a key resource and is very vital for the survival of the organisation in the future (McFarlane, 2008; Riege, 2005, Drucker, 1995). This matter is taken seriously by the Malaysian government and also been adhere included in the Construction Industry Master Plan 2006-2015 (CIDB, 2006b); National Integrity Plan Malaysia (NIP, 2004); and 10th Malaysia Plan 2011-2015 (MP, 2010). Accordingly, the 6th, 9th, and 10th Malaysia Plan highlights the importance of knowledge, particularly involving construction organisations and the need for significant improvement as an urgent issue (CIMP, 2007). Hence, this puts the issue of national knowledge based agenda. Moreover, in 2006, for example, Malaysia Construction Industry Development Board (CIDB) set out to establish specific areas in which to improve the performance of Malaysian construction organisations. The report revealed that the area likely to make the greatest contribution to improving performance was knowledge sharing. This knowledge sharing initiative is also in line with the Malaysian Government's vision to create a knowledge-based economy, as evident from the Knowledge Economy Master Plan launched in 2002.

However there is no framework have been created relating to this. Currently, there is no systematic method or practice of collecting and disseminating relevant and useful knowledge in Malaysian construction industry (CIDB, 2008, 2006a; Chowdhury, 2006a). It is argued that the absence of knowledge-sharing model hinders continuous improvement effort. Previous studies have also reported that there is a dearth of empirical research and knowledge sharing models for construction organisations, resulting in the continuing need for the development and testing of such models (CIDB, 2008; Law and Ngai, 2008; Walker and Wilson 2004; Egbu 2004). Therefore, there is a need for a structured and coherent knowledge-sharing model in Malaysia construction organisations. As a lack of a proper

model or structured guidelines to guide construction organisations on the issues of knowledge sharing, this study intends to fill the gap by developing and validating knowledge-sharing model that encapsulates the key factors that impact upon the successful implementation of knowledge-sharing approaches in Malaysia construction organisations. It argues that the intrinsic characteristic of the construction industry means that the effort of sharing knowledge requires an appropriate model for its successful implementation.

With this background in mind, the following section begins by highlighting the relevant research that justifies the rationale for the thesis.

1.3. Justification of the research

There are three key drivers for this research:

1. the significant role of construction industry and its contractor

2. the importance of sharing organisational knowledge

3. the underdeveloped research area of knowledge sharing from the construction industry's perspective

1.3.1. The significant role of construction industry and its contractor.

In 1998 Egan stated that *"...a successful construction industry is essential to us all. We all benefit from high quality housing, hospitals or transport infrastructure that are constructed efficiently. At its best the UK construction industry displays excellence. But, there is no doubt that substantial improvements in quality and efficiency are possible. Indeed, they are vital if the industry is to satisfy all its customers and reap the benefits of becoming a world leader..."* (p. 3)

The statement above shows the need for change and continuous improvement in the construction industry. This improvement in the construction industry is not only needed in developed countries such as the UK, but also in developing countries, such as Malaysia as construction industry play an important role in order to meet the demand for building and civil engineering products, and to support sustained national economic and social development objective (CIB, 1999).

The construction industry is important, partly because of its large output and also because of its economic significance. Output from the construction industry is a major and integral part of the national output, accounting for a sizeable proportion in the Gross Domestic Product (GDP) of both developed and underdeveloped countries (Crosthwaite, 2000; Tse and Ganesan 1997). Lowe (2003) and Hillebranbdt (2000) further stated that the value added of construction is in the range of 7% to 10% for highly developed economies and around 3% to 6% for underdeveloped economies. In Malaysia, its contribution to the Gross Domestic Product (GDP) is about 6% (DOSM, 2011). In Malaysia, the construction industry is the third-biggest sector in terms of productivity following manufacturing and agriculture (CIDB, 2005). The demand for the Malaysian construction industry under the 9th Malaysia Plan spanning from 2006 to 2010 is in the region of RM280 billion, an average of RM56 billion per year in the stipulated time frame; RM120 billion comes from public spending, RM140 billion from the private sector and another RM20 billion under Private Finance Initiatives (CIDB, 2007). Thus, the importance of the construction industry is recognised as it brings the overall national output.

In addition, the Malaysian government has allocated MYR230 billion in the 10th Malaysia Plan 2011–2015 for development that would either directly or indirectly benefit the construction industry. The 10th Malaysia Plan 2011-2015 also includes a host of initiatives and incentives that are expected to generate more robust activities in the construction industry. These include economic reforms in terms of the private sector-led economy, innovation-led growth and rationalisation of the government's role in business. Again, in the Malaysia Budget (2012), the government has allocated a total of 7,015 projects, or tenders worth MYR85.2 billion. Contractors are one of the important players in the construction industry and play an important role in the Malaysian economy by providing their 'service-input' in construction project such as the construction of buildings, roads, drainage, fences and other projects as their main expertise. Thus, this indicates the important role of contractors in the success of any construction project, as it is the contractors who convert designs into in order to support the government initiatives. Accordingly, the focus of this research is on construction organisations (contractors). For these reasons, efforts should be made to ensure the construction organisations' perform well and thus contribute to the continuous development of the industry as a whole.

While the industry's direct contribution to development is significant, it also stimulates a sizeable amount of economic development through backward and forward linkages. Construction's requirements for goods and services from other industries are considerable; the development of the construction industry therefore stimulates these ancillary industries, thus encouraging further economic development. Due to its economic importance, the performance of the construction industry can significantly influence the development of the overall economy: it is too important to be allowed to stagnate.

The construction organisations in Malaysia also plays an important role in employment generation as it requires a large number of semi-skilled workers to high-skilled professionals such as engineers, architects, quantity surveyors and project managers. It employed 766,000 workers in 2010 (Malaysia Economic Report, 2012). As such, it is important that the knowledge possessed by these construction workers and professionals and the potential of these people to share knowledge are harnessed and maximised for the benefit of organisation and projects that they are involved in and for the construction industry as a whole. Given the large number of construction workers, the construction contributes significantly to the overall economy through employment and consumption. Therefore effort towards improving construction performance would be implemented from time to time.

1.3.2. The importance of sharing organisational knowledge in improving organisational performance.

Gurteen (1999) posited that knowledge sharing is important for at least five reasons:

- Knowledge is an intangible product that includes ideas, processes and information. These intangible products are taking an increasing share of global trade from the traditional, tangible goods of a manufacturing economy.

- Knowledge sharing is important for creating new knowledge in order to achieve competitive advantage.

- Knowledge sharing is important because of the increasing turnover of staff. It enables knowledge retention within the organisation.

- Many organisations have the problem of "we don't know what we know". Expertise learnt and applied in one part of the organisation is not leveraged in others.

- Accelerating change in technology, business and social life: "50 per cent of what we knew 5 years ago is probably obsolete today".

From a construction organisation's perspective, the concept of knowledge sharing is both important and relevant. The short-term, project-oriented nature, instability, fragmentation, inefficiency, lack of innovation, and short life-span of construction organisations has led to chronic knowledge loss compared with other industries (Graham, 2010; Orange et al., 2005; Kurul et al., 2003). If this knowledge is not retained and shared, vast amount of productivity will be lost (Martins and Martins, 2011; Carlson, 1999), which often lead to inefficiency, repetition of costly mistakes, resource wastage and poor performance (Bartholomew, 2008; Gillingham and Roberts, 2006; Shin, 2004). These issues represent a critical problem to an organisation in terms of loss of talent, additional recruitment and training costs (Loi et al., 2006). These losses of knowledge helped to focus minds on the need and importance of sharing organisational knowledge.

Construction organisations are knowledge-based organisations (Rezgui et al., 2010; Egbu and Robinson, 2005). Their daily operation relies heavily on the ideas, knowledge, experience and skills of their employees, which comes from many sources including other people, documents and electronic media. This wealth of knowledge helps execute construction projects as efficiently as possible. Although construction organisations are knowledge-intensive, it has been argued that they do not efficiently utilise the knowledge of their employees and the organisation as a whole (Rezgui et al., 2010; Suresh, 2006). Because individuals have heterogeneous amounts of knowledge, skills and capabilities that vary across organisations, it is important that they are guided and coordinated effectively to share knowledge in order to improve organisational performance (Almahamid et al., 2010).

Construction organisations operate in a highly competitive environment, competing to gain projects in order to survive in the industry (Jaafar et al., 2006). An evaluation of the number of registered Malaysian contractors during 2010–2012 shows that competition is rife in the Malaysian construction industry (Table 2.13 in Chapter 2). Currently, in Malaysia, more than 64,000 contractors operate in different size of organisations. Consequently, it is imperative that Malaysian contractors start to pay more attention to adopting knowledge-sharing approaches to improve their management and also for the purpose of improving performance and survival in a competitive environment. As suggested by Lin, (2008); Hsu, (2008); Du et al. (2007), knowledge sharing could improve organisational performance and as a precondition of organisation competitiveness. Hence,

effective knowledge sharing has a role to play in improving performance and organisation competitiveness. Furthermore, with the huge numbers of registered contractors compared to other construction organisations in Malaysian construction industry (Table 2.9 in Chapter 2), it is argue that the performance of Malaysian construction industry is significantly impacted upon by their performance of its contractors. Thus, Lee et al. (2005) suggests that through the proper management and sharing of organisational knowledge by the contractors, it will bring significant benefit to the organisations, with potential benefits to the wider construction industry and hence the performance of the industry as a whole could be enhanced. It then becomes essential to understand what these contractors do and how they work best in the pursuit of organisational success. Therefore, it becomes crucial to investigate the benefits and importance of knowledge-sharing approaches pertinent to contractors in Malaysia.

Moreover, the government of Malaysia is encouraging and supporting local contractors to participate in regional and global markets based on their expertise and experience in the construction of buildings, infrastructure projects, highways, power generation, ports and airports (Adnan et al., 2011; CIDB, 2007b). As more Malaysian contractors venture overseas, it is also important that the standard and quality of work are on a par with others so that a respectable image is maintained. The increasing knowledge of contractors will drive or reinforce a change in the local market for long-term sustainability and will ensure sustainable capabilities across the construction industry value chain. This will, therefore, enhance their ability to compete in the global market, which will eventually increase foreign exchange earnings (CIDB, 2006). Lin (2008); Swart and Kinnie (2003) suggest that due to this increasing pressure, construction organisations need to share the knowledge held by employees if they are to gain the most from them, in order to compete effectively in the global marketplace. This implies another importance of knowledge sharing: effective knowledge-sharing could help contractors to maintain a share in the global market.

Construction organisations are currently facing the challenges of overloaded knowledge, and the increasing complexity of tasks or projects (Sullivan, 2009; Quddus and Jun, 2008). Additionally information and knowledge can be scattered throughout an organisation (Wen-Bing, 2011; Fong and Chu, 2006), making it difficult to locate and share, as well as potentially redundant, inconsistent or unused (Zack, 1999). Sharing knowledge facilitates a construction organisation's efforts to improve productivity and maintain quality, especially when dealing with complex tasks or projects. When an organisation has the awareness to

manage their knowledge better (i.e., for improving productivity, reducing costs, reaching global markets, etc.), they see the necessity of knowledge-sharing approaches to "know what they know" and to use that knowledge effectively, in order to take control of their knowledge asset (Quddus and Jun, 2008). Therefore, construction organisations need to effectively and efficiently organise and manage the internal process of knowledge sharing in their organisations through the use of well-developed knowledge-sharing approaches. In this respect, there is an urgent need to improve knowledge-sharing approaches suitable for construction organisations. Given how important organisational knowledge is for improving performance, it is worthwhile to consider ways of improving knowledge-sharing approaches in construction organisations (contractors). An examination of knowledge related issues, therefore, demands that knowledge sharing-approaches to the management of knowledge need due consideration.

1.3.3. The existing research gaps.

Although understanding of the processes and phenomena related to knowledge sharing has increased, in the context of construction organisations there is still room for improvement. Based on a review of the literature, there are several key reasons why further research in the area of knowledge sharing in construction organisations is needed:

Even though the benefits of knowledge management are well documented, there is a lack of comprehensive research in the area of knowledge sharing (Foss et al., 2009; Law and Ngai, 2008; Chen and Mohamed, 2006; Egbu, 2004; Ipe, 2003; Choi and Lee, 2003) especially within the construction industry. Articles on knowledge management in the construction industry have concentrated on knowledge management in general, rather than knowledge sharing specifically (Ibrahim et al., 2010; Abdul-Rahman et al., 2005; Imtiaz and Ibrahim, 2005; Robinson et al., 2001a; Robinson et al., 2001b; Robinson et al., 2001c; Pratt, 2000; Abdul-Rahman and Alidrisyi, 1994). The extant body of work has not explored the perspectives of construction organisations (contractors) per se. The limited literature on knowledge sharing in construction organisations, which is considered a problematic issue, provides a clear justification for conducting this study.

In addition, most of the literature on knowledge sharing is based on research in develop countries. There is a substantial pool of knowledge from American and European countries, but the understanding of knowledge sharing in other developing cultures and countries is quite limited. Looking at more specific contextual factors, there is a scarcity of research performed in Malaysia, especially in construction organisations, with the notable

exception of Mohamed et al. (2007); Chen and Mohamed (2006), and Abdul-Rahman et al. (2005). This reveals that very little is known about knowledge-sharing approaches impact on the organisational performance in construction organisations in Malaysia, suggesting large knowledge gaps in the subject. The focus of this study will be on contextual factors that affect the implementation of knowledge-sharing approaches in Malaysia construction organisations.

While knowledge can be seen as important organisational resources, many today agree that the successful implementation of knowledge sharing is linked to other organisational factors. Three of the main disciplines to have embraced the knowledge sharing discourse are organisational structure, culture and human resource practices, with an integration of these having the greatest potential for advances in the field (Egbu, Botterill, and Bates, 2001b). However, there seems to be no clear understanding of the influence of these organisational factors on knowledge-sharing approaches. Much existing work has been focused on individual factors influences such as loss of knowledge power, expertise, tenure, commitment, altruism and reciprocity (Ives et al., 2003; Spender, 1996). It is argue every attempt should be made to look into the organisational factors in such a way it should be made and mean able to allowing knowledge sharing to be embedded in the organisation. Thus, Wei et al. (2012); Almahamid et al. (2010) suggest that a deep understanding of organisational factors and its impacts on the implementation of knowledge sharing in organisation is still needed and much more research should be done. Accodingly, this study is to focus on organisational factors influences rather than individual influences as it could have an immediate, practical effect on organisational practices that stimulate knowledge sharing.

All this points to the fact that the issue of knowledge sharing by Malaysia construction organisations is a relevant and under-researched topic and the antecedents of knowledge sharing have an effect on organisation performance. Thus, the study aims to improve knowledge-sharing approaches in construction organisations in Malaysia for improved performance, and the development of a conceptual model to support the implementation and embedding of appropriate knowledge-sharing approaches. This will not only enable Malaysian construction organisations to identify deficiencies in their practices, but will also contribute positively to the performance of the organsiations' and thus contribute to the uplift of the industry as a whole.

The gaps identifies in the literature are the basis for a number of research questions in the current study, as previously stated in Table 1.1. The following section discusses the research questions, aims, and objectives.

1.4. Research questions.

From the above discussions, the following research questions are formulated:

1. What are the perceptions of construction organisations (small, medium and large) towards knowledge-sharing approaches?

2. What are the different approaches employed by construction organisations and managers for knowledge sharing?

3. What are the main challenges that face construction organisations and managers in the in 'setting-up' and implementation knowledge-sharing approaches within construction organisations?

4. How ready are the construction organisations to 'set-up' and implement knowledge-sharing approaches?

5. What is the significance (importance and benefits) of knowledge sharing to organisations?

6. To what extent does knowledge sharing contribute to organisational performance?

7. How do organisational design factors (organisational structures, culture and human resource practices) within construction organisations influence the implementation of knowledge sharing?

8. How can a model be developed for successful knowledge sharing implementation in an organisation?

1.5. Research aims and objectives.

The overall aim of this research is to improve knowledge-sharing approaches in construction organisations in Malaysia for improved performance, and the development of a conceptual model to support the implementation and embedding of appropriate knowledge-sharing approaches.

In order to achieve the stated aims, the following objectives have been formulated:

1. To critically review the literature and document the perceptions of construction organisations (small, medium and large) and towards knowledge-sharing approaches.

2. To appraise and document the different approaches employed by construction organisations and managers for knowledge sharing.

3. To explore and document the main challenges that face construction organisations and managers in the setting-up and implementation of knowledge-sharing approaches.

4. To specifically explore the readiness of organisations to set up and implement knowledge-sharing approaches.

5. To investigate the significance (importance and benefits) of knowledge sharing, and the extent to which knowledge sharing contributes to organisation performance.

6. To specifically investigate the degree of influence that organisational structure, culture and human resource practices play in the implementation of knowledge sharing in organisations.

7. To develop a conceptual model that encapsulates the key factors that impact upon the successful implementation of knowledge sharing in organisations.

8. To validate the proposed conceptual model.

Table 1.1 shows the relationships between the research aims, objectives and research questions.

Table 1.1 : Research aims and objectives and related research questions.

Aims	Research objectives	Research questions
To improve knowledge-sharing approaches in construction organisations in Malaysia for improved performance, and the development of a conceptual model to support the implementation and embedding of appropriate knowledge-sharing approaches.	RO1: To critically review the literature and document the perceptions of construction organisations (small, medium and large) towards knowledge-sharing approaches.	RQ1: What are the perceptions of construction organisations towards knowledge sharing?
	RO2: To appraise and document the different approaches employed by construction organisations and managers for knowledge sharing.	RQ2: What are the different approaches employed by construction organisations and managers for knowledge sharing?
	RO3: To explore and document the main challenges that face construction organisations and managers in the 'setting-up' and implementation of knowledge-sharing approaches.	RQ3: What are the main challenges in 'setting-up' and implementation knowledge-sharing approaches within construction organisations and different managerial levels?
	RO4: To specifically explore the readiness of organisations to 'set-up' and implement knowledge-sharing approaches.	RQ4: How ready are the construction organisations to 'set-up' and implement knowledge-sharing approaches?
	RO5: To investigate the significance (importance and benefits) of knowledge sharing and the extent to which knowledge sharing contributes to organisational performance.	RQ5: What is the significance (importance and benefits) of knowledge sharing in construction organisations? RQ6: To what extent does knowledge sharing contribute to organisational performance?
	RO7: To specifically investigate the degree of influence that organisational structures, culture and human resource practices play in the implementation of knowledge sharing in organisations.	RQ7: How do organisational design factors (organisational structures, culture and human resource practices) within construction organisations influence the implementation of knowledge sharing in an organisation?
	RO8: To develop a conceptual model that encapsulates the key factors that impact upon the successful implementation of knowledge sharing in organisations	RQ8: How can a model be developed for successful knowledge sharing implementation in an organisation?
	RO9: To validate the proposed conceptual model.	

1.6. Research methodology

A mixed method research was used in this study with a survey questionaire and semi structured interviews as the main instrument for data collection. A mixed method research was selected for two reasons. Firstly, qualitative research attempts to capture people's meaning, definitions, and descriptions of events (Miles and Huberman, 1994). Secondly, it is often argued that for social topics (such as knowledge sharing) qualitative research seems to be more appropriate (Mason, 2002). This qualitative aspect of this study focused on elucidating organisational-contextual factors that underpinned the knowledge-sharing models that emerged from this study, collecting, and describing examples of knowledge-sharing approaches; and to exploring the rationale and conditions underpinning SMEs and large Malaysian construction organisations' perceptions. The quantitative element examined individual responses given by research participants and, was chosen, because potential participants were located in geographically dispersed locations that seemed to be best covered by a postal questionnaire. This concurred with the views of Gable (1994) and Perry (1998) that research of this nature should attempt to mix methods to some extent in order to provide more perspectives on the phenomena being studied.

1.7. Contributions of the research.

This research has contributed to both theoretical and practical bodies of knowledge. The practical contributions (i.e.findings from the research questions) are specific to construction organisations, while the theoretical contributions are applicable to other organisations that wish to improve their success in introducing knowledge-sharing initiatives.

1.7.1. Contributions to the existing body of knowledge

By investigating knowledge-sharing approaches in construction organisations, several contributions will be made to the existing body of knowledge in the knowledge management field for both academic and construction practitioners as follows:

1. This study determines that generally SMEs and large Malaysian construction organisations do execute formal and informal knowledge-sharing approaches

inside the organisation and had also plan to invest in a number of knowledge-sharing approaches. Unfortunately, it seems that Malaysian construction organisations are unable to fully utilise the benefit of knowledge sharing in their organisations. Nevertheless, it is hoped that SMEs and large Malaysian construction organisations with the help of this study, are able apply the factors that impact upon the successful implementation of knowledge sharing as a guideline in achieving successful knowledge management adoption. It is anticipated that the factors proposed in this study could help businesses especially construction organisations to better organise their knowledge management initiatives, as well as to assists Malaysia country in producing knowledgeable society and at the same time creating exceptional wealth. Hence, the findings of the present study have deepened the understanding of knowledge in the field of knowledge management and knowledge sharing, especially among SMEs and large construction organisations in Malaysia.

2. Empirical studies of knowledge sharing in construction have largely concentrated on developed countries, while a few studies of knowledge sharing in construction focused on the developing countries. This study, in addition to partly filling the research gap, provides a practical approach to how construction organisations could understand the knowledge-sharing initiatives in their organisations.

3. The development of an appropriate methodology to investigate the various issues associated with knowledge sharing may be helpful for future researchers.

1.7.2. Contributions to construction practitioners

1. The proposed knowledge-sharing model together with the key factors that are most likely to affect the successful implementation of knowledge sharing will enable managerial levels to adopt a proactive approach in improving knowledge sharing in an organisation. The model may serve as a guide for organisations intended to improve their knowledge-sharing approaches in order to improve performance.

2. The result of the study will have implications to policy makers in general, SMEs and large construction organisations in particular to inform decisions on the need and effective adoption of knowledge-sharing approaches based on different characteristic of the organisations.

3. Policy makers, training providers and those who are associated with the formulation of knowledge-sharing approaches for construction organisations, may wish to incorporate some of the findings of the results in their national provisions.

4. SMEs and large construction organisations may be supported by receiving relevant education and training, and by the development of knowledge-sharing approaches that are suited to their specific knowledge sharing needs.

1.8. The structure of the thesis

The thesis consists of twelve chapters, as depicted in Figure 1.1. A summary of each chapter is summarised as follows:

Chapter 1: Introduction.

The chapter introduces the topic and provides a background to the research. It presents the background of the study and justification of the research. It also outlines the research questions, aims, and objectives, and gives a brief introduction on the research methodology as well as the contributions of the study. Finally, the chapter explains the structure of the thesis.

Chapter 2: Literature review.

The chapter reviews the theoretical foundations of knowledge and knowledge management. First, an overview of the nature and management of knowledge are discussed. Second, addresses knowledge sharing as the core research area of the study. Finally, information on the context in which this study is conducted, the country of Malaysia is discussed.

Chapter 3: The perceptions towards knowledge-sharing approaches.

The chapter focuses on the different viewpoints coming out of from the literature review on knowledge-sharing approaches. The chapter also proposed approaches to knowledge sharing for construction organisation in the context of present study. The chapter

addresses the first objective "To critically review the literature and document the perceptions of construction organisations (SMEs and large) towards knowledge-sharing approaches".

Chapter 4: Research Methodology.

The chapter begins by looking at the range of research philosophies and methodologies that are available and chooses on a methodology for this research. The research design, data collection, and analysis of the qualitative and quantitative research are then described. The difficulties encountered and the various research instruments used in mitigating such difficulties also receive attention.

Chapter 5: Approaches for knowledge sharing.

The chapter discussed some of the common approaches to knowledge sharing used by construction organisations and its managers. This is followed by the extent to which they are used by SMEs and large construction organisations. The chapter also analyses and presents data on approaches to knowledge sharing from both the questionnaire survey and semi-structured interviews. The results are considered from both the organisation and managerial perspectives. The chapter addresses the second objective "To appraise and document the different approaches employed by construction organisations and managers to knowledge sharing".

Chapter 6: Challenges associated with 'setting-up' and implementing knowledge-sharing approaches.

The chapter explained the challenging context of knowledge sharing for improve performance within SMEs and large construction organisations. The chapter also discusses the results and findings related to the challenges faced by construction organisations in 'setting-up' and implementing knowledge-sharing approaches. The findings are elaborated using some of the results gleaned from the questionnaire survey and semi-structured interviews. The discussions laid out in this chapter are also substantiated with findings from a thorough review of the literature. The results are considered from both the organisation and managerial perspectives. The chapter addresses the third objective "To explore and document the main challenges that face construction organisations and managers in the 'setting-up' and implementation of knowledge sharing approaches".

Chapter 7: Organisational readiness for knowledge-sharing approaches.

The chapter discusses the results and findings of the semi-structured interviews and the questionnaire survey on the readiness of an organisation to 'set-up' and implement knowledge-sharing approaches; in other words, ensuring that the organisation is ready to adopt the philosophy of knowledge management. The chapter also discusses the importance of organisational readiness. The results are considered from both the organisation and managerial perspectives. The chapter addresses the fourth objective "To specifically explore the readiness of organisations to 'set-up' and implement knowledge-sharing approaches".

Chapter 8: The significance and contributions of knowledge sharing to organisation performance.

The chapter presents the result of the study on the significance of knowledge-sharing approaches in organisations. It also considers the reasons for their importance to the organisation. Besides that, the contributions of knowledge-sharing approaches to organisational performance are also duly considered. The chapter addresses the fifth objective "To investigate the significance (importance and benefits) of knowledge-sharing approaches, and the extent to which knowledge sharing contributes to organisational performance."

Chapter 9: The influence of organisational structure, organisational culture and human resource practices.

The chapter discussing three categories of organisational factors: organisational structure, organisational culture, and human resource practices and explore whether these factors have an impact in the implementation of knowledge sharing. The chapter also determine how these focal organisational factors may be designed to best possibly promote the knowledge sharing for improve the construction organisations performance. The chapter addresses the sixth objective "To specifically investigate the degree of influence that organisational structure, culture and human resource practices play in the implementation of knowledge sharing in organisations."

Chapter 10: Model development: key factor impacting the successful implementation of knowledge sharing.

The chapter outline the development of a conceptual model to establish the key factors that have an impact on the successful implementation of knowledge sharing in organisations. An overview of the model and the practical implementation opportunities are given. The chapter addresses the seventh objectives "To develop a conceptual model that encapsulates the key factors that impact upon the successful implementation of knowledge sharing in organisations."

Chapter 11: Validation of a proposed knowledge-sharing model.

The chapter presents an analysis of the results of the questionnaire from a survey of managers in Malaysian construction organisations carried out to validate and refine the proposed knowledge-sharing model. A few recommendations to refine the proposed model also discussed. The chapter addresses the eight objectives "To validate the proposed model with relevant personnel."

Chapter 12: Conclusions and recommendations.

The chapter summarises the research output and presents the major research findings in reference to the research questions, aims, and objectives. It concludes by highlighting the overall research findings and offer recommendations for further research in the area of knowledge sharing in construction organisations. It also outlines the limitations of the study.

CHAPTER 1 INTRODUCTION	- Background of the research - Justification of the research - Research questions, aims, and objectives - Contributions of the research - Thesis structure	Outline knowledge gap, specified purpose and description of the literature review study
CHAPTER 2, 3 LITERATURE REVIEW	C2: The concept of knowledge and knowledge management, Knowledge sharing, Malaysian construction organisations C3: The perceptions on knowledge-sharing approaches	Identifying key conditions, dimensions and interrelations among dimensions, review and documented different perceptions on the knowledge sharing
CHAPTER 4 RESEARCH METHODOLOGY	- Overview of the research process - Research methodological design - Identification of the population sample and selection of a sample frame - Data collection and data analysis techniques and procedures	Develop research design, determine research methods, establish resources required, data collection
CHAPTER 5, 6, 7, 8, 9 ANALYSES	C5: Approaches to knowledge sharing C6: Challenges associated with setting up and implementing knowledge-sharing approaches C7: Organisational readiness for knowledge-sharing approaches C8: The significance and contributions of knowledge sharing to organisation performance C9: The influence of organisation culture, structure and HR practices	Data integration: Correlate data analysis and findings with literature, aim and objectives
CHAPTER 10, 11 CONCEPTUAL MODEL	C10: Model development a: Key factors impacting the sucessful implementation of knowledge-sharing model C11: Validation of a proposed model	A conceptual model for describing and explaining the outcome of the knowledge sharing approaches
CHAPTER 12 CONCLUSIONS & RECOMMENDA-TION	- Conclusions - Contributions - Limitations - Recommendations	Summary of the research, fulfilment of the research aim and objectives

Figure 1.1: Structure of the thesis

1.9. Conclusions

This chapter has introduced the research presented within this thesis, the following being a summary of the main points discussed:

- With knowledge sharing recognised as important to the construction organisations, there is a need for further empirical research in this area.

- One of the initiatives to improve the construction industry and its contractor's performance is through improving knowledge-sharing approaches.

- Such knowledge-sharing approaches need to be research based and take into account the particular problems and special nature of construction industry.

- The influence of organisational factors needs to be understood in order to meet the requirements of SMEs and large construction organisations.

The following chapter presents a review and synthesis of the literature relevant to the research topic which provides the theoretical background of this research.

CHAPTER 2.   LITERATURE REVIEW

2.1. Introduction

The previous chapter introduced the background of the thesis, the rationale for the research was justified and the research questions, aims and objectives were established. Subsequently, it presented the summary of the methodology adopted, the contributions of the study, and the structure of the thesis. The purpose of this chapter is to present a review of the literature on knowledge sharing and its association with improving organisational performance.

Accordingly, the chapter is structured as follows:

- Section 2.2 discusses the theoretical foundations for studying knowledge management in organisations. It gives an overview of the nature and management of knowledge.

- Section 2.3 addresses knowledge sharing as the core research area of the study. The discussion starts with an introduction to knowledge sharing from the management literature. Specific consideration is given to the relevance of knowledge sharing to construction organisations.

- Section 2.4 gives an overview of Malaysian construction industry.

- Section 2.5 concludes by summarising the key findings of the study.

2.2. Theoretical foundations for studying knowledge management

The purpose of this section is to provide a theoretical framework of knowledge and knowledge management. There are a few important issues that appear to be significant in the existing theory of knowledge management. These are associated with organisational knowledge (Subsection 2.2.1) and how knowledge is managed within organisations (Subsection 2.2.2). Following this, the discussion moves onto the different approaches to managing knowledge (Subsection 2.2.2.1), as well as the the different schools of thought on knowledge management (Subsection 2.2.2.2). The adoption of

knowledge management in construction organisations are then discussed in Subsection 2.2.2.3. Research into knowledge management in construction organisations is also highlighted (Subsection 2.2.2.4).

2.2.1. Knowledge within organisations

Knowledge exists at multiple levels within organisations (Ipe, 2003). Kasimu et al., (2012); Alavi and Leidner (2001); and Delong and Fahey (2000) grouped it broadly into human (individual), social (group) and structured (organisational) levels. Individual knowledge is knowledge kept in an individual's mind, whereas group knowledge exists through relationships between individuals or within groups. Organisational knowledge is generally said to be a dynamic mixture of individual, group, organisational and inter-organisational experiences, values, information, and expert insights.

The question regarding the nature of knowledge is extremely challenging. Although philosophers have discussed the issue for several hundred years, the search for a formal definition continues (Wang and Noe, 2010; Emery, 1999). The definitions appearing in the literature range from studying knowledge from a broad perspective to more sophisticated definitions (Hari et al., 2005). Most of the debates revolve around the differences between the terms 'data', 'information' and 'knowledge'. Commonly, many do not understand the differences between 'data' and 'information' and sometimes these terms are used interchangeably with knowledge (Kalkan, 2008; Kakabadse et al., 2003; Bartol and Srivastava, 2002; Makhija and Ganesh, 1997; Huber, 1991). An understanding of what constitutes 'knowledge' is central to its effective management (Pathirage et al., 2007).

Any organisation pursuing knowledge management must distinguish from the outset the difference between data, information and knowledge. For example, De Long and Fahey (2000) suggest it is important to distinguish the interrelated concepts of data, information, knowledge and wisdom in order to gain a better understanding of managing knowledge. Otherwise, the organisation will treat data, information and knowledge in the same way, and knowledge will become undervalued (Kalkan, 2008) and utilisation of knowledge will become impossible. The misuse of the terms 'knowledge' and 'information' has also contributed too much confusion in the literature regarding the definition of knowledge. Brown and Duguid (1998) stress that "it would be a 'mistake' to equate the two, as this purposes that you can manage knowledge in the

same way you manage information". Due to the misuse of these terms, some people are of the opinion that knowledge management is a fad and a rebranding of information management (Yu, 2000). In actual fact, they are quite distinct in their meanings (Nonaka and Takeuchi, 1995).

In order to grasp what knowledge management constitutes, it is necessary to first look at what knowledge is and how it is derived. This section will define and illustrate these concepts and differentiate between them, as well as consider the hierarchical relationship between them. In this respect it is useful to consider the following knowledge hierarchy, illustrated in Figure 2.1.
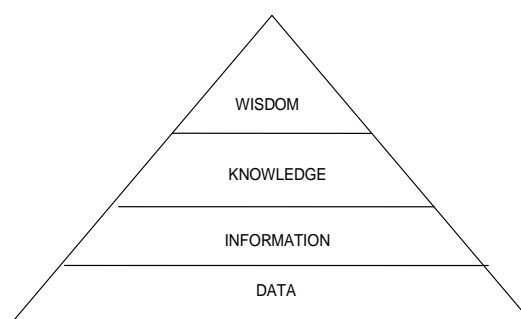
Figure 2.1: Knowledge hierarchy
(Source: adapted from Tobin, 1996)

The knowledge hierarchy is widely used to conceptualise knowledge. The hierarchy represents the common notion of knowledge development in which data is converted into information and information is converted into knowledge, which eventually develops into wisdom (Hick et al., 2007). As depicted in Figure 2.1, each phase of the hierarchy is dependent upon the phase below it.

The first phase of the hierarchy is data, which refers to "… a set of discrete, objective facts about events" (Davernport and Prusak, 1998, p. 2) that have not been organised and processed. Within the organisational context, data or facts in their basic form carry no meaning and have little value for managers in an organisation unless one understands the context in which the data were collected. Most organisations capture significant amounts of data in highly structured databases. Business data is valuable if it can be processed properly, including analysing, synthesising and then transforming it into information and knowledge.

The second phase of the hierarchy is information. When data is processed and structured it becomes information. Unlike data, information carries meaning, purpose and relevance to the individual (Ong, 2003). Information can thus be explained as data that has a function and significance that has been placed in context (Hick et al., 2007). The core value of building activity around information is managing the content in a way that makes it easily accessible, reusable and such that users can learn from experiences so that mistakes are not repeated and work is not duplicated. Therefore, within the organisational context, this structured data is useful for the purpose of analysis and problem solving.

The third phase of the hierarchy constitutes knowledge, which builds on information. Information has little value and will not become knowledge until it is processed by the human mind (Ash, 1998). Information turns into knowledge if humans add their experience, judgement, values and beliefs to use it for comparison, decision-making and conversations (Davenport and Prusak, 1998). Thus, knowledge refers to "applied information", meaning that it is the outcome of information that has been processed (Minnar and Bekker, 2005, p.106). Knowledge is of greater significance, as it derived from experts and is based on expert experience. It therefore demands a higher comprehension compared to information (Lehaney et al., 2004). Knowledge comes about as a result of social interaction between individuals and organisations and, according to Nonaka et al. (2000); it is "context-specific", as it is dependent on a definite period and space. Hick et al. (2007) suggest that if knowledge is not put into context and combined with an understanding of how to utilise it, it is merely information.

The fourth phase of the hierarchy constitutes wisdom. Wisdom, according to Lundvall and Nielsen (2007), is assumed to create a better understanding and ethical basis for action. It is sometimes added to the top of the data-information-knowledge hierarchy (Ackoff, 1989), but its appearance is less widespread in the literature.

From the discussion above, it can be inferred that knowledge is fundamentally different from data, information and wisdom. Data, information, knowledge and wisdom in combination are essential to organisations. As data and information are carriers of knowledge, it seems appropriate to regard knowledge as a major production factor for

organisations (Zeleny, 1989). According to Boersma and Stegwee (1996), the availability of data and information does not necessarily alter the organisation's behaviour or competitiveness. The knowledge needed to interpret the information and to act upon it is the key to organisational success (Boersma and Stegwee, 1996). For this reason, it has to be managed.

2.2.1.1. Definition of knowledge

Considering the unclear distinction between the terms data, information and knowledge, De Long and Fahey (2000) define knowledge as a product of human reflection and experience. In addition, Alavi and Leidner (2001) refer to knowledge as the inflow of new stimuli that is initiated by human cognitive processes. Van der Spek and Spiljkeet (1997), on the other hand, consider knowledge as a whole set of insights, experiences and procedures that are considered correct and true and therefore guide the thoughts, behaviours and communication of people. They suggested that knowledge is always applicable in several situations and over a relatively long period of time.

Another pertinent definition of knowledge is that of Bhatt (2001), who regards knowledge as meaningful information. It is an organised combination of data, assimilated with a set of rules, procedures and operations learnt through experience and practice. In a sense, knowledge is a "meaning" made by the mind; therefore, without meaning, knowledge is information or data. Davenport and Prusak (1998) provide a clearer and more distinct explanation on the definition of knowledge, suggesting that: "Knowledge is a fluid mix of framed experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organisations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices, and norms" (p.5). Nonaka and Takeuchi (1995) propose a theory to explain the phenomenon of organisational knowledge creation. They define knowledge as "justified true belief" (p. 21) to reflect the context in which knowledge exists.

In this study, the definition of knowledge that will be adopted is the one proposed by Probst et al. (2000 p. 24): "…knowledge is the whole body of cognition and skill which individuals use to solve problems. It includes both theories and practical, everyday rules and instruction for action. Based on data and information but unlike these, it is always

bound to (a) person. Constructed by individuals and represents their beliefs about causal relationships". This definition has been adopted based on the fact that it more or less embraces the definition of knowledge given by various scholars (Bhatt, 2001; Van der Spek and Spiljkeet, 1997; Nonaka and Takeuchi, 1995).

2.2.1.2. Knowledge taxonomies

Knowledge can also be defined according to its taxonomy. Taxonomies of knowledge refer to its classification. An understanding of the concept of knowledge and knowledge classification is important because theoretical developments in the knowledge management area are influenced by the distinction between the different types of knowledge (Alavi and Leidner, 2001). Studying the literature relating to the taxonomies of knowledge reveals that knowledge falls into several classifications. A number of examples are given in Table 2.1. However, this chapter will not discuss all the classifications below but instead briefly introduce the most common ones.

Table 2.1 : Different types of knowledge

Authors	Knowledge classifications	Definitions
Alavi & Leidner (2001); DeLong & Fahey (2000)	Individual	Created by and inherent in the individual
	Social	Created by and inherent in collective actions of a group
Hislop (2005); McKenzie & Van WinKelen (2004); Alavi & Leidner (2001); Nonaka & Takeuchi (1995)	Tacit	Knowledge is rooted in actions, experience, and involvement in specific context
	Cognitive tacit	Mental models
	Technical tacit	Know-how applicable to specific work
	Explicit	Articulated, generalised knowledge
Hansen et al (1999)	Codified	Available in written documents and manuals, procedures
	Non-codified	Acquired through experience
McJenzie & Van Winkelen (2004); Alavi & Leidner (2001); Zack (1999)	Declarative	Know-about
	Procedural	Know-how
	Causal	Know-why
	Conditional	Know-when
	Relational	Know-with
McJenzie & Van Winkelen (2004); Blackler (1995)	Endbrain	Conceptual skills and abilities
	Embodied	Acquired by doing
	Encultured	Acquired through socialisation
	Embedded	Organisational routine
	Encoded	Sign and symbols

Source: adapted from Alavi and Leidner (2001)

Zack (1999) sees knowledge from five different classifications: knowledge as declarative (know-about or knowledge by acquaintance), procedural knowledge (know-how), causal (know-why), conditional (know-when) and relational (know-with). Blackler's (1995) knowledge framework ingeniously avoids the paradoxical nature of knowledge (Snowden, 2003) by adapting new conventional assumptions about the location of knowledge (i.e. knowledge resides in bodies, routines, brains, dialogue and symbols). Blackler suggests that there are five different classifications of knowledge: "embrained (conceptual skills and abilities), "embodied (acquired by doing), "encultured" (acquired through socialisation), "embedded" (organisational routines) and "encoded" (sign and symbols). Hensen et al. (1999) suggest two classifications of knowledge: codified (available in written documents and manuals) and non-codified (acquired through experience).

Despite various classifications of knowledge, scholars have some common understanding of parts of these viewpoints. The classification of tacit and explicit knowledge remains the most common and practical. Seminal work done by Polanyi (1958) and Nonaka and Takeuchi (1995) use the concept of tacit and explicit knowledge in defining knowledge dimensions in the discipline of knowledge management and has received substantive international reference and commendation. A distinction between the two categories of knowledge (i.e. tacit and explicit) is necessary in order to have a better understanding of managing knowledge in organisations.

Tacit knowledge is referred to as internalised knowledge encompassing the expertise, skills, understanding and experience within the organisation. Tacit knowledge is found embedded in actions, commitment and involvement in a specific context and it is also derived from personal experiences; it is subjective as well as difficult to formalise (Nonaka et al., 2000). Yahya and Goh (2002) view tacit knowledge as not visible, hence not easily communicated, understood or measured. Thus, the subjective and intuitive nature of tacit knowledge makes it difficult to be represented or transferred in a logical and systematic way (Nooteboom, 1992). It is therefore imperative that organisations find ways to encourage their employees to share tacit knowledge which is recognised as a strategic asset. In the context of the construction organisations, tacit knowledge is the experience and expertise kept in the construction professional's mind, company culture,

lessons learned, know-how, and gained from successful and failed projects in the past is often perceived as very important. The major challenge is to convert tacit knowledge to explicit knowledge, and vice versa, in a format that can be easily absorbed by construction organisations (Barrett and Sexton, 1999). A few examples of tacit knowledge in construction organisations include estimating and tendering skills and interaction with clients/customers and project team members.

Conversely, explicit knowledge is knowledge that has been or can be articulated, codified and stored in different formats and can be readily transmitted to others. Similarly, Pan and Scarborough (1999) believe that the explicit part of knowledge is systematic and easy to communicate in the form of hard data or codified procedures. This means that the explicit form of knowledge can be easily stored and transmitted formally between individuals. Due to these characteristics, explicit knowledge can often be reused within organisations for decision-making purposes and will remain with the organisation even after the knowledge creators have left the organisation (Choo, 2000). In the construction organisations, explicit knowledge refers to documented information such as a description of estimate procedure, contract policy manual, project information, design drawings and specifications, cost reports, risk analysis results, and other information being collected, stored, and archived in paper or electronic format.

Tacit and explicit knowledge are not totally separated, but mutually complementary entities. This organisational knowledge can be created through a continuous dialogue between tacit and explicit knowledge (Carrillo et al., 2003). This resonates with Nonaka and Takeuchi's (1995) suggestion that knowledge is the product of the interaction of both explicit and tacit knowledge. However, both tacit and explicit knowledge can be easily lost unless organisations manage their knowledge resources effectively in order to sustain their competitive advantage (Aziz et al., 2013). This requires organisations to design systematic attempts to manage and organise this valuable intangible asset.

Despite the categorisations of knowledge to be managed in organisations, current discussions of knowledge emphasise two perspectives, as identified by Empson (2001): "knowledge as an asset" and "knowing as a process". Hence, current knowledge management definitions further emphasise these dominant perspectives of knowledge (Subsection 2.2.1.3).

2.2.1.3. Knowledge perspectives

There are two main perspectives describing knowledge in organisations: Knowledge as an asset or knowing as a process. This represents a paradox that has been addressed by clarifying the levels of reference. The knowledge as an asset perspective is focused on the identification of valuable knowledge within organisations and how to develop mechanisms for managing it effectively. In the knowing as a process perspective, knowledge is viewed as a social construct that is developed, transmitted and maintained in social situations, and the focus is to support relations and interactions where knowledge emerges.

In a resource-based view of the firm, knowledge is seen as strategic assets and claims that knowledge is the key productive resource of the firm (Grant, 1996; Spender, 1996). According to the resource-based view, rival firms compete on the basis of the heterogeneity and immobility of their resources and capabilities (Barney, 1991). Resources can be physical, human and organisational in nature and can be used to implement value-creating strategies (Grant, 1996). In fact, it is suggested that resources which are valuable, rare, inimitable and non-substitutable have the potential to provide firms with a sustainable competitive advantage (Barney, 1991). The knowledge-based view of the firm holds that the firm's capability to create and utilise knowledge is the most important source of a firm's sustainable competitive advantage (Grant, 1996; Kogut and Zander, 1992; Nonaka, 1991; Prahalad and Hamel, 1990). Nonaka (1991) observes that, in the current economy, where "the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge" (p. 96).

2.2.2. Knowledge management within organisations

A continuous search for the precise meaning of knowledge management has been created due a lack of consensus on the means of knowledge management (Haggie and Kingston, 2003; Gupta et al., 2000). Ives et al. (1998) state that knowledge management is an emerging practice, and therefore there are many different differentiations as to what knowledge management is and how to use its potential power effectively. Some researchers are of the opinion that the complexity behind defining knowledge management is partially attributed to the challenges in identifying knowledge itself, as discussed in Subsection 2.2.1 (Pathirage et al., 2007; Yahya and Goh, 2002; Stewart, 2000; Barrett and Sexton, 1999). Therefore, defining knowledge management is

difficult, as different viewpoints or schools of thoughts on knowledge management can yield different dimensions and meaning (Yahya and Goh, 2002; Choi, 2000). Table 2.2 offers a few examples of the possible definitions of the multiple views on knowledge management drawn from the literature.

Table 2.2 : Definitions of the term 'knowledge management'

Authors	Knowledge Management definitions
Harris & Berg (2003)	Formalising the management of an enterprise's intellectual assets.
Sunasee & Sewry (2002)	Knowledge management is an integrates systematic approach to identify, manage and share all information assets, including databases, documents, policies, procedure and previously unarticulated expertise and experience held by individual workers.
Newman & Conrad (2000)	Knowledge management is a discipline that seeks to improve the performance of individuals and organisations by maintaining and leveraging the present and future value of knowledge assets. Knowledge management systems encompass both human and automated activities and their associated artefacts.
Scarborough et al. (1999)	Any process or practice of creating, acquiring, capturing, sharing and using knowledge wherever it resides, to enhance learning and performance in organisations.
Ruggles (1998)	Knowledge management is an approach to adding or creating value by more actively leveraging the know-how, experience, and judgement resident within and, in many cases, outside of an organisation.
Wiig (1997)	Knowledge management is a systematic, explicit, and deliberate building, renewal, and application of knowledge to maximise and enterprise's knowledge-related effectiveness and returns from its knowledge assets.
Hibbard (1997)	Knowledge management is a process of capturing a company's collective expertise whatever it reside-in databases, on paper or in people head's-and distributing it to wherever it can help produce the biggest, payoff.
Beckman (1997)	Knowledge management is formalisation of and access to experience, knowledge, and expertise that create value new capabilities, enable superior performance, encourage innovation, and enhance customer value.
Quintas et al. (1997)	Knowledge management "is the process of continually managing knowledge of all kinds to meet existing and emerging needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities".
Mackintosh (1996)	Knowledge management involves the identification and analysis of available and required knowledge, and subsequent planning and control of actions to develop knowledge assets so as to fulfil organisation objectives.
O'Dell (1996)	Knowledge management applies systematic approaches to find, understand, and use of knowledge to create value.

The different definitions of knowledge management in the literature result from the various perspectives and contexts that are specific to the authors (Carrillo, 2004; Egbu, 2004). A thorough review of the literature reveals that some of the definitions of knowledge management are more focused on the objectives (goals) of using knowledge such as "creating value" (Ruggles, 1998; O'Dell, 1996) and "to achieve organisational objectives" (Mackintosh, 1996), as opposed to a process approach (Quintas et al., 1997; Scarborough et al., 1999) (Table 2.2).

The definition by Sunasee and Sewry (2002), Wiig (1997) and Hibbard (1997) is fundamentally about making the collective information and experience of an organisation available to the individual knowledge worker, who is responsible for using it wisely and for replenishing the stock of this ongoing cycle to encourage a learning organisation, stimulate collaboration and empower people to continually enhance the way they perform their work. Knowledge management can also be viewed as an integrated discipline that seeks to improve the performance of the individual and the organisation by maintaining and leveraging the present and future value of knowledge assets (Newman and Conrad, 2000). It highlights the importance of integrating individual and collective knowledge in considering the true meaning of knowledge management.

On the other hand, a number of researchers in knowledge management have focused on specific processes and activities within knowledge management (Scarborough et al., 1999; Quintas et al., 1997). For instance, Scarborough et al. (1999) introduces knowledge management as "any process or practice of creating, acquiring, capturing, sharing and using knowledge wherever it resides, to enhance learning and performance in organisations" (p. 1). Quintas et al. (1997) define knowledge management as a process of continually managing knowledge of all kinds to meet existing and emerging needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities.

Even though the researchers use different definitions of knowledge management, they agree that the definitions of knowledge management reveal a fundamental aspect of how organisations should design their knowledge management activities or approaches in order to manage knowledge processes or facilitate knowledge related activities. This means that the goals and strategies of knowledge management should reflect those of

the organisation (Kim et al., 2003). Keeping all of these in mind, an operational definition has been developed for the purposes of this research. It is proposed that "Knowledge management involves the synthesis of diverse but supporting procedures, processes, technologies and fields of study needed to bring about a sustainable environment, enabling knowledge to be celebrated and exploited for improved organisational performance". Another perspective focuses on how knowledge is managed in organisations. This view is part of the theory that states that organisations and knowledge can be analysed according to two approaches: codification and personalisation. These two approaches are discussed in the next section.

2.2.2.1. Knowledge management approaches

Within business organisational contexts, managing knowledge has always been part of general management activities, even though some of the practices are not labelled as knowledge management (Salojarvi et al., 2005; Quintas, 2005; OECD, 2004; Beckett et al., 2000). Knowledge management is widely regarded as the approach whereby an organisation can leverage the tacit and explicit knowledge of its employees, trading partners and outside experts for the benefit of the organisation (Ackerman et al., 2002; Bellaver and Lusa, 2001).

Organisations have adopted various knowledge management approaches to encourage employees' participation in knowledge-sharing activities (Choi et al., 2008). In general, there are two broad fundamental approaches to knowledge management that form the central theme of discussion in the knowledge management literature: codification and personalisation (Tsui, 2003; Hansen et al., 1999). Other researchers refer to the former as the "process-centred approach" (Leidner et al., 2006; Mentaz, 2001) and the latter is referred to as the "decentralised approach" (Yahya and Goh, 2002) or "practice approach" (Leidner et al., 2006).

The codification approach proposes that selected knowledge can be articulated as explicit knowledge by knowledge sharers and stored, later to be retrieved, reconstructed and internalised by knowledge receivers. The codification approach is assumed to be formal and involves the use of electronic databases. In this approach, the discussion focuses on enhanced methods of access through database and data mining technologies and knowledge management solutions are proposed which include the use of email, groupware and other communications software such as the intranet, which provides

employees with quick reference. ICT, therefore, is seen as offering a radical opportunity to improve the knowledge management process. This approach is also referred to as the "product-centred approach" (Leidner et al., 2006; Mentaz, 2001) or the "centralised and decision making approach" (Yahya and Goh, 2002).

The personalisation approach, on the other hand, focuses on the tacit dimension of knowledge and assumes that it is shared mainly through direct interpersonal communication. The personalisation approach provides a rich medium for communication, as it is concerned with the use of people in managing knowledge (Argote, 1999). The personalisation approach is often assumed to be more ad hoc and informal (Boh, 2007). With personalisation, knowledge management takes place through personal communication, and it is closely tied to the person who developed and shared it mainly through direct person-to-person contact (Hansen et al., 1999). Personalisation as a knowledge management approach has the inherent flexibility of transmitting tacit knowledge and allowing for discussion and sharing interpretations that may lead to the development of new knowledge (Prencipe and Tell, 2001). The main purpose of information technology in this approach is to help people communicate knowledge, not to store it. Some examples of knowledge management approaches from other industries described in the mainstream literature are presented by Hansen et al. (1999).

However, Tiwana (2000) argues that there is no right or wrong approach. Companies can take both approaches simultaneously. One fact that does seem to be agreed upon is that different situations require different knowledge management approaches. In a nutshell, effective knowledge management requires a balanced approach. The right balance is determined by the organisational objectives in pursuing knowledge management. For any knowledge management approach, both approaches need to be presented, but not necessarily to the same degree (Tiwana, 2000). Further, Hansen et al. (1999) highlight that effective organisations must excel by predominantly focusing on using either the personalisation or codification approach to knowledge management and use the other in a supporting role. They claim that what determines the set of approaches to focus on depends on the task routineness of the organisation or the nature of their business. Table 2.3 gives an overview of the distinctive characteristics of these two knowledge management approaches as well as a short description of the medium used and the role of IT in both approaches.

Table 2.3: Characteristics of the codification and personalisation approaches to knowledge

management

	Codification Approach	**Personalisation Approach**
Definition	The codification approach presumes that knowledge can be disconnected from its source.	The personalisation strategy presumes that knowledge cannot be disconnected from its source.
Medium	Knowledge is stored or shared through electronic repositories/databases, independent of the individual that generated it. Repositories are database of knowledge usually contributed to by individuals, teams, organisations for potential use by others. The electronic repositories/databases which contain organisational knowledge facilitate knowledge transfer among the organisation members.	Knowledge can be shared through person-to-person interactions or networks. Network facilitates communication among team members or among groups of individuals who are not necessarily identified as a priority. The interactions can be face to face with a shared context or mediated by technology as in email, instant messaging, text messaging, video conferencing, groupware etc. Communication and collaborative tools and technologies allow temporarily and globally dispersed individuals to work together and to engage in knowledge management through interpersonal communication.
IT is used to:	Capture the knowledge representation and store in a computer	Facilitate the communication of knowledge.

Current knowledge management definitions further emphasise the dominant perspectives of knowledge. Accordingly, the knowledge management discussion focuses on three principle schools of thought on knowledge management.

2.2.2.2. Different schools of thought on knowledge management

The last 20 years have seen an increased interest in knowledge management by organisations in a variety of sectors, and by academia (Anumba et al., 2005; Despres and Chauvel, 1999). As interest in knowledge management grew, different schools of thought emerged. A considerable body of literature addresses the management of knowledge from a variety of schools of thought. Several research projects have been undertaken that focus on various aspects of knowledge management. By taking a different stance, Earl (2001), Bollinger and Smith (2001) and Poynder (1998) suggest

that there are currently three broad major schools of thought on knowledge management:

1. The first school of thought suggests that knowledge management is primarily an information technology issue (Al-Ghassani et al., 2004; Egbu and Botterill, 2002; Al-Ghassani et al., 2001; Carrillo et al., 2000).

2. The second school of thought suggests that knowledge management is more of a human resource issue (Dainty et al., 2005; Olomolaiye and Egbu, 2004; Yahya and Goh, 2002; Soliman and Spooner, 2000; Scarborough et al., 1999).

3. The third school of thought promotes the integration of both IT and human resource perspectives (Bhatt, 2001).

The first school of thought suggests that knowledge management is primarily an IT issue, with computer networks and groupware being key (Mason and Pauleen, 2003). Earl (2001) defines this school as a "technocratic school of thought" which focuses on information management or management technologies which are thought to assist employees to improve their business performance. In this view, knowledge management is an issue of information storage and retrieval through information technology. The introduction of the internet, intranet and ICT has provided organisations with new tools for capturing, coding, transferring and sharing knowledge. This school of thought deals more with the management of explicit knowledge (Stahle, 1999). Unfortunately, these initiatives have resulted in failure (Fernie et al., 2003; Davenport and Pursak, 2000). Storey and Barnett (2000) conducted a study of the failure of knowledge management initiatives, which confirmed the role of human factors. Observing these failures is the basis of recognising that knowledge management is 90% human activity and 10% technology (Egbu, 2000).

For this reason, knowledge management has shifted to the second school of thought, which suggests that knowledge management is more of a human resource issue with emphasis on organisation culture and teamwork. Earl (2001) defines this as "the economic school", which regards knowledge as an intellectual capital/asset to be exploited. Knowledge management gives priority to the way that people construct and use knowledge. It recognises that learning and doing are more important to organisational success than dissemination and imitation. A strong, positive organisation culture is critical to promote learning, development and the sharing of skills, resources

and knowledge. Also important is the building of communities of practice (Wenger, 1998; Brown and Duguid, 1998; Lave and Wenger, 1991) and the development of social networks through which tacit knowledge is transferred and sharing may be achieved (e.g. Rice and Rice, 2005; Nahapiet and Ghoshal, 1998). More importantly, it stresses that it is not the technology that makes knowledge management work; instead, it is the processes and environment that matter most (Mason and Pauleen, 2003; Gupta and Govindarajan, 2000b). This school of thought helps the organisation to work flexibly with a people-centred orientation and involves management of tacit knowledge (Stahle, 1999).

The third school of thought, the 'behavioural school', endeavours to create a business culture which stimulates knowledge production, sharing, and (re)use (Earl, 2001). Processes do not necessarily need to involve the use of IT (e.g. work processes (Davenport et al., 1996; Nonaka, 1994) as methods to manage the creation and/or transmission of relatively unstructured knowledge. This school of thought is an integrated perspective which acknowledges that the IT and human resource perspectives complement each other (Scarborough et al., 1999). Nevertheless, knowledge management is defined as the "process of creating, acquiring, capturing, sharing and using knowledge, wherever it resides, to enhance learning and performance in organisations (Scarborough et al., 1999), which emphasises both perspectives.

It is now becoming widely recognised that this integrated approach or 'behavioural school' offers the greatest scope to deliver real benefits (e.g. Anumba et al., 2005; Jashapara, 2004; Choi and Lee; 2003). As Jashapara (2004) and Choi and Lee (2003) argue, effective knowledge management requires a symbiosis between explicit and tacit knowledge in line with both human resource practices and technology, with Jashapara (2004) defining knowledge management as "the effective learning processes associated with exploration, exploitation and sharing of human knowledge (tacit and explicit) that use appropriate technology and cultural environments to enhance an organisation's intellectual capital and performance" (p. 12). Thus, this integrated approach emerges as a more relevant view for this study, given the nature of the problem being investigated. Therefore, this study argues that both IT and human resource perspectives need to be embraced for an effective balance of knowledge sharing.

2.2.2.3. Knowledge management in construction organisations

The view that knowledge is a valuable asset to the construction industry has become widely acknowledged and has gained substantial attention in recent years (Rezgui et al., 2010; Graham and Thomas, 2006). If the construction industry wishes to improve profitability, reduce waste and inefficiency and offer better value to clients, Walker (2005) states that the industry must fully embrace knowledge management. In this regard, some seminal work done within the construction industry identifies knowledge management as an overarching strategy for the construction industry to address its goal (Carrillo et al., 2004; Robinson et al., 2001a,b); knowledge management can bring about the much needed innovation and improved business performance the industry requires (Egbu et al., 1999; Webb, 1998). Furthermore, knowledge management has been identified as a driving force for construction organisations to improve organisational performance (Schenkel and Teigland, 2008; Hsu, 2008) and to remain competitive (Egbu et al., 2004; Khalfan et al., 2003) in a volatile and competitive market. Thus, managing knowledge is an essential part of organisational survival (Dave and Koskela, 2009; Mohamed et al., 2007; Mohamed and Anumba, 2004; Wong and Aspinwall, 2004). Effective knowledge management is imperative for the construction industry, as the industry is widely perceived to have low productivity and poor performance, despite its importance to the national economy (Ofori, 2012; Ling and Shan, 2010; Egbu et al., 1999). They also state that the project-based nature of the industry has made it particularly important to record and transfer lessons from project to project.

There is also evidence that construction organisations that have adopted knowledge management are reaping rewards, even if they still struggling to quantify them (Anumba, 2009). Other organisations, including construction, are beginning to follow, as knowledge is increasingly recognised as the most powerful asset and a source of competitive advantage to improve business performance (Robinson et al., 2001b). Major construction review reports and initiatives identify a number of improvement themes including the need for "organisational learning and innovation". The role of knowledge management and learning as a source of potential advantage for construction organisations has also been addressed by Carrillo et al. (2000); Patel et al. (2000); and Kululanga et al. (1998). Knowledge is undoubtedly central to organisational learning and innovation, and a knowledge management strategy should therefore be the

cornerstone of improving performance in construction organisations (Robinson et al., 2001b). Within this perspective, many construction organisations are increasingly interested in the potential benefits of knowledge management (Chinowsky and Carrillo, 2007; Carrillo et al., 2000) and developing their strategies and capability to effectively create, codify, share and use knowledge in a purposeful fashion (Bhatt, 2001; Hansen et al., 1999). Anumba et al. (2005), Ikhsan and Rowland (2004a) and Davernport et al. (1996), for example, have stressed that products and services in projects and businesses can be more successfully delivered with appropriate knowledge management approaches which provide organisation members with the right knowledge and the right owners at the right time. This issue is seen as being particularly important in project-based industries, such as the construction industry, where the effective management of organisational and project knowledge can lead to improved organisation performance.

Some of the key benefits of knowledge management to the construction industry include the following (Anumba et al., 2005):

- Innovation is more likely to thrive in an environment where there is a clear strategy for managing knowledge.

- Improved performance will result from the pooling of an organisation's knowledge, as workers will be both more effective (adopting the most appropriate solutions) and more efficient (using less time and other resources).

- Knowledge management is vital for improved construction project delivery, as lessons learned from one project can be carried on to future projects, resulting in continuous improvement.

- Knowledge management can facilitate the transfer of knowledge across a variety of project interfaces (participants, disciplines, organisations, stages etc.); with effective knowledge management, firms and project teams can avoid repeating past mistakes and/or re-inventing the wheel.

- Increased intellectual capital is a major benefit for many organisations who are able to narrow the gap between what their employees know and what the organisation knows.

- Firms that adequately manage their knowledge are better placed to respond quickly to clients' needs and other external factors.

- Knowledge management results in improved support for teams of knowledge workers in an organisation or project team; dissemination of best practice is one of the results of knowledge sharing – this can happen both within and across organisations.

- Organisations can retain the tacit knowledge that would otherwise be lost when valued employees leave, retire or die.

- Increased value can be provided to the customers of construction organisations through better management of knowledge.

- With effective knowledge management, construction organisations can be more agile and better able to respond to organisational changes.

- Risk minimisation is one of the key benefits of knowledge management, as the enhanced knowledge base means that organisations have fewer uncertainties to deal with.

2.2.2.4. Research into knowledge management in construction organisations

Knowledge management has received significant attention from the construction management academic community in recent years, evidenced in a number of recent publications and conferences. Several knowledge management research and projects initiatives in the construction industry have been undertaken that focus on various aspects of knowledge management. While some researchers have focused on the human and organisational aspects of knowledge management (e.g. Olomolaiye and Egbu, 2006, 2004; Dainty et al., 2005; Yahya and Goh, 2002; Iles et al., 2001), others have sought to develop advanced technological tools that facilitate knowledge management (e.g. Udeaja and Kamara, 2010; Anumba, 2009; Udeaja et al., 2008, Al-Ghassani et al., 2004, 2001; Peansupap and Walker, 2006, 2005; Kamara et al., 2002; Egbu and Botterill, 2001; Al-Ghassani, 2001; Carrillo et al., 2000; Patel et al., 2000). Yet others have investigated the role of knowledge processes (e.g. Robinson et al., 2006; Egbu et al., 2003; Kamara et al., 2002; Fernie et al., 2003), the impact on construction innovation (e.g. Drejer and Vinding, 2006; Egbu et al., 2001a; Egbu et al., 2001b) and the impact on business performance (e.g. Amran and Wan Maseri, 2006; Sheehan et al., 2005; Robinson et al., 2001b; Preece et al., 2000; Egbu et al., 2001b). Several authors have also discussed the drivers and applications of knowledge management in the

construction industry (Egbu, 2006; Jewell and Walker, 2005; Carrillo et al., 2004; Kamara et al., 2002; Robinson et al., 2001a, b, c; Egbu et al., 1999). In addition, some research projects have been carried out within knowledge management in the construction industry (e.g. Multi-agent System, 2010; SMAZ, 2006; Knowledge Caputre Awareness Tool, 2005; C-sanD, 2004; CAPRICON, 2004; Egbu et al., 2003; KnowBiz, 2003; CLEVER, 2001; E-COGNOS, 2000; McCarthy et al., 2000, KLICON, 1999).

2.3. Knowledge sharing

This section discusses the introduction of knowledge sharing from the management literature (Subsection 2.3.1). Following this, the discussion moves onto the knowledge sharing perspectives (Subsection 2.3.2). This is followed by a discussion of the different approaches to knowledge sharing (Subsection 2.3.3), the challenges to set-up and implement knowledge-sharing approaches (Subsection 2.3.4), the readiness of the organisation for setting up and implementing knowledge-sharing approaches (Subsection 2.3.5), the significance of knowledge sharing (Subsection 2.3.6), the factors influencing organisational knowledge sharing (Subsection 2.3.7) and finally the research into knowledge sharing carried out within construction organisations (Subsection 2.3.8).

2.3.1. Knowledge sharing defined

Over the past decade, scholars from a variety of disciplines have produced a considerable volume of literature on knowledge sharing. Although there is a significant body of research that has investigated knowledge sharing aspects, there is no widely accepted definition of knowledge sharing. Knowledge sharing has been defined in several different but similar ways by different researchers. Ipe (2003) definesknowledge sharing as the action of individuals in making knowledge available to others within the organisation. Similarly, Bartol and Srivastava (2002) view knowledge sharing as the sharing of organisationally relevant information, ideas, suggestions, and expertise with one another. According to Hickins (2000), knowledge sharing is more than telling hoarders to play nice. It is about capturing the tacit knowledge such as memories and experiences locked in people's heads. As only 2% of information gets written down, the

rest is in people's heads (Hickins 2000). The challenge is therefore to capture and transform such knowledge into a shareable form.

Knowledge sharing is also referred to as activities of transferring or disseminating knowledge from one person, group organisation to another (Lee, 2001; Garvin, 1993). Another view about knowledge sharing given by Yang (2004) defines that knowledge sharing as information and knowledge dissemination to entire organisation or department. However, according to Coleman (1999), knowledge sharing differs from information sharing because knowledge is not easily copied like information because knowledge still belongs to the owner though it is shared. The operational definition for knowledge sharing adopted on this study is "a process of exchanging knowledge (skills, experience, and understanding) among employees in an organisation for the purpose to increase organisational performance." Table 2.4 offer a few examples of the possible definitions of the multiple views on knowledge sharing drawn the literature.

Table 2.4 : Knowledge sharing defines

Authors	Definitions
Yang (2004)	Knowledge sharing as information and knowledge dissemination to entire organisation or department.
Ipe (2003)	Knowledge sharing as the action of individuals in making knowledge available to others within the organisation.
Bartol and Srivastava (2002)	Knowledge sharing as the sharing of organisationally relevant information, ideas, suggestions, and expertise with one another.
Hickins (2000)	Knowledge sharing is more than telling hoarders to play nice.
Krogh (2000)	Knowledge management has narrowed the definition of knowledge sharing as being essentially a process of capturing a person and organisation's expertise wherever it resides and distributing it to wherever it can help produce the biggest returns for the individual and organisation.
Lee (2001)	Knowledge sharing as "activities of transferring or disseminating knowledge from one person group, or organisation to another".
Wang (1999)	Knowledge sharing is the conversion between tacit knowledge to explicit knowledge and vice versa whiles the knowledge 'oscillates' from individuals to the organisations and back.

2.3.2. Knowledge-sharing perspectives

Knowledge sharing can take place at individual and collective level. Knowledge is produced by individuals and should be translated into organisational knowledge (Jain et al., 2007). This requires knowledge sharing. A review of the literature revealed that there are no well-defined knowledge-sharing theories. Most of the views on knowledge

sharing are embedded in knowledge management theories (Sharrat and Usoro, 2003) and are rooted in various disciplines under different perspectives such as the theoretical reviews and classification the knowledge, the interaction perspective (Wang 1999; Nonaka, 1994), the learning perspective (Wang and Ahmed, 2003; Senge, 1998;), the communication perspective (Cummings, 2003; Hendriks, 1999), the communities of practices (Brown and Duguid, 1991), and the knowledge market perspective (Davenport and Prusak, 1998). Apart from the lack of solid theories, there is also a dearth of empirical evidence (Ryan et al., 2010).

The knowledge interaction perspective of Wang (1999) and Nonaka (1994) define knowledge sharing as the conversion of tacit to explicit knowledge and vice versa. Nonaka and Takeuchi (1995) considered that knowledge sharing could be converted via individuals or different mechanisms within an organisation. Nonaka (1994) identified four modes of knowledge conversion between tacit and explicit knowledge and vice versa. Nonaka expected this four modes of knowledge conversion can enhance knowledge sharing effectiveness and play a key role in knowledge sharing amongst individuals, as he assert "the interaction between tacit and explicit knowledge will tend to become larger in scale and faster in speed as more actors in and around the organisation become involved". Nonaka and Takeuchi (1995) argue that during shared activity, four modes of knowledge conversion can take place by the exchange of tacit and explicit knowledge leading to a spiral effect of knowledge creation. There are named as socialisation, externalisation, combination and internalisation. Figure 2.2 present the SECI knowledge conversion model that developed by Nonaka and Takeuchi (1995) demonstrate the dynamic interactions between tacit and explicit knowledge.

Tacit knowledge To   Explicit knowledge

	Tacit knowledge To Explicit knowledge	
Tacit knowledge **From**	**Socialisation**	**Externalisation**
Explicit knowledge	**Internalisation**	**Combination**

Figure 2.2: SECI model by Nonaka and Takeuchi (1995)

The SECI model can be explained as follows (Nonaka and Takeuchi, 1995). Socialisation mode emerges when tacit knowledge is added to tacit knowledge through, for example, on-the-job training, sharing experiences, observation, brainstorming, imitation and practices. This creates technical skills and shared mental models, for instance. Externalisation mode is take place when tacit knowledge converted to explicit knowledge. This process transforms one's idea, experience or insight into readily understandable form or formal models (Seufert et al., 2003). Also externalisation is most prevalent when concept is created in new product development. Combination is adding explicit knowledge by bringing together a variety of sources such as, for example, databases and memorandums. Lastly, internalisation is a process focussed on adding to personal, tacit knowledge by examining explicit knowledge. Explicit knowledge is, thus, converted to tacit knowledge. This requires learning and acquiring new tacit knowledge in practice by experiencing what others go through. When explicit knowledge is internalized into an individual's tacit knowledge, a shared mental model is formed within the firm, thereby starting a new spiral of knowledge conversion. These methods have a variety of implications for an organisation and highlight the importance of knowledge sharing. Seeing the knowledge conversion methods as synonymous to knowledge sharing methods suggest that every activity based on developing tacit or explicit knowledge is really a method of sharing. Socialisation is nothing more than someone sharing tacit knowledge with someone else, whether deliberately or not. The same is true for externalisation-a person willingly shares his/her tacit knowledge so that it can form part of an organisation's explicit knowledge.

Sharing knowledge develops new capacities for action; it is about creating learning processes (learning perspective). Senge (1998), Argyris and Schon (1978) considered knowledge sharing from the perspective of organisation learning as effective mechanisms for assisting others to convert knowledge into effective actions. The communication perspective, on the other hand, argues that for learning to occur in organisations, knowledge must be communicated and shared effectively. According to this theory, knowledge is shared through communication from the source to the recipient (Shannon and Weaver, 1949, cited in Cummings, 2003, p 6). Hendriks (1999) defines knowledge sharing as something other than, but related to, communication and information distribution.

The communities of practices perspective which developed in the "organisational learning" movement, posits that knowledge flows best though networks of people who may not be in the same part of the organisation, but have the same work of interest (Brown and Duguid, 1991). Some organisations have attempted to formalise these communities, even though theorists argue that they should emerge in a self-organising fashion without any relationship to formal organisational structures. The knowledge market perspective of Grover and Davenport (2001), and Davenport and Prusak (1998) further states that knowledge sharing is a process that involves exchanging knowledge between individuals and groups. This perspective recognises the interest that individuals have in holding onto the knowledge they possess. In order to part with it, they need to receive something in exchange (Davenport and Prusak, 1998). Any organisation is a knowledge market in which knowledge is exchanged for other things of value (e.g. money, respect, promotions, or other knowledge). These perspectives are useful and allow us to create a common vocabulary for research and practice.

2.3.3. Knowledge-sharing approaches

This section provides a review of the literature for the second objective of the study, which is "to appraise and document the different approaches employed by the construction organisation to knowledge sharing".

Knowledge sharing is the process by which knowledge is disseminated across the organisation. Hsu (2006) suggests three approaches used to enhance employees' knowledge sharing within organisation:

- A technology-based approach in which the technology is considered the facilitator of knowledge sharing initiatives within an organisation. Knowledge sharing can be supported by the use of information and communication technology (ICT) for example online databases, data warehousing/knowledge repositories and intranets. The strategy to adopt ICT is one of the most followed managerial practices within the organisations (Marr, 2003) and ICT can be a facilitator to encourage individuals to share their knowledge.

- An incentive-based approach in which the monetary and non-monetary rewards promote knowledge-sharing initiatives. A transparent rewards and recognition system however, motivates people to share more of their knowledge.

- An organisational-based approach in which structure, processes, and management style simplify the application of knowledge sharing initiatives.

The study below highlighted a number of differences in the approach used for knowledge sharing both between SMEs and large construction organisations. The studies provide good examples of knowledge sharing.

Table 2.5 : Knowledge-sharing approaches applied in the construction organisations.

Authors	Studies	Organisations Size	Knowledge-sharing approaches
Abdul-Rahman & Wang (2010)	Knowledge Management techniques used amongst Malaysian construction organisations	Large construction organisations	<u>Knowledge Management techniques</u> Brainstorming, Cross-function teamwork, Face-to-face meeting, Job rotation and observation, Mentoring, Post project review, Project briefing and review, Recruitment, Story telling,Technical gathering, Threaded discussion, Written report and manuals
Graham & Thomas (2007)	Knowledge Management Within a Leading Irish Construction Organisation	Large construction organisations	<u>Knowledge sharing practices</u> CPD policy, Mentoring, Performance appraisal, Lesson learned, Cross audits, Workshop and seminars, Intranet.
Ruikar et al. (2007)	Integrated used of technologies and techniques for construction knowledge management	Large construction organisations	<u>Knowledge management techniques</u> Brainstorming, Cop, Face to face interaction, Post project reviews, Recruitment, Apprenticeship Mentoring, Training.
Fong & Chu (2006)	Exploratory study of knowledge sharing in contracting companies: a socio technical perspective	SMEs construction organisations	<u>Knowledge sharing practices</u> Internet, Intranet, E-mail, Memoranda and letters, Knowledge sharing boards, Internal newsletter and circulars, Phone calls and teleconferencing, Informal chatting and story telling, Meetings, Project briefing and reviewing sessions, Newsgroup and web-based discussions, Internal training courses, Talks and seminars, Mentoring and tutoring.
Robinson et al. (2005)	Knowledge management practice in large organisations	Large construction organisations	<u>Knowledge sharing practices</u> Knowledge sharing strategy, Management Support, Recognition/Reward Scheme, IT, Performance Measure.
Carrillo et al.	HRM Strategies	Large	<u>Approaches to sharing knowledge</u>

(2005)	for promoting knowledge sharing within construction project organisations:	construction organisations	Informal knowledge workshops, Knowledge Exchange seminar, Departmental meetings, Site visit programme, Summary Reports, Project award scheme, Coaching and mentoring, Intranet and e-library.
Egbu et al. (2001a)	A conceptual research framework for studying km in project based environment.	SMEs and large construction organisations	<u>Technologies and techniques for knowledge management</u> Internet/intranet/e-mail , IT-based database, Telephone , Face-to-face meetings, Coaching and mentoring, Interaction with supply chain, Formal on-the-job training, Formal education and training, Cross-functional teamwork, Informal networks, Brainstorming sessions, Documents and reports, Project summaries, Knowledge-based expert systems, Work manuals, Video-conferencing, Job rotation, Decision support systems, Bulletin boards, Help desks, Quality circles, Knowledge maps, Communities of practice, Groupware, Storytelling.

Abdul-Rahman and Wang (2010) highlighted twelve knowledge management techniques used amongst large Malaysian construction organisations to share knowledge, namely brainstorming, cross-function teamwork, face-to-face meeting, job rotation and observation, mentoring, post project review, project briefing and review, recruitment, storytelling, technical gathering, threaded discussion, and written report and manual. Graham and Thomas (2006) conducted a study to explore the knowledge-sharing practices of the leading Irish construction organisations. CPD policy, mentoring, performance appraisal, lesson learned, cross audits, workshop and seminars, intranet were identified as the current knowledge-sharing practices.

Fong and Chu (2006), in their study of knowledge sharing in the UK contracting companies, identified 14 knowledge-sharing approaches: Internet, intranet, e-mail, memoranda and letters, knowledge sharing boards, internal newsletter and circulars, phone calls and teleconferencing, informal chatting and storytelling, meetings, project briefing and reviewing sessions, newsgroup and web-based discussions, internal training courses, talks and seminars, mentoring and tutoring.

Carrillo et al. (2005) identifies some approaches to sharing knowledge throughout a construction organisation that have been utilised in a knowledge management case study; informal knowledge workshops, knowledge exchange seminars, departmental meetings, site visit programme, summary reports, project award scheme, coaching and mentoring, intranet and e-library. Another knowledge sharing-practice was found by Robinson et al. (2005) in their study of knowledge management practice in large organisations in the UK. They highlighted the following knowledge sharing-practices: knowledge sharing strategy, management support, recognition/reward scheme, IT, performance measure.

In a survey done by Egbu et al. (2001a) the respondents, 19 small, medium and large UK public and private sectors construction organisations, were ask to rank the usage and the effectiveness of certain tools and technologies in managing knowledge. From the responses, it was clear that the most commonly used technologies in the UK construction organisations are: telephone, internet/intranet/e-mail and documents and reports. These are followed by face-to-face meeting and interaction with the supply chain. These suggest that the conventional techniques (informal approaches) to knowledge sharing are still used frequently among construction organisations.

In the context of present study, the findings on the the different approaches employed by the SMEs and large Malaysian contruction organisations to knowledge sharing will be discussed in Chapter 5 of the thesis.

2.3.4. Challenges in setting up and implementing knowledge-sharing approaches

A review of the literature indicates that the construction industry has begun to realise the importance of knowledge sharing. However, many construction organisations are facing challenges to do with collating, assimilating and exploiting relevant information and experiences. Even if knowledge is shared, getting people to contribute and utilise stored knowledge assets is a challenge. With these come further challenges, which are precipitated either because people are not aware of the involved knowledge sharing technologies or are not cognisant of the benefits of such knowledge-sharing initiatives.

The processes of knowledge sharing are replete with various barriers, making management of knowledge a very challenging task (Wunram et al., 2001). Despite various benefits associated with knowledge sharing, there are many situations where

knowledge is not shared effectively. Sharing which is always voluntary happen to be the challenge in developing an environment where people both want to share what they know and make use of what others know. As mention by Horibe (1999), "To convince experts to share their knowledge, organisation needs to make them aware of why it is important to share knowledge." This way will make them feel that they are important and be willing to share their knowledge.

There are number of reasons why developing smooth and "effective" knowledge-sharing approaches represents a considerable challenge. Many of the barriers to effective knowledge-sharing approaches are arguably people-related as knowledge sharing has a human component at its core. Human are complex with diverse psychological needs. The UK study done by Carrillo et al. (2004) on large construction organisations revealed four main challenges faced in implementing knowledge sharing in construction organisations as: not enough time, organisational culture, lack of standard work processes, and insufficient funding. Dainty et al. (2005) highlighted three principal barriers to the creation of a knowledge sharing culture and that organisations need to overcome these through an effective knowledge management strategy. The three principal barriers are: an unsupportive culture, poor communications structure and time constraints.

Robinson et al. (2001a) have carried out knowledge management research in large construction organisations in the UK where they examined the perceptions and barriers in implementing knowledge sharing. Some of the challenges found were; organisational culture, lack of standard work processes, time constraint, employee resistance, poor IT infrastructure, insufficient money, long term organisational commitment, lack of understanding of knowledge management and conflicting priorities on the demand for resources. Egbu (2004) also conducted a study on knowledge management issues in three empirical studies conducted in construction organisations in the UK. In this study, he investigated the incoherent and lack of ownership of knowledge vision in the industry. There was a prevalent lack of appreciation of knowledge as an important asset. Organisations in the industry do not promote an information-sharing culture and there was a lack of appropriate methods and tools for measuring and valuing knowledge. In addition, there were inadequate standardised processes in place. There was also an evidence of inflexible organisational structures, time constraints and enormous pressure on key staff (knowledge "experts").

There was an endemic reluctance to, or fear of, the use and application of IT tools for knowledge management (technophobia). Some members of the industry only see the "knowledge is power syndrome" and not the "law of increasing returns" associated with knowledge creation whereby shared knowledge stays with the giver while enriching the receiver (Egbu, 2004). Overall, there was a lack of a clear purpose or shared language and meaning of knowledge management in the industry. While some companies have implemented knowledge sharing projects, not all have succeeded; most were partial successes or outright failures. Table 2.6 reveals some obstacles to success in such initiatives.

Table 2.6 : Some obstacles to the success of knowledge management initiatives in construction industry

Authors	Survey results
Robinson et al. (2001)	Organisational culture, lack of standard work processes, time constraint, employee resistance, poor IT infrastructure, insufficient money, long term organisational commitment, lack of understanding of knowledge management; and conflicting priorities on the demand for resources.
Egbu et al. (2003)	Trust, resistance, litigation, power, confidence, buy-ins, benefits expectation/motivation, insularity due to project-based tasks, lack of soft skills (different skill levels and communication skills), admitting what you do not know/be prepared for question; and time.
Egbu (2004)	Incoherent knowledge vision/lack of ownership of the knowledge vision, no appreciation/lack of appreciation of knowledge as an important asset, lack of an information-sharing culture and climate, lack of/or inappropriate methods/tools for measuring and valuing knowledge, lack of/inadequate standardised processes, rigid/inflexible organisational structures, time constraints and pressure on key staff/ knowledge "experts", fear of the use and application of it tools for km (technophobia), the "knowledge is power syndrome" and failure to see the "law of increasing returns" associated with knowledge creation – shared knowledge stays with the giver while enriching the receiver and lack of a clear purpose and shared language and meaning of km.
Carrillo et al. (2004)	Inadequate time, organisational culture, lack of standard work processes; and insufficient funding.
Dainty et al. (2005)	Unsupportive culture, poor communication structures and time constraints.
Carrillo & Chinowsky (2006)	Not enough time, cautious approach to new 'management' idea, not enough money, 'not invented here' culture, knowledge is power' culture and use of coessential was not mandatory.
Isa & Haddad (2008)	Organisational culture, trust and IT.

Judging by the wide-ranging studies conducted above, the key issues associated with the development and implementation of knowledge-sharing approaches are critical. In implementing knowledge-sharing approaches, the construction organisation needs to be aware of the challenges that may inhibit the successful implementation of knowledge sharing initiatives. Given the above discussions, setting up and implementing knowledge-sharing approaches is largely seen as a challenge in construction organisations. Hence, knowledge sharing in construction organisations needs a more in-depth study. The detailed findings on the challenges of organisations to set up and implement knowledge-sharing approaches will be discussed in Chapter 6.

2.3.5. The readiness to set up and implement knowledge-sharing approaches

Organisational readiness is now a popular and widely used term with varying definitions. Readiness is understood differently by different people and different organisations. For instance, the general definition supplied in the existing literature uses the word 'readiness' as a necessary precondition for a person or an organisation to succeed in organisational change (Holt, 2000). Lacovou et al. (1995) define organisational readiness as "the availability of the needed organisational resources for adoption" (p.467). In the knowledge management literature, Jalaldeen et al. (2009) explain readiness to adopt knowledge management as the availability of physical and logical infrastructures in the organisation (organisational factors), and the willingness of the organisational members (individual factors) to adopt knowledge management. According to Jalaldeen et al. (2009), the word 'readiness' incorporates both attitudinal and physical attributes. Attitudinal elements include the level of knowledge, optimism and awareness, perception of importance, interest and willingness of the contractors to implement the programme. Personnel, investment in IT and infrastructure readiness are used to measure the physical readiness of the respondents to implement the programme. On the other hand, Mohammadi et al. (2009) define knowledge management readiness as the ability of an organisation, department or work-group to successfully adopt, use and benefit from knowledge management. Thus, it is important for companies seeking to adopt knowledge management to analyse their businesses to ensure its productive and beneficial implementation (Shirazi et al., 2011). As Shawn and Tuggle (2003) highlight, "a critical question for organisations that are thinking of attempting to extract the value implicit from knowledge management is to what degree are they ready to have knowledge management successfully adopted by people in the organisation" (p. 153).

The implementation of knowledge management philosophies or knowledge sharing in organisations is a complex issue and requires significant organisational effort (Siemieniuch and Sinclair, 2004; Davenport and Prusak, 1998; Wiig, 1993). According to Wiig (1993), "usually, introducing knowledge management (knowledge sharing) in an organisation results in considerable change. It requires adoption of new perspectives and management and work practices and implementation of new approaches. Such changes require efforts and time" (p.29). In this context, organisations have to undertake a broad range of initiatives (policies, budget actions, organisational structures, which, taken in sum, represent a determined agenda) to assess and actively manage their readiness to setup and implement knowledge-sharing approaches. As such, knowledge-sharing readiness is an important aspect of the process to facilitate and diffuse knowledge management. The following are some examples from previous studies regarding organisational readiness for knowledge management and knowledge sharing.

Cho et al. (2000) suggest that knowledge management enablers are related to employees, processes and technology. Similarly, in a model suggested by O'Dell and Jackson (1998), infrastructure, processes, culture and technology are identified as enablers of knowledge management. Meanwhile, Choi and Lee (2002) performed a comprehensive experiment to integrate the many views on knowledge management readiness. Their research examined the relationship between knowledge enablers, processes and organisational performance in an integrative framework.

Organisational readiness for knowledge-sharing approaches is considered a critical precursor to the successful implementation of knowledge management in construction industry settings (Siemieniuch and Sinclair, 2004; Kamara et al., 2002a). Siemieniuch and Sinclair (2004), for example, propose a framework for organisational readiness for knowledge management in different industrial settings, with the introduction of 14 steps of knowledge lifecycle management (KLM) processes. Taylor and Wright (2004) investigated knowledge sharing in a public service context in the UK and identified six factors that influence the readiness of an organisation to share knowledge effectively: an innovative culture; a capacity to learn from failure; and good information quality. All these are strong predictors of successful knowledge sharing. They also identified factors associated with change management, and a predisposition to confront performance indicators, that significantly influence the knowledge-sharing process.

Also, Holt et al. (2004) conducted a study on civilian and military personnel in the US to develop an instrument to assess knowledge management readiness. The study draws on the literature dealing with knowledge management and organisational change to propose a synergistic tool to measure readiness for knowledge management and apply it in an organisational setting. This tool or instrument considers individual, context, content, process measures and knowledge management attitudes. Other research by Holt et al. (2007), considers the receptive attitudes of organisational members to indicate readiness for knowledge management process adoption. They developed an instrument to assess readiness for knowledge management, which mostly concentrates on knowledge sharing processes and human factors.

Hung and Chou (2005) propose a three-dimensional Knowledge Management Pyramid Model (KMPM) to assess the maturity of organisational capabilities in knowledge management in Taiwan. KMPM comprises three components: maturity levels, knowledge management processes and knowledge management capabilities or enabling infrastructures. In addition, Wei et al. (2009, 2007) investigated the readiness of the Malaysian telecommunication industry to adopt knowledge management by investigating the perceived importance and actual level of implementation of five success factors (business strategy, organisational structure, knowledge management team, K-Map and K-Audit), four knowledge management strategies (organisational culture, leadership support, technological infrastructure, performance measurement) and three knowledge management processes (construction, embodiment and deployment).

Robinson et al. (2006) provide the STEPS maturity roadmap as a mechanism for construction organisations to benchmark their knowledge management activities and to develop a knowledge management strategy that would improve their activities. The STEPS maturity roadmap is a structured approach to determine the steps involved and the actions required to implement knowledge management, and to benchmark implementation efforts to achieve the goals of corporate sustainability. Mohammadi et al. (2009) further developed a systematic study to determine readiness for knowledge management implementation in the SME sector in Iran. They provide several organisational antecedents for effective knowledge management implementation, including vision for change, infrastructure, structure for change and culture of knowledge. Jalaldeen et al. (2009) propose a model to assess organisational readiness and the contributing factors for knowledge management process adoption by integrating

the knowledge management infrastructure (organisational culture, structure and IT) and unified theory of acceptance and use of technology, and suggest that organisational readiness needs to be assessed by taking into consideration both organisational and individual factors. The proposal is still at the conceptual level and not yet empirically validated.

A comprehensive review of the knowledge management literature above reveals that very limited information is available on knowledge management readiness (in particular knowledge sharing). Moreover, previous studies report that there is a dearth of empirical research into knowledge-sharing readiness for construction organisations. In view of this, the above review of the literature confirms that the concept of knowledge-sharing readiness has to be explored. Based on the above discussion on the organisational readiness dimensions, this study explores the level of organisational readiness to setup and implement knowledge-sharing approaches. It is argued that different sizes of organisations may have different levels of readiness to setup and implement knowledge-sharing approaches. Hence, this study explores the level of readiness to setup and implement knowledge-sharing approaches in the context of SMEs and large Malaysian construction organisations. However, this study does not attempt to explore and explain every possible scenario that can be used to set-up and implement knowledge-sharing approaches, but provides guidance for the initial set-up of an organisation that is beginning to use knowledge-sharing approaches, along with a number of other suggestions that may help an organisation that wants to set-up and implement knowledge-sharing approaches somewhat differently. The detailed findings on the readiness of organisations to set-up and implement knowledge-sharing approaches will be discussed in Chapter 7.

2.3.6. The significance of knowledge sharing to organisation performance

The significance of knowledge sharing in any organisation is increasingly being realised. As a result, knowledge sharing is increasingly being incorporated in the management agenda and in organisational strategic choices. Knowledge sharing is becoming an important tool in staying ahead in the competition between organisations. A number of studies demonstrate that knowledge sharing has provided many advantages, from helping the organisation to maintain its sustainable competitive advantage to enhancing organisational performance. There are many opportunities

which will be created through knowledge sharing that can help maximize the ability of organisations to meet the needs of the industry and create solutions to problems to their business advantage (Reid, 2003). In fact, knowledge sharing is an important factor that influences organisational development and performance (Bakhari and Yusof, 2009; Yang, 2007). Previous research also suggests that knowledge sharing can reduce the loss of intellectual capital due to people leaving the company, reduce costs by decreasing and achieving economics of scale in obtaining information from external providers, reduce the redundancy of knowledge-based activities, increase productivity by making knowledge available more quickly and easily and increase employee satisfaction by enabling greater personal development and empowerment (Hussain, 2004). The empirical results of this study regarding the significance (benefits and importance) of knowledge-sharing approaches in the context of construction organisations are analysed and reported in Chapter 8.

2.3.7. Factors influencing organisational knowledge sharing

Despite the fact that knowledge sharing is needed in all types of organisation, knowledge sharing is not easy to implement for a variety of reasons. According to a growing number of scholars and practitioners (e.g. Cross et al., 2001; Von Krogh, 2000; Streatfield and Wilson, 1999), knowledge cannot be managed, but knowledge sharing can be supported by acting on certain contextual and organisational factors that influence knowledge flow. Knowledge management influencing factors (or enablers) are organisational mechanisms for intentionally and consistently fostering knowledge (Ichijo et al., 1998), they can stimulate knowledge creation, protect knowledge, and facilitate the sharing of knowledge in an organisation (Stonehouse and Pemberton, 1999). Appropriate enablers can enhance an organisation's ability to share knowledge (Pan and Scarborough, 1998). Many contextual factors prevent the nurturing of knowledge-sharing initiatives. There are some factors that can lead to the sharing process, which benefits many people and organisations (Teimouri et al., 2011). For example, the review of literature indicates that some factors have strong motivational power that influences the successful implementation of knowledge sharing in the organisation. Upon a critical review on factors affecting knowledge sharing, individual (Al-Mahamid et al., 2010; Wang and Noe, 2010; Riege, 2005; Ipe, 2003; Lee and Al-Hawamdeh, 2002), organisational (Islam et al., 2012; Teimouri et al., 2011; Martin and Martin, 2010; Er-ming, 2006; Kim and Lee, 2004; Ives et al., 2003; Spender, 1996) and

technological (Argote et al., 2003; Alavi and Leidner, 2001) factors are frequent mentioned in literature. Several researchers (Islam et al., 2012; Teimouri et al., 2011; Martin and Martin, 2010; Liu (2009); Er-ming, 2006; Kim and Lee, 2004; Ives et al., 2003; Spender, 1996) have identified a number of organisational factors that correlate with the adoption of knowledge sharing. Table 2.7 present reported relationships between organisational factors and knowledge sharing.

Table 2.7 : Relationship between organisational factors and knowledge sharing.

Author(s)	Independent variables	Relationship
Islam et al. (2012)	Learning and development, leadership commitment and formalisation	Positive
Teimouri et al. (2011)	Organisational structure, strategy, and technology	Positive
Martin & Martin (2010)	Organisational structure, culture and human resource practices	Positive
Liu (2009)	Organisational culture, organisational structure, IT technology, and Non-IT approaches	Positive
Er-ming (2006)	Management trustworthy behavior, organisational culture, and flexibe organisational structure	Positive
Kim & Lee (2004)	Organisational structure, culture, and information technology	Positive
Ives et al. (2003); Spender (1996)	Structure, culture, processes and strategy, and information technology	Positive

Teimouri et al. (2011) conducted an empirical study on the effective organisational factors on knowledge sharing between employees of governmental organisations in Isfahan Province culture context. The results indicate that organisational technology, strategy, culture, structure and process affect on knowledge sharing between employees of governmental organisations in Isfahan province.

Liu (2009) conducted an empirical study to explore the association between organisational culture, organisational structure, IT technology, and No-IT approaches as four main independent variables on the performance of knowledge sharing in two UK consultant firms and one China construction project. The results reveal that there are significant relationships between some of the variables and the performance of knowledge sharing.

Er-ming (2006) examined the influence of some organisational factors on the knowledge sharing of members in Chinese context, and discusses the implications of these factors for formulating organisational strategies that encourage knowledge sharing. He found that management trustworthy behavior, two categories of organisational culture (sociability and solidarity) and the flexibility of organisational structure positively influence organisational members' knowledge sharing behavior.

Islam et al. (2012) investigated organisational culture and structure on knowledge sharing in Malaysian MNCs which involve some key factors i.e., support and collaboration, learning and development, leadership and commitment, formalisation and centralization. The research findings indicate that out of the five independent variables, learning and development, leadership commitment and formalization are positively related to knowledge sharing. Kim and Lee (2004) analyse how organisational structure, culture, and information technology influence knowledge sharing capabilities in Korean public organisations. The results reveal that there are significant relationships between organisational structure, culture, and information technology and knowledge sharing

From the above discussion, it appears that an organisational factor does play an important role in improving knowledge sharing. Evidently, organisational factors do affect the implementation of knowledge sharing. Therefore, it is necessary for construction organisations to consider these organisation factors in implementing knowledge-sharing approaches within organisation. This study looks at the fundamental organisation factors, which are organisational structure, organisational culture and human resource practices, in the implementation of knowledge sharing. This study includes an adaptation of Egbu's (2003) structural factors (complexity, centralisation, formalisation and stratification), Hofstede's (1984) cultural dimension (power distance, uncertainty avoidance, collectivism, long-term orientation and masculinity) and Armstrong's (2006) human resource practices dimension (recruitment, reward, training and performance appraisal). The detailed findings for the degree of influence that organisational structure, culture and human resource practices play in the implementation of knowledge sharing in organisations is discussed in detail in Chapter 9. The next section discusses the context in which this study is based, the construction organisations.

2.3.8. Research into knowledge sharing in construction organisations

Although knowledge sharing has been widely discussed by many academics and practitioners (see Subsection 2.3.1), there is relatively little information on knowledge sharing as found in construction organisations. Knowledge sharing is not well defined in the literature, partially because the research area has not been very active (Oscar, 2011; Bechina and Bommen, 2006). In addition, there is not much literature that includes knowledge sharing as part of a company's key components, as knowledge sharing is considered difficult to measure (Christensen, 2007). But the bottom line is that knowledge sharing is critical to an organisation's success (Davenport and Prusak, 1998). In academia, several research papers have been published recently on knowledge sharing related to construction organisations. They are listed in Table 2.8.

Table 2.8 : Summary of recent publications on knowledge sharing in construction organisations

Main Theme	Topic	Author(s)
Human and organisational aspects of knowledge sharing	Human factors of knowledge sharing intention among Taiwanese enterprises: a preliminary study.	Tseng et al. (2012).
	Generations of knowledge management in the architecture, engineering and construction industry: An evolutionary perspective. Advanced Engineering Informatics, 24(2), 219–228	Rezgui et al. (2010)
	Exploratory study of knowledge sharing in contracting companies: a socio-technical perspective	Fong & Chu (2006)
	HRM strategies for promoting knowledge sharing within construction project organisations: a case study	Dainty et al. (2005)
	Sharing knowledge across professional boundaries in the architectural services department	Fong & Lo (2005)
ICT to facilitate knowledge sharing	Past, present and future of information and knowledge sharing in the construction industry: towards semantic service-based e-construction?	Rezgui et al. (2011)
	Why share knowledge? The influence of ICT on the motivation for knowledge sharing	Hendrix (1999)
Knowledge-sharing practices	Knowledge-sharing practices in construction organisation in Nigeria	Kasimu et al. (2013)
	Attitude toward knowledge sharing in construction teams.	Zhang & Ng (2012)
	Motivating knowledge sharing in engineering and construction organisations: power of social motivations	Javernick-Will (2012)

	Implementing the process of knowledge sharing for small construction consultant practices	Scully & Khosrowshahi (2011)
	Knowledge sharing practices as a facilitating factor for improving organisational performance through human capital: A preliminary test	Hsu (2008)
	Practices of managing knowledge sharing: towards a second wave of knowledge management	Huysman & De Wit (2004)
	Social practices and the management of knowledge in project environments	Bresnen et al. (2003)
	Sharing good practice across construction organisations: the search continues	Sarshar (2000)
Knowledge-sharing success factors	Knowledge sharing in a fragmented construction industry: on the hindsight	Alashwal et al. (2011)
	Case studies on knowledge sharing across cultural boundaries	Dulaimi (2007)
	Critical success factors for knowledge management studies in construction	Lin & Lin (2006)
Knowledge sharing and business performance	Framework of knowledge acquisition and sharing in multiple projects for contractors	Hu (2008)

In conclusion, Section 2.3 has discussed the perspectives of knowledge sharing, different approaches to knowledge sharing, challenges in setting up and implementing knowledge-sharing approaches, the readiness of the organisation to set up and implement knowledge-sharing approaches, the significance of knowledge sharing, factors influencing organisational knowledge sharing, and knowledge sharing applications in construction organisations. The next section discusses the context in which this study is based, the Malaysian construction organisiations.

2.4. Research Context

This section provides an overview of the Malaysian context, including the Malaysian construction industry (Subsection 2.4.1), the nature of Malaysian construction organisations as the justification for this research (Subsection 2.4.2), and the adoption of knowledge-management initiatives in Malaysia (Subsection 2.4.3). Finally, research into knowledge sharing in the Malaysian construction industry is discussed (Subsection 2.4.4).

2.4.1. Overview of the Malaysian construction industry

In Malaysia, construction means "new construction, alteration, repairs and demolition. Installation of any machinery or equipment which is built-in at the time of the original construction is included, as well as installation of machinery or equipment after the original construction but which requires structural alteration in order to install" (DOSM, 2003).

The Construction Industry Development Board (CIDB) is a body established to develop, improve and expand the Malaysian construction industry. The CIDB is a professional body established in 1994 representing a statutory board under the Malaysia Ministry of Works. One of the functions of the CIDB is to accredit and register contactor firms. It is mandatory for all contractors, whether local or foreign, to register with the CIDB before they undertake any construction work in Malaysia. The CIDB is given the responsibility to register the nation's construction personnel. From this registration, a database is created which can be used as a basis to outline directions and policies and facilitate the planning of the construction sector's human resource development programmes. Figure 2.3 shows that as of 31st December 2009, out of 595,781 full-time workers, 86% were categorised as construction workers, the managerial and professional group accounted for 3.8%, technical and supervisory workers 4.3%, while clerical and general workers accounted for 5.8% (DOSM, 2011).
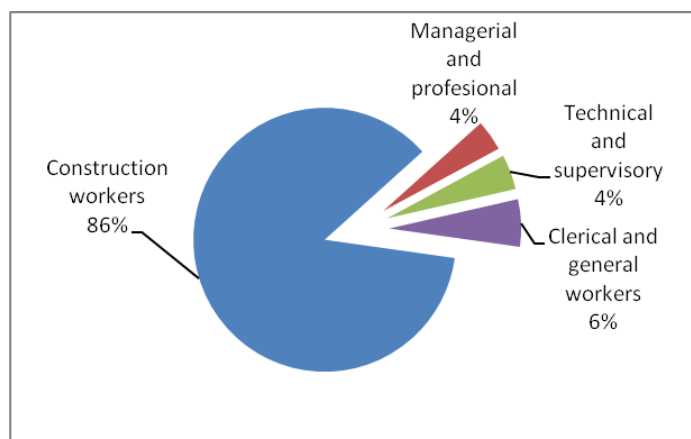
Figure 2.3: Employment in the Malaysian construction industry by category of workers, 2009. (Source: Report on the survey of construction industries, Department of Statistics Malaysia, Jun 2011).

2.4.2. Malaysian construction organisations

Construction organisations in this study is refer to contractors in Malaysia. The discussion focuses on contractors, as they are the dominant party in the industry (Table 2.9). In addition, due to the nature of construction, contractor organisations typically operate over a number of geographical regions under a collective brand, affording them a degree of independence (Raiden and Dainty, 2006). With this fragmented system, the contractor culture operates under a 'knowledge is power' hoarding methodology (Williams, 2012). Furthermore, personnel in contractor organisations prefer to perform their tasks in project management based on past experience and advice passed down from mentors rather than on written standard procedures or textbooks or established analysis (Tupenaite et al., 2008). Knowledge in construction industry is therefore mostly in the heads of knowledgeable workforce and is lost when the workforce relocates or retires (Noordin et al., 2012).

In Malaysia, the majority of the contractors (i.e. almost 90%) are classified as small and medium-sized firms (i.e. G6 category and below – Table 2.13). The estimated number of contractors registered with CIDB is shown in Table 2.13.

Table 2.9 : Estimated numbers of construction organisations in Malaysia

Discipline	Registered construction organisations
Architect firms	1424
Engineering firms	1837
Quantity surveying firms	313
Contractor firms	64,593

Source: Malaysia Country Report (2010)

Types of contractors in Malaysia

The Malaysian construction industry is generally separated into two areas: general construction, which comprises residential construction, non-residential construction and civil engineering construction. The second area is special trade works, which comprises activities of metal work, electrical work, plumbing, sewerage and sanitary work, refrigeration and air-conditioning work, painting work, carpentry, tiling and flooring work, and glass work. The contractors in Malaysia are composed of three separate specialisations, as shown in Figure 2.4. These are classified further as specialist categories: building construction (B), civil engineering construction (CE), mechanical and electrical construction (ME). These specialist categories are further subdivided into subspecialties (Appendix H). As per a CIDB ruling, a construction company can be registered in more than one category and subspecialty within one grade (tendering limit) as long as it satisfies the registration requirements, as per Figure 2.4 below.
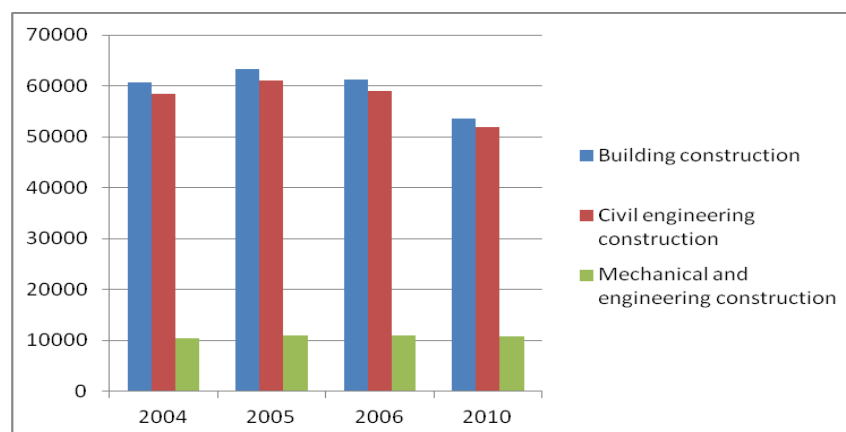
Figure 2.4: Malaysian contractors' registration by specialisation

Definition of size of organisations in Malaysia

Before the formation of the Malaysia National SME Development Council (NSDC) in June 2004, there was no standard definition of small and medium enterprises (SMEs) in use in Malaysia. A broad definition of SMEs is provided, along with specific definitions for micro, small and medium enterprises. For wider coverage, businesses are considered as SMEs as long as they meet either the threshold set for annual sales turnover, or the number of full-time employees (Bank Negara Malaysia, 2005). According to the NSDC (2005), for consistency and comparability of data across sectors, the working definition for SMEs in the mining and quarrying sector and construction sector is based on the SME definition for the services sector (see Table 2.10 and Table 2.11).

Table 2.10 : Summary of the approved SME definitions in Malaysia based on the number of full-time employees.

Sector / Size	Primary agriculture	Manufacturing (including manufacturing agro-based & manufacturing related services)	Service sector (including ICT, mining and quarrying, and construction sector)
Micro	Less than 5 employees	Less than 5 employees	Less than 5 employees
Small	Between 5 & 19 employees	Between 5 & 50 employees	Between 5 & 19 employees
Medium	Between 20 & 50 employees	Between 51 & 150 employees	Between 20 & 50 employees

Source: Bank Negara Malaysia (2005).

Table 2.11 : Summary of the approved SME definitions in Malaysia based on annual sales turnover

Sector / Size	Primary agriculture	Manufacturing (including manufacturing agro-based & manufacturing related services)	Service sector (including ICT, mining and quarrying, and construction sector)
Micro	Less than 200,000	Less than 250,000	Less than 200,000
Small	Between 200,000 & less than 1 million	Between 250,000 & less than 10 million	Between 200,000 & less than 1 million
Medium	Between 1 million & 5 million	Between 10 million & 25 million	Between 1 million & 5 million

Source: National SME Development Council (NSDC, 2005).

Definition of size of organisation in the Malaysian construction sector

Defining the size of an organisation in construction services based on the definition by the NSDC does not reflect the true size of the construction companies in Malaysia (CIDB, 2006). To show the exact picture of the size of Malaysian contractor companies, CIDB Malaysia recommends that the definition for SMEs in the construction sector should be based on paid-up capital or tendering capacity for the following reasons:

- Contractors registered with the CIDB are awarded grades of registration from G1 to G7, G1 being the lowest grade and G7 the highest. These grades reflect the tendering capacity of the construction firm, whereby Grade G1 may tender only for projects less than RM200, 000 and in the other extreme, Grade G7 companies have no tendering limits. Therefore, a construction firm cannot undertake contracts exceeding the value that it is registered for.

- A construction company therefore adopts a structure based on its grade of registration and therefore their financial or tendering capacity. As their order book expands they can then apply to be upgraded to a higher grade of registration, thus increasing their financial and tendering capacity.

- The different grades of registration are awarded based on criteria such as the financial capacity (paid-up capital), personnel resources and track record (experience and performance) of the company. The different grades of registration reflect the financial and tendering capacity of the company and therefore its size. Table 2.12 shows the value of the work which approved construction companies can tender for; construction companies can apply for promotion to a higher grade.

Table 2.12 : Contractors' classification according to tendering capacity and paid-up capital

Grade of registration	Tendering capacity (MYR)	Paid-up Capital/net capital (MYR)	Contractor category/size
G7	No limit	RM 750,000 (USD247,500)	Large
G6	Not exceeding 10 million (USD 3.3 million)	RM 500,000 (USD165,000)	Large
G5	Not exceeding 5 million (USD 1.65 million)	RM 250,000 (USD82,500)	Medium
G4	Not exceeding 3 million (USD 990,000)	150,000 (USD49,500)	medium
G3	Not exceeding 1million (USD 330,000)	RM 50,000 (USD16,500)	Small
G2	Not exceeding 500,000 (USD 165,000)	RM 25,000 (USD8,250)	Small
G1	Not exceeding 200,000 (USD 66,000)	RM 5,000 (USD1,650)	Micro

Source: CIDB Malaysia (2010)

General Definition of SME contractor firms by CIDB Malaysia

A small and medium enterprise in the construction industry is an enterprise with paid-up capital not exceeding MYR250, 000 or tendering capacity not exceeding MYR5 million.

Specific definition by CIDB Malaysia

- A micro enterprise in the construction industry is an enterprise with paid-up capital of less than MYR5, 000 or tendering capacity of less than MYR200, 000.

- A small enterprise in the construction industry is an enterprise with paid-up capital of between MYR5,000 and less than MYR50,000 or tendering capacity between MYR200,000 and less than MYR1 million.

- A medium enterprise in the construction industry is an enterprise with paid-up capital of between MYR50, 000 and less than MYR250, 000 or tendering capacity between MYR1 million and MYR5 million.

According to the CIDB (2006), defining SMEs in the construction industry based on the company's financial or tendering capacity is a better reflection of its true size and its capacity to undertake the various aspects of construction projects. Based on contractor registration records with the CIDB, the number of contractors registered is increasing year by year. In 2012, a total of 69,490 contractors registered with the CIDB (CIDB,

2013). Of this total, 52% were micro contractors, i.e. those in the G1 category, who are qualified to tender for projects valued at less than MYR200,000; (27%) were small contractors, i.e. those in G2 and G3 categories; 10% were medium (G4–G5); whilst only 9% (6,836) were big contractors (G6–G7). The status of contractors registered with the CIDB in different grades as at 2012 is shown in Table 2.13 and Figure 2.5.

Table 2.13 : Number of contractors registered with the CIDB

Grade	Tendering Capacity	Annual turnover	2010	2011	2012
G1	Not exc. 200,000	5,000	32,987	32,752	36,399
G2	Not exc. 500,000	25,000	8,077	8,187	8,665
G3	Not exc. 1 million	50,000	10,761	10,437	10,351
G4	Not exc. 3 million	150,000	2,766	2,686	2,922
G5	Not exc. 5 million	250,000	3,962	3,817	4,317
G6	Not exc. 10m	500,000	1,507	1,398	1,692
G7	No Limit	750,000	4,533	4,573	5,144
	Total		64,593	63,850	69,490

Source: CIDB Malaysia (2013)
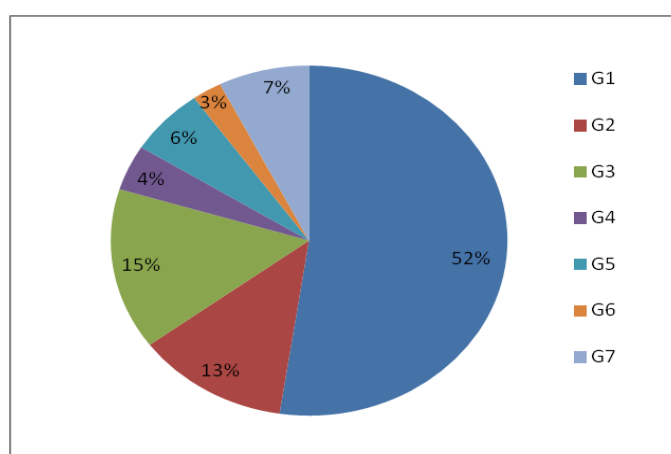
Figure 2.5: Malaysian contractor population by grade
Source: CIDB Malaysia (2013)

2.4.3. The adoption of knowledge management in Malaysia

Knowledge-based economies (K-economies) came into existence only in the 20th century (UNECE, 2002). However, in Malaysia, despite agriculture being the core industry of the country, efforts at transforming Malaysia into a K-economy began in the early 1990s. Malaysia started to lay the foundations of a K-economy in the mid-1990s, with, among others, the launch of the National IT Agenda (NITA) and the Multimedia Super Corridor (MSC). Efforts have also been made in the areas of human resources, science and technology, research and development, infrastructure and financing, as well as ensuring that the development of the K-economy did not result in a knowledge divide.

In 1991, the former prime minister of Malaysia, Mahathir Mohammad, stressed the need for the country to develop a K-economy. At the same time, various information and computer technology-based initiatives were initiated to enhance the country's competitiveness. The K-economy can be seen as knowledge management at the macro level, thus the government is putting in efforts to ensure that the K-economy is the way of life for Malaysians in the near future, since globalisation requires individuals to become knowledge workers in order to maintain a competitive edge for them and for the organisation that is "renting" their knowledge (Leng, 2005). As deputy prime minister of Malaysia in 2006, Najib mentioned "the discipline of knowledge management is very relevant for Malaysia, especially its move to transform its economy into a K- economy, as envisaged in vision 2020. This knowledge should serve as a launching platform for greater public-private sector collaboration, and the government strongly supported the enlarged roles played by the private sectors" (Bernama, 2006). However, Abdul-Rahman and Wang (2010) argue that knowledge management does not merely act as a stepping stone for the construction industry to strive towards a K-economy, but it is an initiative to meet future challenges.

The Third Outline Perspective Plan, 2001-2010, clearly spells out Malaysia's aim to develop a K-economy as a means to advance its economic growth and competitiveness. To this end, the K-economy Master Plan was officially launched in 2002. This master plan has a vision for the Malaysian construction industry to be world class by 2015, with the aim to transform Malaysia from a production-based economy to a K-economy.

Having a K-economy will strengthen Malaysia's capability to innovate, adapt and create indigenous technology, and design, develop and market new products, thereby providing the foundation for endogenously driven growth (Knowledge-based Economy Master Plan, 2002).

In Malaysia, the vision for the construction industry to be a world class, innovative and knowledgeable global solution provider has been formulated in accordance with the objectives and goals of Vision 2020 (CIDB, 2007). The Construction Industry Master Plan (CIMP 2006-2015) was launched in December 2007 and served as a guideline to turn Malaysia's construction industry into a more dynamic, robust and resilient service. It is intended to provide the industry stakeholders with a clear direction of the Malaysian construction industry through a clearly defined vision, mission, critical success factors, strategic thrusts, recommendations and action plans (CIDB, 2007). The CIMP is also intended to ensure that the construction industry is well positioned to support the nation's overall economic growth and in meeting various challenges, such as the need to enhance productivity and quality along the entire construction industry value chain. The current challenges faced by the construction industry in the country include low productivity, fragmentation, bureaucratic delays, shortage of skilled manpower as well as lack of data and information (CIDB, 2007). In order to achieve the overall strategic direction, seven Strategic Trusts have been developed, and for each Strategic Trusts specific recommendations have been developed to address the key issues identified. The stress on knowledge, and encouragement of knowledge sharing for continuous improvement, underlies Strategic Trust number 5 and 6 of the CIMP, as summarise in Table 2.14 below:

Table 2.14 : Strategic Trusts

Trust	Recommendations
ST1	Integrate the construction industry value chain to enhance productivity and efficiency.
ST2	Strengthen the construction industry image
ST3	Strive for the highest standard of quality, occupational safety and health and environmental practices
ST4	Develop human resource capabilities and capacities in the construction industry
ST5	Innovate through research and communication technology in the construction industry
ST6	Leverage of information and communication technology in the construction industry
ST7	Benefit from globalisation including the export of construction products and services

In addition, on 1st August 2008, CIDB Malaysia started to implement the Malaysian Contractor Continuous Development (CCD) programme, which emphasised knowledge as the key element to improve the performance and efficiency of contractors. The CCD programme was developed with the objective of enhancing contractors' knowledge and efficiency in various aspects of management and enhancing networking among contractors through various construction industry activities. The programme features a point-collection system known as CCD Points, which are allocated through contractors' involvement in various events and activities organised either by the CIDB or promoters registered with the CIDB. Contractors have to attend mandatory courses every year to enhance their competency and efficiency. The courses, to equip the contractors with the right attitude, skills and knowledge, are also meant to inculcate a lifelong learning culture among construction employees. Contractors are required to collect points throughout their CIDB registration validity period and the accumulated points are taken into account in evaluating their registration renewal. Parallel with the direction and policy of the Malaysian government described above, the need for contractors to embark seriously on the implementation of knowledge management practices is accurate and timely. In light of this scenario, the contractors, as role models for construction organisations, should become competent enough not only to execute the agenda given in the CCD and Vision 2020, but also to perform steadily in the real world.

Nevertheless, despite the Malaysian government's encouragement and the fast growth of construction organisations, managing intellectual wealth is still new in Malaysia. Research done by Noordin et al. (2012) and Chowdhury (2006) revealed that most Malaysian construction organisations do not have formal knowledge management in place. As noted by Chowdhury (2006), "what is lacking at the moment is a comprehensive report on knowledge management adoption in Malaysian construction organisations, as well as a comprehensive list of local companies that have implemented knowledge management practices".

2.4.4. Research into knowledge management and knowledge sharing in Malaysian construction organisations

Recently, many knowledge management studies have been done in diverse sectors in Malaysia; for example, the service and manufacturing industries (Wong, 2009; Wong and Aspinwall, 2005), IT service companies (Chong, 2006; Gan et al., 2006; Chong and Choi, 2005; Raja Suzana, 2005; Bontis et al., 2000), the telecommunication industry (Wei et al., 2009; Chong et al., 2007), public organisations (Raja Suzana, 2010; Zawiyah et al., 2012; 2008; Raja Suzana and Rahim, 2008; Salleh and Ahmad, 2005; Ikhsan and Rowland, 2004a; 2004b; Salleh et al., 2006), the oil and gas industry (Abdul Aziz and Lee, 2007; Ahmed and Chowdhury, 2005), the banking industry (Tan et al., 2010; Hafizi and Nor Hayati, 2006; Hafizi and Zawiyah, 2004) and the education sector (Sharimilah et al., 2007; Sirajuddin et al., 2006) have now started their knowledge management journey. Most of the organisations studied revealed that the link between knowledge management, business benefits and the bottom line is almost self-evident, especially amongst those who are enthusiastic advocates of knowledge management.

Although knowledge management has been accepted in principle in the majority of industries in Malaysia, awareness in the Malaysian construction industry remains low (Mohamed et al., 2007). Studies of knowledge management in Malaysian organisations are limited, especially in construction organisations. Moreover, the relatively few studies of knowledge management in Malaysia tend to be conceptual or theoretical with no primary research having been conducted (Gan et al., 2006). Most Malaysians do not understand well about knowledge management and it functions (Blankenship et al., 2009 as cited in Mohamed Yusoff et al., 2012). One of the earliest studies of knowledge management in Malaysia indicated that Malaysian organisations tend to be slow on the uptake of knowledge management and that knowledge management is still in its infancy (Chowdhury, 2006; Yahya et al., 2001). Bate and Robert (2002) confirms that construction organisations, traditionally slower to embrace knowledge management practices, are only beginning to recognise the importance of knowledge. There is as yet little published research about its implementation in this context (Bate and Robert, 2002). It is suspected that the slow response to knowledge management and knowledge sharing implementation in the Malaysian construction industry is not caused by a lack of knowledge but because of little awareness in exploiting available knowledge (Chowdry, 2006). Exposure and more understanding of the benefits of knowledge

management and knowledge sharing is needed to encourage construction organisations to take a leap of faith. The development of knowledge sharing by Malaysian construction organisations is therefore vital to achieve improvement within the industry.

Several studies have been conducted during the last ten years that review knowledge management strategies and knowledge sharing practices in Malaysian construction organisations (see Table 2.15). These studies have revealed interesting features that are peculiar to the Asian culture and seem to have implications for Malaysian construction organisations in the area of knowledge management and knowledge sharing. Malaysia provides an interesting study in this regard. Malaysia is conservative in adhering to Asian cultural traditions and at the same time open to innovation and creativity. It is a diverse and multi-ethnic society that is eager to stick to meritocracy and system efficiency in it pursuit of innovation and creativity. There is a dearth of research studied in relation to the construction organisations in Malaysia. Thus, the study tried to exploring the issues relate to construction organisations in Malaysia when managing their knowledge in order to improve construction organisations performance.

Table 2.15 : Summary of recent publications on knowledge sharing in Malaysian construction organisations

Author(s)	Topic
Noordin et al. (2012)	The current state of information management and knowledge management in the Malaysian construction industry.
Ali et al. (2012)	Investigation of key success factors in knowledge management in Malaysian firms.
Alashwal et al. (2011)	Knowledge sharing in a fragmented construction industry: in hindsight.
Abdul-Rahman &Wang (2010)	Preliminary approach to improving knowledge management in engineering.
Asmi (2009)	Malaysian practitioner's perception of knowledge management in construction consulting companies.
Majid (2006)	Knowledge management framework for Malaysian construction consulting companies.

2.5. Conclusions and recommendations

This chapter presents an extensive review of knowledge management and knowledge sharing within the context of construction organisations. In the early part of this chapter, an overview of the theoretical foundations of studying knowledge management in organisations is discussed, providing an overview of the nature and management of knowledge. This chapter also described knowledge sharing in organisations and its importance in the organisational context. This elaboration provides a further foundation and direction for the study of knowledge sharing in constructions organisation for improved performance.

From the discussions throughout the chapter, the following conclusions can be made:

- Knowledge sharing has a major role to play in improving organisational performance.

- In order to better reflect features and needs of improving knowledge-sharing approaches in SMEs and large construction organisations, there is a need to investigate the challenges and readiness in setting up and implement knowledge-sharing approaches, understanding of the significance of knowledge sharing, and the enables for successful implementation of knowledge sharing in organisation as there is little or no empirical research in this area. Empirical results are discussed in chapters 5, 6, 7, 8 and 9.

Having discussed and reviewed these issues, the next chapter presents the perception of construction organisations and managers towards knowledge-sharing approaches.

CHAPTER 3.   THE PERCEPTION ON KNOWLEDGE-SHARING APPROACHES

3.1. Introduction

This chapter presents the second part of the literature review. The main focus of this chapter is to review the general perceptions of construction organisations on knowledge-sharing approaches. A variable for knowledge-sharing approach is proposed in this chapter and the variables under consideration in this research are discussed individually. Overall, Chapter 3 aim to fill the first objective of the study (see Table 1.1 in Chapter 1): "To critically review the literature and document the perceptions of construction organisations (small, medium and large) towards knowledge-sharing approaches".

Accordingly, the chapter is structured as follows:

- Section 3.2 reviews the literature on organisational size and knowledge-sharing approaches.

- Section 3.3 presents a review of literature on the perceptions of construction organisations towards knowledge-sharing approaches.

- Section 3.4 discusses the proposed knowledge-sharing approaches for construction organisation in the context of present study.

- Section 3.5 concludes by summarising the key findings of the study.

3.2. Organisational size and knowledge-sharing approaches.

This section begins with a literature review on organisational size and knowledge-sharing approaches. The review of literature on organisational size provides a broad contextual overview of characteristics of the SMEs and large organisations, while demonstrating the possible impact of organisational size on the adoption of knowledge-sharing approaches. The number of employees has been employs as a common tool of classifying organisations (refer Subsection 4.5.2 in Chapter 4 of the thesis).

Organisational size has been proposed as a significant antecedent of adoption in many knowledge management and knowledge sharing studies (Uhlaner and Van Santen, 2007; Strach and Everett, 2006; Moffett and McAdam, 2006; Sveiby and Simons, 2002; McAdam and Reid, 2001). For example, Sveiby and Simons (2002) suggested that the size of an organisation influenced the effectiveness of knowledge-sharing initiatives. It was argued that the size of an organisation may influence internal knowledge sharing (Strach and Everett, 2006). Uhlaner and Van Santen (2007) found evidence for a positive relationship between size and formalised knowledge-management strategies. While some knowledge-sharing studies suggest a positive relationship between organisational size and the adoption of knowledge-sharing initiatives, a negative relationship between organisational size and knowledge sharing has also been reported, for example, Connelly and Kelloway (2003) demonstrated empirically a negative relationship between organisational size and knowledge-sharing initiatives resulting from changes in social interactions. Serenko et al. (2007) suggested that, as the size of an organisational unit increases, the effectiveness of internal knowledge flows dramatically diminishes and the degree of intra-organisational knowledge sharing decreases.

Prior research on organisational size has discusses the distinctive unique needs of organisations based on its size (Lai 1994, Delone 1988, Raymond 1985). In the past, most scholars have studied knowledge management issues in large organisations leaving out SMEs because large organisations were the leading knowledge management force (Wong, 2008; Chen et al., 2006). SMEs are falling behind large companies in developing knowledge-management strategies and benefits of knowledge management has not fully exploited by these firms (Evangelista et al., 2010; Nunes et al., 2006). Wong and Aspinwall (2004) conclude that most small businesses lack the understanding of key knowledge management concepts and are slow in implementing formal knowledge sharing. Nunes et al. (2006) asserted that small business face substantially more difficulties to adoption of knowledge-management principles than large businesses. Beijerse (2000); McWilliams (1996); Welsh and White (1981) also argued that small businesses usually endure more restrictions, such as lack of resources, financial constraints, lack of experts, and management with short-term insight. The time and resources required for more developed technological knowledge sharing were found to be largely lacking in SMEs (Sadler-Smith et al., 1998). The lack of use of more

sophisticated technology based knowledge sharing, such as multimedia, divergent databases and creativity techniques support this argument (Corso et al., 2003; Moffett et al., 2003).

On the one hand, it has been convincingly argued that large organisations have more resources for formal knowledge sharing development and employee involvement (Sadler-smith et al., 1998) than SMEs. Carrillo and Chinowsky (2006) investigated the knowledge management practices of SMEs and large US engineering design and construction organisations found that smaller companies find it more cost effective to rely on local, accessible pools of knowledge and thus do not need the sort of IT and HR infrastructure required by the larger organisations. However, study done by Moffett and McAdam (2006) indicate that knowledge sharing can be applied to small organisations without innate effects of lack of resources and skills, however, while many knowledge-oriented issues are applicable to all organisations, the manner in which they are addressed differ slightly depending on the organisation size.

Although larger organisations have dominated the knowledge management and knowledge sharing literature, there is evidence that more SMEs are adopting knowledge management strategies to attempt to move ahead of their rivals (Staplehurst and Ragsdell, 2010). It was recognised that the peculiarities of SMEs mean that they 'do' knowledge management differently from large companies (Supyuenyong et al., 2009; Basly, 2007; Desouza and Awazu, 2006; McAdam and Reid, 2001). Even though smaller organisations are less advanced at launching formal knowledge-management strategies and have lower knowledge management investment rates, similarly to large organisations, they encourage direct dialogue among employees as part of knowledge-management strategies and facilitate informal discussions that are critical for knowledge sharing (Desouza and Awazu, 2006; McAdam and Reid, 2001).

The debate over whether small or large organisations are more successful at adopting knowledge-sharing approaches continues in the popular press. Much of this debate takes place in different industrial settings, with very little in the construction industry sector. Having discussed the impact of organisational size on the adoption of knowledge-sharing approaches in organisation, the following sections review the previous research on the perception of SMEs and large construction organisations towards knowledge-sharing approaches.

3.3. The perceptions on knowledge-sharing approaches – a review of literature

Perception, is defined by Robbins et al. (2011, p. 144) as "a process by which individuals organise and interpret their sensory impressions in order to give meaning to their environment". This definition implies that an individual's response in describing knowledge-sharing approaches may not be identical with others even though they are in the same organisation. Schermerhorn et al. (2008, p. 81) further suggest that: "Through perception, people process information inputs into responses involving feelings and action. Perception is a way of forming impressions about oneself, other people, and daily life experiences. It also serves as a screen or filter through which information passes before it has an effect on people. The quality or accuracy of a person's perceptions, therefore, has a major impact on his or her responses to a given situation". Thus, perceptions on what reality is, govern employee's behaviour as Robbins et al. (2011, p. 144) suggest that "the world as it is perceived is the world that is behaviourally important". Manager's perceptions that represent the general view of organisations can, therefore, be considered as an effective measurement tool to demonstrate improvement of successful knowledge sharing within organisation. It is hoped that this research may provide an "organisations" understanding of the associations among the proposed approaches in supporting organisational knowledge management strategies.

There are many ways to support knowledge sharing. Oxford dictionary (1994) defines an "approach" as 'a way of dealing with a situation or problem'. Reviewing the knowledge management literature has revealed a number of different definitions of "approach". Clarke and Rollo (2001) describe the different approaches adopted by various companies as "knowledge management initiatives", which incorporate the shared characteristic of a company's commitment to developing the production and flow of knowledge, and the dissemination and use of knowledge to create economic value. Another definition given by Bishop et al. (2008) define knowledge management "initiative" denotes a holistic approach to managing knowledge. Zanjani et al. (2008) however, define knowledge management strategy depicts the general approach an organisation aim to take to align its knowledge resources and capabilities to the intellectual requirements of its strategy, thus reducing the knowledge gap existing between what a company must know to perform its strategy and what it does know.

However, the "approaches" term is different from the term "system" or "tool", which is often used in knowledge management literature to describe either different media or IT-technology oriented approaches to knowledge management. A "knowledge-sharing approaches" is therefore the term utilised in this study to describe an organisation's initiative to sharing its organisational knowledge that includes both formal and informal approaches. The knowledge management strategies and the implementation were investigated in order to understand the approach that construction organisations have adopted for their knowledge-sharing initiatives.

Knowledge sharing has been conceptualised as involving two distinct ways of transferring knowledge across organisations. The first ways to sharing knowledge is from written documents that may be available in paper or in electronic format (Hansen and Haas, 2001). Sharing via written documents is more appropriate for knowledge that can be readily codified (Wintern, 1987). This document to person sharing is the separation between the provider and receiver. The receiver of the document does not have to contact or speak to the provider directly but can be use the document as a standalone resource. This type of knowledge sharing may be labels as formal approaches. Research on formal approaches to knowledge sharing has examined issues such as explicit knowledge can be shared more easily through many formal methods of training and development (Connolly and Thorn, 1990) and strategies for gaining attention in an overloaded marketplace for explicit knowledge (Hansen and Haas, 2001).

The second ways to sharing knowledge is through direct contact between individuals, when one person advises another about how to complete specific task (e.g. Cummin and Cross, 2003, Tsai 2002, Hansen 1998). This person-to person sharing is that the handover of knowledge required direct contact between the provider and receiver of knowledge, in meeting by phone or via email. Because it involves direct contact such sharing allows for the transmission of tacit knowledge, which is knowledge that has both been fully articulated in written (Von Hippel, 1988). This type of knowledge sharing may be called informal approaches. Research on tacit knowledge has emphasized the role of social networks and communities of practice in facilitating knowledge sharing (Reagans and McEvily, 2003; Hansen, 1999; Brown and Duguid, 1998). Dixon (2000) emphasised that the selection of the appropriate knowledge sharing approaches within an organisation depends on the type of knowledge (explicit or tacit),

the routine and frequency of the sharing approach, and the knowledge receiver (individual, group or the whole organisation).

A study by Hutchison and Quintas (2008) examined the distinction of knowledge management processes between SMEs and large construction organisations and found that larger organisations are more ready to adopt formal approaches to knowledge sharing. They indicate that many formal knowledge-sharing approaches focus on technological system (such as IT systems as opposed to person-based initiatives) that are costly and are designed specifically for the larger organisation. Indeed these two factors i.e. differing needs (and therefore inappropriate existing knowledge sharing solutions) and high cost, suggest that formal knowledge-sharing approaches may be less suited to the internal processes of smaller construction organisations. Overall, small organisations are more likely to encounter more resource based difficulties than that of large organisations in attempting to implement formal approaches to knowledge sharing. Therefore, a size effect on the formality and informality of knowledge-sharing approaches is likely to exist.

It was suggested by Hutchison and Quintas (2008) that smaller organisations have a lesser need for establishing formal knowledge-sharing approaches since their structure is flatter and less bureaucratic that better facilitates knowledge sharing on its own. Hutchison and Quintas (2008) assert that formal knowledge-sharing approaches are less likely to found in SMEs than large organisations, partly because small organisations do not have the inherent internal knowledge sharing and communication problems of large organisations. SMEs tend to provide an environment that is conducive to generating knowledge, mainly due to their size, often single site location, and closer social relationships of employees, resulting in good communication flows and knowledge sharing (Riege, 2005).

3.3.1. Towards a typology of knowledge-sharing approaches in the context of present study

A broad range of knowledge-sharing approaches has been mentioned in the literature (see Tables 3.1, 3.2 and 3.3). However, no systematic work exists on characterising a collective set of knowledge-sharing approaches in the construction organisations context. An appropriate knowledge-sharing approach which is relevant for the construction organisations will help them to keep in mind the important issues that

should be dealt with when designing and implementing a knowledge-sharing initiative. Based on the preceding discussion, typologies of knowledge-sharing approaches employ by organisations were proposed to facilitate knowledge sharing, which can be broadly classified under formal and informal knowledge-sharing approaches.

In definition, Hutchinson and Quintas (2008) noting that formal knowledge management concerns policies, plans, structures, initiatives, projects and practices that are named and governed by the concepts of knowledge management. In contrast, the informal management of knowledge refers to practices that are concerned with knowledge processes, but are not so rigid or constituted. That is, the practices exist without use of the concepts or terminology of knowledge management (Hutchinson and Quintas, 2008).

Taminiau et al. (2009) define formal knowledge-sharing approach as all the forms of knowledge sharing that are institutionalised by management. These include resources, services and activities, which are designed by the company or organised with the aim of knowledge sharing or of learning from each other (organisational learning). Further, Taminiau et al. (2009) define informal knowledge-sharing approach as all forms of knowledge sharing which exist alongside all the institutionalised forms of knowledge sharing. It relates to resources, services and activities, which might not necessarily be designed for that purpose, but nonetheless, are used to facilitate knowledge exchange.

Formal approaches to knowledge sharing provide individuals with a structured environment in which to share knowledge. Okhuysen and Eisenhardt (2002) identify some formal interventions that encourage knowledge sharing in organisations, from basic instructions to share knowledge, to more complex interventions such as the Nominal Group techniques and Delphi technique. Formal interventions and opportunities not only create a context for knowledge sharing but also provide individuals with the tools needed to do so. However, according to Nonaka and Takeuchi (1995), knowledge shared through formal channels tends to be mainly explicit in nature such as the use of procedure, formal language, and the exchange of handbooks. Formal approaches to knowledge sharing provides the advantage of being able to connect to large numbers of individuals and they allow for the speedy dissemination of shared knowledge, especially through electronic network and other technology based systems.

Constant et al. (1996) and Hickins (1999) have all presented empirical evidence for successful knowledge sharing through formal approaches.

An organisation's capacity to share knowledge among its individuals and teams and to apply that shared knowledge is increasingly viewed as a vital source of competitive advantage in many industries (Grant, 1996). This importance is reflected in the large number of organisations that over the last two decades have implemented formal approaches to knowledge management designed to facilitate this process (Voelpel et al., 2005; House and Bell (2001). The implementation of formal approaches to knowledge management has been demonstrated to have significant and meaningful effects on a range of relevant business outcomes (Cappelli, 2010).

Although formal approaches to knowledge sharing play an important role in facilitating knowledge sharing, research indicates that knowledge is mostly shared in informal settings - through informal approaches (e.g. Reychav and Te'eni, 2009; Riege (2005); Chaudhry, 2005; Scarborough et al., 1999). Riege (2005) assert that a knowledge sharing strategy may not necessarily need any formal approaches to perform well, because many people collaborate, share information and teach one another naturally in informal situations, not because managers tell them or forces them to do so but because internal business environments have become more competitive and faster moving and people increasingly depend on each other's knowledge to complete their jobs (e.g. marketing teams) or complete them faster (e.g. new product development teams). As suggested by Davernport (1994), "most managers don't rely on computer based information to make decisions. [they] get two-thirds of their information from face-to-face or telephone conversations; they acquire the remaining third from documents, most of which...aren't on the computer system."

The next aspect of knowledge sharing is "learning by doing". In order to do that, it is important to recognise the ways that knowledge is being shared, for example through informal network (relationship-base, community of practices, storytelling), informal settings (design of the physical office layout, social events), and informal communications (face-to-face social interaction). By sharing their experiences in these informal approaches, employees learn from each other and can develop common solutions. In existing researches there seems to be an overlap between informal knowledge sharing, informal communication and the conceptualisation of an informal

network (Taminiau et al., 2009; Awazu, 2004; Bresnen et al., 2003). Bartol and Srivastava (2002) refer informal approaches to knowledge sharing as "formal interaction," and Rulke and Zaheer (2000) call them "purposive learning channels" which are designed for explicit knowledge acquisition and dissemination. Rulke and Zaheer (2000) define these informal approaches to knowledge sharing as a "relational learning channel". Informal knowledge-sharing approaches is importance because no sophisticated infrastructure is required although some approaches required more resource than other (e.g. training requires more resource that face to face). Moreover, informal approaches are easy to implement and maintain due to their simple and straightforward nature.

Organisations usually use a combination of formal and informal approaches to share knowledge (Hutchinson and Quintas, 2008; Jewels et al., 2003). Few studies have concluded that the combination of formal and informal approaches to knowledge sharing contributes to effective organisation performance (Azudin et al., 2009; Malhotra, 2003). Hence, for this research, both formal and informal approaches to knowledge sharing are taken into account.

Given the above discussions, for the purpose of the study, formal approaches to knowledge sharing can be defined as initiatives that are well defined, structured, systematically organised; using formal knowledge-sharing approach and usually presented in written forms. Such initiatives often embody policies transpiring the life span of an organisation and should ideally not be rigid so as to accommodate changes that may occur in tandem with the organisational environments. It reflects internal knowledge within an organisation and aspires towards continued improvement. Informal approaches to knowledge sharing however can be defined as initiatives that are unstructured, not organised in form, occurring in ad hoc fashion and often undocumented or labelled as knowledge sharing. It reflects internal networking knowledge and occasionally results from external communications with the aim of improving internal knowledge sharing. Informal knowledge sharing may occur spontaneously without any official assistance from the management. Table 3.4 shows the operational definition for formal and informal approaches to knowledge sharing in the context of the present study.

Since one knowledge-sharing approach has different characteristics from the other, organisations need to identify their knowledge-sharing approach first before they commit to implementation of the knowledge-sharing initiatives. Different knowledge-sharing approach will require different methods and different tools. Knowledge-sharing approaches however require organisations to invest a significant amount of time and resources to put in place supporting infrastructure, systems, routines rules and procedures, artefacts, and organisational structure and strategy. Discussions related to the proposed knowledge sharing-approaches are presented in the following sections.

3.4. Propose knowledge-sharing approaches for construction organisation.

An in depth literature review indicated that numerous approaches used by organisations for sharing knowledge. In this study, items used to operationalise the constructs for formal and informal knowledge-sharing approaches were mainly adapted from previous studies on knowledge management and modified for use in the knowledge sharing context, especially those of Wei et al. (2009); Goodwin (2009); Steyn and Kahn (2008); Wong (2008); Olomolaiye et al. (2004); Egbu et al. (2003); Liebowitz and Wright (1999); Ruggles (1998); and Allee (1997). For informal approaches to knowledge sharing, the works of Taminiau (2009); Selena et al. (2009); Shoemaker (2008); Egbu et al. (2003); Bresnen et al. (2003); and Corrall (1999) were considered. Although different researchers have used different terminologies to indicate these approaches, they can be represented by generic themes. In addition, they have also been mentioned in the literature with a mixed extent of emphasis and coverage. Based on the review, 12 formal and 7 informal approaches to knowledge sharing were proposed to form the basis for knowledge sharing adoption in the SMEs and large construction organisations. A comparison between the researcher's perceptions on knowledge-sharing approaches with those of other researchers is given in Tables 3.1, 3.2, and 3.3.

Table 3.1 : Comparison of studies on formal approaches for knowledge sharing.

Authors / Formal KS approach	Wong (2008)	Wei et al. (2009)	Olomolaiye et al. (2004)	Ruggles (1998)	Liebowitz & Wright (1999)	Goodwin (2009)	Egbu et al. (2003)	Steyn & Kahn (2008)	Allee (1997)	Frequency of citation / Researcher Proposition
IT system	✓	✓		✓	✓	✓	✓	✓	✓	(8) Formalised knowledge sharing-based IT system
Appointing knowledge management leaders and teams /Senior management support	✓	✓		✓	✓	✓	✓	✓	✓	(8) Formalised knowledge sharing leaders and teams
Formal organisation structure			✓	✓	✓	✓	✓	✓	✓	(7) Formalised flexible organisational structure for knowledge sharing
Human resources management	✓		✓		✓	✓	✓	✓	✓	(7) Formalised recruitment and selection for knowledge sharing
Building and maintaining employee's expertise and skills / Training	✓		✓		✓		✓	✓	✓	(6) Formalised training for knowledge sharing
Creating a supportive environment for knowledge sharing / culture	✓	✓	✓	✓				✓	✓	(6) Open & supportive environment
Developing strategies	✓		✓	✓		✓			✓	(5) Formalised knowledge sharing policy
Motivational aids	✓			✓			✓		✓	(4) Formalised appraisal and reward system for knowledge sharing
Feedback and measurement	✓	✓					✓		✓	(4) Formalised performance measurement system for knowledge sharing
Communication and coordination			✓				✓			(3) Formalised communication channels for knowledge sharing

Table 3.2 : Comparison of studies on informal approaches to knowledge sharing

Authors / General Factors	Taminiau (2009)	Selena et al. (2009)	Shoemaker (2008)	Egbu et al. (2003)	Bresnen et al. (2003)	Corrall (1999)	Degree frequency of citation
Informal communication.	✓			✓	✓		3
Informal networks.		✓			✓		2
Informal settings such as lunches, drinks and dinners; informal meetings.	✓			✓			2
Informal interaction.	✓			✓			2
Informal channels (ad hoc channels), for example through telephone or mail.	✓			✓			2
Informal learning environment.			✓	✓			2
Knowledge networks and discussions (Tacit knowledge).						✓	1
Organisational social structures		✓					1
Sense-Making.				✓			1

Table 3.3 : General categorisation for informal approaches to knowledge sharing

Informal knowledge-sharing approaches (general categorisation)	Wording used

Informal networks	1. Informal networks (Bresnen et al., 2003)
	2. Knowledge networks and discussions (tacit knowledge) (Corrall, 1999)
	3. Organisational social structures (six types of social structures) (Selena et al., 2009)
	   (a) Work Groups,
	   (b) Project Teams,
	   (c) Strategic Communities,
	   (d) Learning Communities,
	   (e) Community of practices, and
	   (f) Networks

Informal communication	1. Informal communication (Bresnen et al., 2003); Taminiau (2009) 2. Informal interaction (Taminiau, 2009) 3. Informal channels ("ad hoc channels"), for example through telephone or mail (Taminiau, 2009). 4. Manual, monthly meetings, communicating or sharing knowledge (Egbu et al., 2003) 5. Maintenance of conventional documents, such as a Standard Project Procedures (Egbu et al., 2003) 6. Sense-making (Egbu et al., 2003)
Informal settings	1. Informal settings such as lunches, drinks and dinners, meetings (Taminiau, 2009) 2. Internet-based chat rooms, discussion groups and bulletin boards are among the less formal (Egbu et al., 2003) 3. Informal learning environment (Shoemaker, 2008)

Table 3.4 : Operational definition for formal and informal approaches to knowledge sharing

	Formal	**Informal**
Definition	Formal approaches to knowledge sharing is defined as an initiative that is well defined, structured, systematically organised, using formal knowledge sharing approaches and usually presented in written form. Such initiative often embodies policies transpiring the life span of the organisation and should ideally not be rigid so as to accommodate changes that may occur in tandem with the organisational environment. It reflects internal knowledge within the organisation and aspires towards continued improvement.	Informal approaches to knowledge sharing is defined as an initiative that is unstructured, disorganised in form, occurring in ad hoc fashion and often undocumented or labelled as knowledge sharing . It reflects internal networking knowledge and occasionally results from external communications with the aim of improving internal knowledge sharing. Informal knowledge sharing may occur spontaneously without any official assistance from the management.
Comprise:	An initiative that is structured, in order and systematically arranged; such as a plan, proposal, scheme, idea, project or programme.	An initiative that is unstructured disorganised and not arranged in any particular order
	A scheme that is lawful in nature and officially authorised for implementation throughout the organisation.	A behaviour that is tolerated by the organisation with the view that it is not detrimental to organisational survival
	A policy more often in written form that is accepted, well understood and widely communicated by members across ranks within the organisation	A scheme that proliferates (grow) throughout the organisation, continuously being adapted and refined to reflect changing organisational environment.
	A written strategy that formally spells out the aims and objectives of knowledge management to be adopted by all members of the organisation	An unwritten understanding adopted by various levels within the organisation to share knowledge.
	A process of systematic and actively managing and leveraging knowledge which is recognised by organisation	A subtle shift in internal knowledge fed by internal and external inputs, indirectly influenced by accepted knowledge-sharing approaches
Types of knowledge-sharing approaches	Formal approaches to knowledge sharing include: 1. Formalised knowledge sharing-based IT system (Internet and Intranet technology) 2. Formalise mentoring for knowledge sharing 3. Creating an open and conducive environment for knowledge sharing 4. Formal training for knowledge sharing approaches 5. Formal recruitment and selection for knowledge sharing 6. Formalised internal communication channels for knowledge sharing 7. Formalise flexible organisation structure for knowledge sharing 8. Formal performance measurement system for knowledge sharing 9. Formal company appraisal and reward system for knowledge sharing 10. Appointing knowledge sharing leaders or champion 11. Developing formal policy for knowledge sharing	Informal approaches to knowledge sharing include: 1. Informal network (relationship-base, community of practice, storytelling) 2. Informal settings (conducive workplace settings, social events) 3. Informal communications (Spontaneous informal communications, face-to-face social interaction)

In total, there are 12 formal and 7 informal approaches to knowledge sharing were proposed in this study. Formal and informal usage represent two ways of sharing knowledge, and it is useful to separate them conceptually and empirically because they are likely to involve different benefit and costs for organisation (Haas and Hansen, 2007). Having proposed the approaches to knowledge sharing in construction organisations, the next section will discuss each of them in detail.

3.4.1. Proposed formal approaches to knowledge sharing

- **Formalised knowledge sharing-based IT system (Internet technology)**

Much research has revealed that information technology (IT) is closely associated with knowledge management and knowledge sharing (Symonds et al., 2003; Egbu and Botterill, 2002; Egbu et al., 2001). As Egbu and Botterill (2002) assert, the role of IT in knowledge management is an essential consideration for any company wishing to exploit emerging technologies to manage their knowledge assets. A range of IT is available to support knowledge sharing, including e-mail, internet, intranet, fax machines and telephones for communication; collaborative computing tools including groupware and electronic brainstorming capabilities; and databases including data marts and data warehousing for storage and retrieval of information (Turban et al., 2006; Laudon and Laudon, 2003). Such technologies enable access to stored knowledge, connect sharers and receivers for sharing and collaboration and support business process improvement (Zack, 1999).

The internet is defined as an "International network of networks that is a collection of hundreds of thousands of private and public networks" (Laudon and Laudon, 2003, p. 17). Thus, the internet provides tools for inter-group contact with the advantages of creating a secure environment, minimising anxiety, removing geographical barriers, creating equal status and maintaining a friendly atmosphere (Amichai-Hamburger and McKenna, 2006). There are many examples of how sharing knowledge occurs on the internet. The internet has helped people by allowing better communication to occur and knowledge to be shared over a wide geographical area (Connelly and Kelloway, 2003). The internet also can help employees to learn more about the best practices of other organisations which could save time and money, for example in searching for favourite subcontractors, quotations and materials purchasing. Internet technologies also

encourage staff members to interact and share knowledge with each other and the rest of the organisation. As asserted by Symonds et al. (2003), the internet has become a very useful source of information and provides many organisations with the framework for sharing knowledge.

- **Formalised knowledge sharing-based IT system (Intranet technology)**

Computer systems that are networked across organisational boundaries can improve the flow of information and knowledge to meet business goals (Skryme and Amidon, 1997). Intranets (an internal internet) are seen as user-friendly and cost-effective ways of achieving this. The intranet is defined by Mphidi and Snyman (2004) as "a network that uses internet concepts and technologies within an organisation in order to be accessed by employees to share knowledge". Many believe that intranets facilitate the sharing of employee knowledge (Peariasamy and Abu Mansor, 2008; Ruppel and Harrington, 2001; Alavi and Leidner 2001; Jarvenpaa and Staples, 2000; Elliot and O'Dell, 1999; Hills, 1997). Intranets provide platforms, especially email, for shared individual and corporate knowledge as well as improving creativity and innovation (Hills, 1997). Intranets technologies enable people to actively work together based on the information available to them, and facilitate the documentation of their experiences. The intranet can be used to support and enhance knowledge-sharing activities and facilitate the sharing of both tacit and explicit knowledge (Alavi and Leidner, 2001). Peariasamy and Abu Mansor (2008) claim that knowledge within a department can best be spread via the organisation's intranet. Jarvenpaa and Staples (2000) suggest that the intranet is a useful knowledge-sharing technology, as it encourages the sharing of ideas in a free-flowing manner as well as in the form of structured repositories. Elliot and O'Dell's (1999) study shows that an effective internet and intranet structure has a positive effect on knowledge sharing within organisations. This is because by using the internet and intranet to communicate and exchange ideas, the chances of knowledge sharing taking place is improved (Wong, 2008). Therefore, well-developed internet and intranet technology that is accessible and easy to use will leverage knowledge sharing within an organisation.

- **Formalised mentoring for knowledge sharing**

Mentoring is another formal knowledge-sharing approach which providing a means of developing knowledge-sharing skills and encouraging learning. Researchers argue that mentoring has been suggested as the proper method for sharing complex tacit knowledge (Bryant, 2005; Baastrup, 2003; Hassan and Handzic, 2003). An organisation can develop a mentoring programme to gently transfer "subtle and private skills and experiences" to others (Cope, 1998, p. 29).

Mentoring is defined as "off-line help by one person to another in making significant transitions in knowledge, work or thinking" (Megginson and Clutterbuck, 1995, p. 13). A mentor is "someone who helps another person to become what that person aspires to be" (Montreal CEGEP, 1988). The study by Collin (2004) indicates that senior employees often act as mentors to junior employees. The process of mentoring is more to encourage experienced workers to share their knowledge, experience and ideas with those who are less experienced as well as encouraging them to take further training. Research has shown that mentoring programmes not only help junior employees better understand informal organisational rules and guidelines, but can also increase the job satisfaction of senior employees, who can be recognised for their experience and insights (Fontaine and Lesser, 2002). Mentoring also teaches other senior employees the skills and techniques needed if they were to take over new assignments in the future. The role of the mentor is to advise, coach, coax, encourage, support, empathize with and generally assist learners. In this way, no employees are left out in the competition of hoarding knowledge. Nobscot Corporation (2003–2006) opines that in mentoring, "the knowledge retained in key individuals is the most valuable part of the organisation". According to them, this not only benefits the organisation by "reducing the risk of loss of key skills and knowledge", but it also helps "reduce the load on the key employees" (Periasamy and Abu Mansor, 2008). By recognising that mentoring has a positive effect on creating a knowledge-sharing culture, it can help to increase employees' effectiveness. A variety of approaches could be used by organisations to encourage mentoring by experienced employees to share their knowledge such as coaching, training, discussion and counselling to transfer or share their best practices.

- **Creating an open and conducive environment for knowledge sharing**

Open and conducive environment for knowledge sharing is one of the most critical elements in implementing knowledge sharing. A conducive environment to sharing knowledge will help employees to share their knowledge freely with others, which in turn will increase the efficiency and effectiveness of the organisation (Mahmood and Ali, 2011). An open and conducive environment can influence knowledge sharing in a variety of ways. For example:

1. Organisational culture influences knowledge sharing by creating an environment of caring and trust, which is so important to encourage individuals to share with others. Trust can encourage a positive team spirit and a willingness to share tacit knowledge.

2. Teamwork allows people working together in an organisation and on projects to increase knowledge sharing across geographical boundaries. The more team work is promoted, the more prominent it can be in knowledge implementation (Hessami, 2012).

- **Formal training for knowledge-sharing**

Training plays a pivotal role in knowledge sharing, and numerous studies highlight this point (Olomolaiye and Egbu, 2004; Cabrera and Cabrera, 2005; Hunter et al., 2002). Olomolaiye and Egbu (2004) highlight that lacks of training negatively influence effective knowledge sharing within construction organisations. Training for coaching, for example, is not just for employees but also for managers, to aid them to deal with day to day issues, and to aid them to become better coaches to their staff (Egan, 2003). Training to enhance knowledge-sharing initiatives should include the use of technology tools to support knowledge sharing as well as the behaviours that they are expected to exhibit Smith (2003). Employees should also be trained how to use knowledge management systems, as well as be educated about the value of sharing knowledge. Organisations have to assist employees to understand what the system is, what it does and how it can benefit them personally (Greengard, 1998). Through such training they have a better understanding of the concept of knowledge sharing (Moffett et al., 2003). It also provides a common language and perception of how they can define and think about knowledge (Wong, 2005). Hence, the use of formal training to enhance knowledge-sharing initiatives is vital.

- **Formal recruitment and selection for knowledge sharing**

Recruiting and selecting are defined by Beardwell and Wright (2004) as integrated activities involving "identifying, attracting and choosing suitable people to meet an organisation's human resource requirement" (p. 190). Brelade and Harman (2003) point out that through recruitment and selection strategies, the organisation can fill the organisation's knowledge gaps, as opposed to just fill jobs. Knowledgeable people are important for knowledge sharing. To acquire knowledgeable people via recruitment and selection processes, organisations need to identify primarily who they really need and want, referred to as job defining (Beardwell and Wright, 2004). Hiring people with different backgrounds, choosing people with diverse skills and selective hiring stimulate employees to have new ideas and thoughts and therefore improve their willingness to share knowledge (McGill and Slocum, 1993). In this regard, recruitment and selection processes are anticipated to be associated with knowledge sharing.

- **Formalised internal communication channels for knowledge sharing**

Communication is commonly defined as the transference of meaning from one person to another (Berlo, 1960) and is known to be affected by such things as beliefs, attitudes, values and knowledge. It can also be define as formal and informal sharing of meaningful and timely information between organisations (Anderson and Narus, 1990). The knowledge management literature also points out the importance of effective communication in knowledge sharing. Fong (2005) states that knowledge sharing relies on reaching a shared understanding of the underlying knowledge, not just in the content but also in the context of the knowledge, and for this reason communication is vital to capturing and sharing it. Communication can be formal and informal. Both Herbsleb and Mockus (2003) and Perry et al. (1994) refer to formal communication as written specification documents, reports, protocols, status meetings or source codes. The clearer the communication channel, the better it enables the customisation of information to suit the context and the more it enables interactions to seek clarification and aid further reinterpretation of the knowledge. Hence, using the appropriate communication channels to facilitate effective communication for knowledge sharing is essential to support knowledge sharing in an organisation.

- **Formalised flexible organisation structure for knowledge sharing**

Knowledge management theorists suggest that flexibility and a non-hierarchal structure are the best environmental factors for implementing knowledge sharing initiatives (Egbu et al., 2010; Gold et al., 2001). Formal and centralised structures often dampen knowledge-sharing success, while a more flexible and informal structure facilitates it (Egbu et al., 2010). Similarly, Gold et al. (2001) point out that a formal organisational structure inhibits interactions among employees, interactions that are vital to the effective sharing of knowledge. Ikhsan and Rowland (2004a,b) argue that knowledge sharing prospers where the structure supports ease of information flow with fewer boundaries between divisions. Flexible and informal structures facilitate internal communication within an organisation, enhance people's willingness to cultivate a critical attitude in the interpretation of information, and encourage individuals to share knowledge. Hence, a decentralised/flexible organisational structure encourages collaboration between individuals in the organisation, and thereby encourages individuals to share their knowledge.

- **Formal performance measurement system for knowledge sharing**

A knowledge-sharing measure or audit is a formal evaluation of how and where knowledge is shared in an organisation (O' Riordan, 2005). Through the measurement, organisations can identify and evaluate the critical knowledge shared by employees. It also helps to identify enablers and barriers to knowledge sharing. Measurement of knowledge sharing initiatives as well as the resulting efficiencies attained in the processes and practices are essential (Du Plessis, 2008). Earnst and Young (1999) indicate that the performance of the overall initiatives needs to be measured, as well as the management of knowledge itself. The primary reason for using performance measurement for knowledge sharing is to manage and improve the performance of an organisation (Shannak, 2009). Effective knowledge knowledge-sharing approaches needs performance measurement.

- **Formal company appraisal and reward system for knowledge sharing**

Performance appraisal is concerned with bringing about organisational improvement that directly affects employee behaviour (Yahya and Goh, 2002). Providing feedback on the performance and competencies of individuals may encourage positive performance by providing a reward that influences positive behaviour as well as giving direction to enhance their competencies to meet the needs of the organisation (Minbaeva, 2005). A significant body of past research has shown that performance appraisal and reward play a crucial role in encouraging people to share their ideas (Zhang and Liu, 2009; Yu, Kim and Kim, 2007; Cabrera and Cabrera, 2005; Jain, 2005; Bartol and Srivastava, 2002). Performance appraisal systems that include an assessment of knowledge-sharing behaviour, feedback on such behaviour, and an appropriate reward for the behaviour (Cabrera and Cabrera, 2005) should enhance knowledge-sharing behaviour by satisfying the three needs and promoting sharing norms. Ang (2002) conducted a study to assess the level of knowledge sharing in a Ministry in Singapore and suggested that there was a need to implement policies to assure employees that their value would not dissipate when they shared knowledge. Given the predicted impact of the perceived benefits of knowledge sharing, performance appraisal and reward systems must be designed to encourage knowledge-sharing behaviour. The need to create and use more structured rewards and appraisal systems to encourage employees and managers to change their behaviour is no doubt necessary in most organisations.

- **Appointing knowledge sharing leaders or champion**

Knowledge sharing, like any other programme in an organisation, requires leadership commitment to create an environment within which people are able to share knowledge and allows them to assimilate as well as practise the knowledge gained. Islam et al. (2011) found that leadership has a positive and significant relationship with knowledge sharing. Leadership at all managerial levels is required to develop a desired culture that enhances knowledge sharing in organisations (Welch and Welch, 2005; Marsh and Satyadas, 2003; Kluge et al., 2001). The role of leadership in improving a knowledge-sharing culture in organisations is also supported by other studies (Kerr and Clegg, 2007; Oliver and Kandadi, 2006; Marsh and Satyadas, 2003; Kreiner, 2002; Kluge et al., 2001). Kreiner (2002) found that leaders can influence employees to create the necessary knowledge locally. Kerr and Clegg (2007) also show that leadership is

important to facilitate knowledge sharing within and across boundaries. They opine that leaders act as role models for the manner in which knowledge sharing occurs. They found that leaders help to create a network of knowledge members and provide best practice for coordination and collaboration activities. The importance of leadership in affecting knowledge-sharing culture in organisations is also supported by Oliver and Kandadi (2006). They are of the opinion that "senior management should actively involved in the evangelisation process and convey that knowledge creation and knowledge sharing is highly valued in organisations". The organisation is advised to consider whether to create a leadership role to develop and drive the process, for instance a Chief Knowledge Officer or Knowledge Champion (otherwise known as Knowledge Management Champion, Knowledge Activist, Knowledge Steward, Knowledge Coordinator, Knowledge Management Rep) to perform an important role in distributing messages and activities consistently across an organisation. Knowledge leaders or champions are considered to be the senior executives and top managers of the organisation who lead and promote the knowledge management agenda by channelling an organisation's knowledge into initiatives that are expected to become a source of competitive advantage (Menkhoff et al. 2006). Hence, the use of a knowledge leader or champion to be responsible for knowledge-sharing initiatives in knowledge sharing is vital.

- **Developing formal policy for knowledge sharing**

Policy is defined as an outline of a set of procedures governing knowledge sharing within a company by using a knowledge management strategy (Knowledge Leader, 2012). This serves as a framework for knowledge management. A more directed and focussed approach to knowledge management can be achieved, knowledge sharing throughout the organisation can be facilitated and structures that are currently impeding knowledge sharing can be streamlined. A knowledge-sharing policy can include various areas like a policy statement, purpose, scope and the roles and responsibilities of individuals and managers. An effective knowledge-sharing policy plays a vital role in the implementation of knowledge-sharing approaches. Without an effective knowledge-sharing policy in place, it will be difficult for any organisation to implement knowledge-sharing approaches effectively in a satisfactory and sustainable manner. According to Shanker et al. (2003), a major reason for the failure of many knowledge-

sharing initiatives is the absence of a well-defined strategic plan to guide implementation. Having a well-defined knowledge-sharing policy will help the organisation to store and access the right information and knowledge for the benefit of the staff and the organisation.

Having discussed the formal approaches to knowledge sharing, the following subsection discusses the informal approaches to knowledge sharing.

3.4.2. Proposed informal approaches to knowledge sharing

- **Personal relationships**

Good long-term relationships provide employers and employees with the incentive to invest trust in their organisation (Sonnenberg, 1994). Long-term relationships give managers more time to learn about the skills, work habits, interests and abilities of individual employees, making it easier to match jobs and employees within the construction industry. Holste and Fields (2010) suggest that warm personal relationships most likely develop through face-to-face interactions, and solid respect for another worker's professional capability is required for the sharing of tacit knowledge.

- **Community of practice**

The community of practice has emerged as one of the most researched and widely praised approaches to knowledge sharing. Alvesson (2004) and Kelloway and Barling (2000) emphasise that it is a common belief that knowledge work is best facilitated in organic and informal settings such as, for instance, communities of practice that assimilate sharing behaviour. Brown and Duguid (1991), in their analysis of communities of practices found that shared learning is located in complex, collaborative practices involving informal networks within the community. Communities of practice are "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger et al., 2002; p. 4). Communities provide a focus for the creation, discovery and sharing of information and knowledge (Wenger et al., 2002). The community of practice provides an opportunity for learning and a platform for innovation among its members. Organisations can develop communities of practice to promote knowledge sharing (Arora, 2002; Carter and Scarborough, 2001; Geraint, 1998). Knowledge can be leveraged by developing existing communities in a natural

informal way (Ahmed et al., 2002; Carter and Scarborough, 2001). Communities of practice informally bind together people who share expertise, a passion for joint enterprises and a common interest in knowledge sharing. These efforts will enhance learning and encourage the recognition, use and spread of tacit and explicit knowledge. Both face-to-face and online community of practice communications have elements of formal professional and informal social interaction. Communities of practice enhance learning and encourage the recognition, use and spread of tacit and explicit knowledge.

- **Storytelling**

Storytelling is quite simply the use of stories in organisations as a communication tool, which may be suited to the sharing of tacit knowledge (Mitchell, 2005; Egbu et al., 2004). It is literally about telling a story: a person who has valuable knowledge tells stories of his/her experience in front of people who want to gain knowledge. Tacit knowledge spreads when people meet and tell stories. As tacit knowledge remains hidden, unspoken and elusive, this knowledge can either be embodied in people and social networks or embedded in the processes and products that people create (Horvath, 2007). One of the most important characteristics of stories is that they convey not only information but also meaning and knowledge. As Egbu et al., (2004) assert, storytelling has a strong power to share one's experience and lessons learned since effective stories can convey rich contexts along with contents. Storytelling unveils unseen tacit knowledge and generates meanings from sentences, which are told messily from narratives to reminiscences. Storytelling is therefore capable of connecting knowledge with emerging contexts, introducing skills, providing meanings for association and structures, creating an environment for dialogue, explaining adaptive changes, revealing the creativity of an individual and reconstructing authenticity (Denning, 2000). Storytelling is therefore an effective learning technique for persuading people to externalise their values and beliefs, to share their knowledge, to work together, to change and to lead them into the future (Nyame-Asiamah, 2009). However, in the modern business world, storytelling (narrative) is emerging as an important informal method of communication and is regarded as important to convey experiences of work whilst communicating shared knowledge and learning and maintaining organisational memory (Lehaney et al., 2003).

- **Conducive workplace setting**

Physical workspace, in this context, literally means the settings of the physical aspects of the office. The physical layout of the workplace directly influences the openness of communication and the ease with which employees share knowledge within the company (Cook et al., 2003). Davenport (2005) asserts that the way in which an organisation is physically designed affects the flow of information and knowledge. In addition, conducive workplace settings in terms of office layout will encourage employee interactions, which in turn enhance employees' willingness to learn and share knowledge with others (Low, 2005). Davenport and Prusak (2000) suggest that corporate planners, architects, managers, academics and executives should give consideration and creative thought to the issue of office design to promote a knowledge-sharing environment. It is critical that office designs do not become a hindrance to knowledge sharing among employees (Arora, 2002). An office environment with either an open or closed layout is conducive to knowledge sharing when it encourages the social mingling of employees, leading to informal sharing of knowledge. The physical space and layout influence the way in which employees move around in the organisation and thus whom they interact during the day (Petersen, 2002). This enables communication on an informal level and can result faster solutions to the question at hand. As stated by Davenport (2000), the best enabler for knowledge sharing is to hire smart people and let them talk to each.

- **Social events**

Social events such as gatherings and outings promote team building and the trust that serves as the basis for sharing valuable knowledge (Supyuenyong et al., 2009). It is a pre-requisite for effective knowledge sharing (Azudin et al., 2009). Informal meetings during social events allow person-to-person knowledge sharing, which is one of the best ways to share knowledge even without a formal reward. Sturdy et al. (2006) emphasise the importance of social events to provide informal settings to allow people to socialise, talk together and share knowledge. Informal communication like conversation during the lunch hour builds trust and strengthens relationships between participants besides just being a storytelling session.

- **Spontaneous informal communications**

Spontaneous interactions are "interactions that occur because two people happen to see each other and get into a conversation on a topic not prepared by either person (Isaac et al., 1997). Informal communication is spontaneous, interactive and rich (Kraut et al., 1990). Herbsleb and Mockus (2003) and Perry et al. (1994) describe informal communication as explicit communication via diverse communication channels such as meetings, telephone, video, audio conference, voicemail, e-mail or other verbal conversations. These informal communications are vital to achieve certain types of work-related tasks. The characteristics of informal communication are that it is spontaneous, coincidental and impromptu. Informal communication happens every day in the organisation between staff. Informal communication is more spontaneous and less structured, for example telephone interruptions, asking the person at the next desk about office procedure rather than consulting the appropriate manual and a chat with colleagues over coffee; knowledge sharing can be applied where the ideas or opinions of the staff on certain projects or tasks are discussed. Informal communication allows informal knowledge sharing to take place through daily social interactions such as participation in group activities, working alongside others, tackling challenging tasks and working with clients. The success of these forms of informal knowledge sharing is highly dependent upon the quality of human relationships in the workplace (Eraut, 2004).

- **Face-to-face social interaction**

Face-to-face social interaction is the primary method of sharing tacit knowledge (Teece, 2000; Davenport and Prusak, 1998; Nonaka and Takeuchi, 1995). Nonaka and Takeuchi (1995) assert that much knowledge, perhaps 80%, lies in people's brains, and hence face-to-face social interaction would help to collect this tacit knowledge. Informal approaches to knowledge sharing include social interaction, which encourages the building a trust, which in turn develops the sharing of knowledge. These informal opportunities to interact with other people helps individuals develop respect and friendship, which influence their behaviour (Nahapiet and Ghoshal, 1998). Granovetter (1992) call this 'relational embeddedness' – the kind of personal relationship that people develop when they interact with each other over a period of time. By using face-to-face social interaction, people's know-how, secrets and personal skills will be shared

easily. Moreover, individuals are more intrinsically motivated to acquire and utilise knowledge if they are engaged in face-to-face interactions, as they report greater personal and social satisfaction from such interactions (Minbaeva et al., 2010). Epstein (2000) found that individuals who were friends were more likely to exchange personal and complex knowledge through face-to-face communication. Furthermore, face-to-face social interaction with the person with the right skills and knowledge is considered to be the best source for the future development of a company. In face-to-face social interaction, an effective approach to gain knowledge is to request help from another, i.e. someone who may possess the knowledge or expertise required. This request may lead to a conversation that will facilitate the creation of new knowledge in the recipient. This suggests that in face-to-face social interactions, conversations can be an effective conduit for knowledge sharing. Indeed, it has been suggested that conversation may be the only effective means of sharing knowledge (Pierce, 2002).

Overall, the knowledge-sharing approaches discussed in this chapter is an attempt to bring together all these approaches into one to provide a more comprehensive approach to understanding the phenomenon of formal and informal approaches to knowledge sharing in organisations.

3.5. Conclusions and recommendations

The discussion in this chapter has addressed the first objective of this current study, which is "to critically review the literature and document the perceptions of construction organisations (small, medium and large) towards knowledge-sharing approaches".

- The term 'approaches' for knowledge sharing is used very loosely in industrial settings, with very few practitioners providing a definition for this. Too often, knowledge-sharing "approaches" is used to mean only IT tools.

- It had been identified that there was a need for a better understanding of the knowledge-sharing approaches, their differences and characteristics. Thus, two approaches types have been identified, namely formal approaches to knowledge sharing (an initiative that is well defined, structured, systematically organised) and informal approaches to knowledge sharing (an initiative that is unstructured, disorganised in form, occurring in ad hoc fashion and often undocumented or labelled as knowledge sharing). The differences between formal and informal approaches to knowledge sharing have been highlighted and the features of each presented.

- It is useful to gain a broad understanding of the variety of approaches to knowledge sharing. Not only are there many alternatives, but also some of them differ quite widely from others in their methods.

Having discussed the perception of construction organisations and managers on knowledge-sharing approaches, the different knowledge-sharing approaches employed by Malaysian construction organisation and its managers will be discussed in detail in Chapter 5. The next chapter presents a more in-depth discussion of the research methodology adopted in this study for the empirical work.

CHAPTER 4.   RESEARCH DESIGN AND METHODOLOGY

4.1. Introduction

This chapter presents the research design and reviews a range of research methodologies, in particular those adopted for this study. It elaborates methodologies that can be used for the purpose of data collection, data analysis, reporting and for discussion on findings and results. It also outlines the design used in of this research in order to provide valid and reliable conclusions.

Accordingly, the chapter is structured as follows:

- Section 4.2 presents an overview and the steps adopted during the design process.

- Section 4.3 discusses the process of undertaking a literature review and pilot study in order to establish the research problem.

- Section 4.4 discusses the research methodological design and elaborates on the identification of the research philosophies, approaches, strategies, choices, and the research techniques and procedures of this study.

- Section 4.5 explains the data collection techniques and procedures involved in the study, including problems encountered and the strategies adopted to mitigate these problems.

- Section 4.6 discusses the data analysis techniques used to find meaning in the mass of information collected.

- Section 4.7 discusses validity and reliability of the study.

- Section 4.8 discusses the ethical issues related to this research.

- Section 4.9 presents the research methodological framework reflections made during the progress of the study.

- Section 4.10 discusses the validating and refining knowledge sharing model

- Section 4.11 provides a summary and overview of the research processes and methodological framework.

4.2. Overview of the research process

In order to achieve the aims and objectives of this research, a robust methodology was developed. As shown in Figure 4.1, the research process was identified broadly as having three key stages within its flexible boundaries. These are: the establishment of the research problem (Section 4.3); the research methodological design (Section 4.4); and the outputs (Section 4.10).
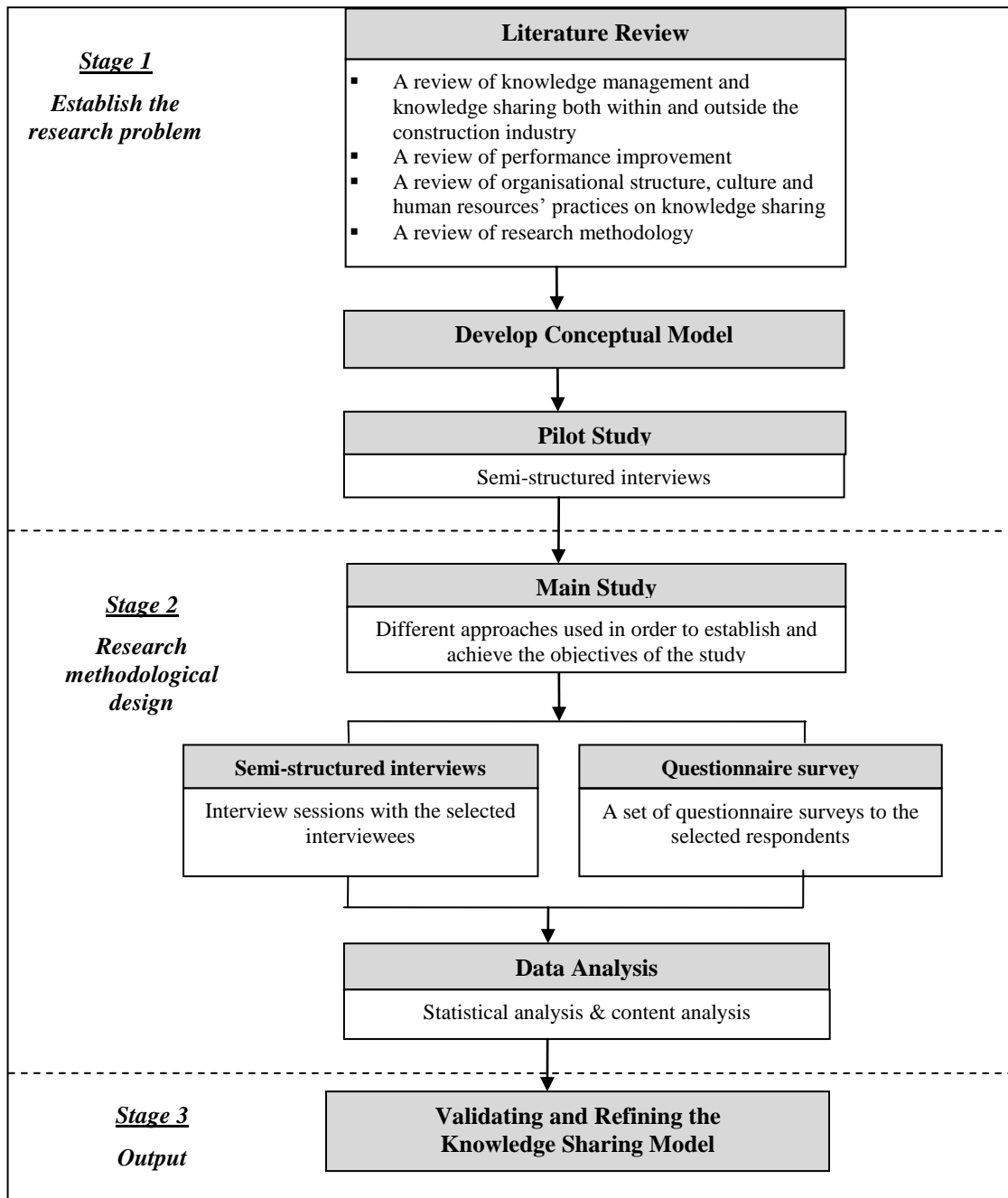
Figure 4.1: Overview of the research process

4.3. Stage 1 - Establishment of the research problem

Saunders et al. (2009) viewed the proper establishment of the research problem as the most difficult yet most important element of research. The research problems of this study were established from the conclusions of the literature review (Subsection 4.3.1), and the findings from the pilot study (Subsection 4.3.2).

4.3.1. Review of the literature

The study began with a thorough review of the literature to capture background information on knowledge management. The literature review and synthesis focused on a number of areas: knowledge management; knowledge sharing; the Malaysian construction industry; organisational performance; research methodology; construction engineering; and general and construction management. Various resources including databases, internet resources and online journals were searched, including those of the Association of Researchers in Construction Management (ARCOM) and the International Council for Research and Innovation in Building and Construction (CIB). Text books were used to support the literature. Published documents from the Malaysia Construction Industry Master Plan 2006-2015 (CIMP), the 3rd Industrial Master Plan (2006-2020), the 9th Malaysia Master Plan (2006-2010), CIDB Annual Reports and the Malaysia Knowledge-Based Economy Master Plan (2002) were also found to be useful.

The review of literature was a multi-stage process incorporating an iterative structure. The initial research process began with a broad review of knowledge management literature that highlighted the key areas in knowledge management. This provided the basis for identifying the issues to be investigated in the context of construction organisations. The literature clarified the definitions of knowledge and its component parts (Subsection 2.2.1 in Chapter 2) and confirmed the need for research on knowledge sharing in construction organisations (Section 1.3 in Chapter 1). It also helped to identify the importance of knowledge sharing in the management process (Subsection 2.3.6 in Chapter 2). Common themes and key factors related to knowledge sharing as identified from the literature were then synthesised to form the conceptual model presented in Chapter 10.

All the significant reported factors for the successful implementation of knowledge sharing for improved performance in construction were considered in order to develop a list of items for empirical testing. This list was then used to develop a set of questions for the questionnaire and the semi-structured interviews (see Appendices A and B), provided an

element of consistency in the data collection. In conclusion, the literature review on knowledge management provided the basic for identifying the issues to be investigated in the context of construction organisations. In order to provide a comprehensive background, literature published from 1971 through to 2013 was reviewed. This identified 64 knowledge sharing approaches (Section 3.4 in Chapter 3) that were carried forward to the next stage to be confirmed through the pilot study. This stage formed the basis of the development of the conceptual framework underpinning this research.

4.3.2. Pilot study

A pilot study was carried out due to the paucity of literature on knowledge management relating to construction organisations (Subsection 2.3.8 and 2.4.4 in Chapter 2). The pilot study was designed to achieve five specific objectives:

1. To collect primary evidence on the existing status of knowledge management within construction organisations, and investigate the importance of knowledge management to construction organisations.

2. To elicit any critical issues that needed to be addressed within the knowledge management process as identified within the specific literature review and synthesis.

3. To identify appropriate respondents.

4. To identify the most efficient way of collecting the data

5. To identify any other areas that could be investigated.

The pilot study was conducted in June and July 2009, using semi-structured interviews to provide managerial and holistic organisational perspectives. This was deemed the most appropriate method of data collection given the nature of the research (Haigh, 2008; Naoum, 2007). Twenty-one construction professionals and managers from seven SMEs and large Malaysian construction organisations were interviewed, with organisations selected on the basis of geographical convenience and data availability. Sample size was determined by the purpose and time constraints of the pilot study. Details of the organisations and the interviewees are summarised in Table 4.1 below. The outcome of the pilot study guided the selection of the sample for main data collection.

Table 4.1 : Profile of pilot study participants

Size of organisations	Number of organisations	Professional categories	Number of participants
Small (less than 50)	7	Managing Director	1
		Director	1
		General Manager	2
		Senior Quantity Surveyor	3
Medium (50 - 250)	7	Managing Director	7
Large (more than 250)	7	Managing Director	7
Total	21		21

The next section presents the findings from these pilot interviews.

4.3.2.1. Findings of pilot interviews

An interview questions was developed to solicit the necessary data to explore the perceptions and practices of Malaysian construction organisations with respect to the knowledge management constructs or factors. For example to examine specific issues such as how knowledge management is perceived, whether organisations have a strategy, what the elements of a strategy are, and the factors that could facilitate the successful implementation of knowledge management strategies.

Knowledge management strategy in place.

Respondents were asked whether their organisation had a formal knowledge management strategy in place. Overall, three of twenty one respondents (14.3 %) indicated that their company had a formal knowledge management strategy in place (Table 4.2). Of the respondents who stated their companies were not currently involved in a knowledge management initiative, 66.66% plans to have a strategy in the short term.

Most of the respondents interviewed found it difficult to answer the question whether or not their organisation had any planned, authorised, and /or systematic knowledge management initiatives/approaches/strategies. Some argued that knowledge management is written into several different strategies, and can therefore be found in several places. While, others argued that written knowledge management strategies are not very common. However, it was found that all seven large organisations involved in this pilot study have intranet to facilitate them in knowledge sharing. The study also found that knowledge in the Malaysian construction organisations was available and embedded in their organisation procedures and policies, job manual procedures, report meeting, ISO 9000, specification,

work flow and database. Others organisations (18 out of 21) manage / share their knowledge informally and no specific system in place. Table 4.2 indicate that 18 companies do not have planned, authorised, and/or systematic knowledge management initiatives/approaches/strategies, so it would be interesting to investigate in more detail how all of these company manage their knowledge.

Table 4.2 : Knowledge management strategy

	Formal planned, authorised, and/or systematic knowledge management initiatives/approaches/strategies	**Large (7)**	**Medium (7)**	**Small (7)**	**Total (21)**
1.	No planned, authorised, and/or systematic knowledge management initiatives / approaches / strategies	4	7	7	18
2	Yes	3	0	0	3

There are 18 of 21 organisation of opinion that planned, systematic and authorised initiative/approach of knowledge management is not important for the time being. This opinion are support with low priority/uncertain with the ongoing projects for long terms / concentrate trying to get as much project (18/21).

"We not interested to implement formal / planned, authorised, and/or systematic knowledge management at the moment; in terms of priority it is not that important to manage knowledge using formal knowledge management approach in this organisation".

This is prior to the small numbers of staff they have. They also constraint on budget especially they lack in infrastructure and lack of staff to look into the knowledge management initiatives.

"To make an investment in formal knowledge management approaches, we need to depend on our financial too. We can't afford to spend in infrastructure, resources and time because we are uncertain with the ongoing projects for long terms. This is important for comp's survival".

Knowledge management processes

When being asked to their understanding about the knowledge management processes, some managers in construction organisations replied that knowledge management is about managing information and its application, indicating that they did not understand the whole spectrum to knowledge management. Since the cooperative approach was used the interviewer (researcher) took the opportunity to explain to them what constitute knowledge management processes.

All organisations involved in this study are aware of the importance of knowledge sharing and the benefits of knowledge management but there some differences in perception. Some organisations enjoy a higher degree of top management support than others. Senior management support and leadership is vital for knowledge management. Three out of the five organisations interviewed had developed a specific role and had established full-time knowledge management position – a chief knowledge officer. The organisations also have employed additional staff, and have an allocation for the position.

In general, the result from pilot study shows that knowledge management as a formalised concept is a subject in its infancy and there are no common definitions as to what it entails. It is clear from the responses that most of the organisations participating in the interview are approaching knowledge management as an informal knowledge management approaches. However interviews with senior management revealed that they believe that the managing of knowledge is very important to the success of the organisation. This finding support study done by Kamara, Augenbroe, Anumba, and Carrillo (2002a) which concluded that although the label of 'knowledge management' is often not used, knowledge is being managed through people-based strategies, and other organisational and contractual arrangements.

A thorough review of literature and the use of semi structured interview were conducted as originally designed. However it become apparent after conducting twenty one interviews and analysing the collected data through content analysis, that knowledge sharing posed the greatest challenge when compared with the other knowledge management sub-processes (knowledge identify, knowledge capture, knowledge stored, and knowledge sharing). Fourteen managers in 14 of 21 organisations expressed challenges associate with knowledge sharing in various ways such as being busy, time constraints, pressure, budget issues, competition, etc. They also used various terminologies such as technical phrases or

institutional terms and acronyms like critical, big problem and challenge to express their views on knowledge sharing. Therefore the study is focus on knowledge sharing. The following Table 4.3 indicated the extent to which knowledge management sub process is a challenge. Further, the findings from the pilot interviews were analysed when developing the questionaire survey and semi-structured interviews questions for main study, addressing the knowledge sharing process. The next section describes the research methodological, design of this study.

Table 4.3 : Knowledge management sub process is a challenge

Knowledge management sub processes	Extent to which knowledge management sub-processes is a challenge																					Total (21)
	Large							Medium							Small							
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	
K Identify	1							1			1	1			1	1	1		1	1		9
K Capture	1	1	1	1			1				1			1		1		1				9
K Stored				1			1				1				1	1				1	1	7
K Sharing	1	1	1	1	1	1	1	1		1	1				1		1	1	1			14

4.4. Stage 2 - Research methodological design

The research methodological design undertaken within this study can be best illustrated by the use of the 'Research Process Onion'. Important layers of the onion need to be peeled away in order to come to the central issue of how to collect the data needed to answer the research questions (Saunders et al., 2009). Figure 4.2 illustrates different layers and approaches that are available and must be consistently employed when conducting research.
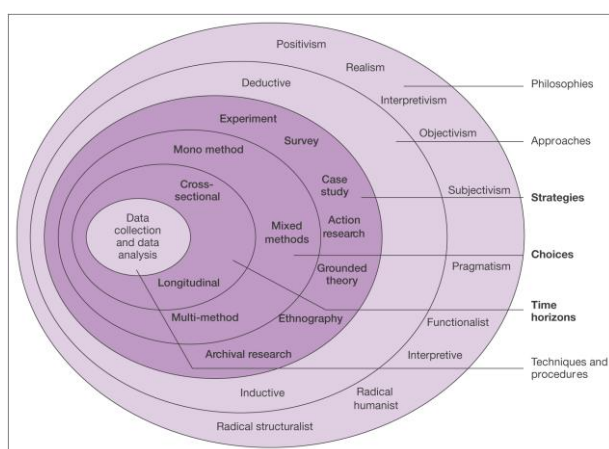
Figure 4.2: The research process 'onion' model
(Source: Saunders, Lewis and Thornhill, 2009: p.108)

4.4.1. Research philosophy

There are at least three reasons why an understanding of philosophical issues is very useful (Easterby-Smith et al., 2008):

- It helps to clarify the research design (more than simply the methods by which the data is collected and analysed).

- It can help the researcher to recognise which designs will work and which will not.

- It can help the researcher identify, and even create, designs that may be outside his or her past experience.

Accordingly, this section discusses two main philosophical issues that appear to be significant for any research (Saunders et al., 2009): research paradigm (epistemology) and ontology.

Research paradigm

'A paradigm is a way of looking at the world. It is composed of certain philosophical assumptions that guide and direct thinking and action' (Mertens, 2005: p.7). There are different types of research paradigms (Saunders et al., 2009), and understanding these helps in deciding suitable methodologies and research methods (Easterby-Smith et al, 2008). Two of these paradigms, positivism and interpretivism, appear to be the most relevant to this study on knowledge sharing practices.

The first research paradigm is often described as positivist (Saunders et al., 2009; Easterby-Smith et al., 2008; Sobh, and Perry, 2006; Robson, 2006). The purpose of the paradigm is to establish facts, which are an absolute truth, value free and independent of social construct. Positivists generally assume that there is one true reality that can be discovered by means of rigorous, mostly quantitative and empirical study (Guba and Lincoln, 1994). Thus, positivist studies are usually quantitative, subjected to statistical analysis to either prove or disprove the hypothesis, and generally attempt to test theory, in order to increase the predictive understanding of phenomena.

The interpretivism paradigm argues that people and organisations are complex, unique and fundamentally differ from that of natural science. Interpretivists see the world as socially constructed. They attempt to understand phenomena through analysing meanings people assign to these phenomena rather than search for external causes or fundamental laws.

Their research approach is inductive and concerned with discovering and interpreting social patterns (Walsham, 1995; Lacity and Janson 1994). This paradigm argues that the study to investigate social science research requires a different logic to that of the natural scientist, in an attempt to grasp the subjective meanings of social action (Bryman, 2008). The purpose of this paradigm is to examine the meaning of situations in great depth, acknowledging that situations in the real world cannot be subject to control as in the laboratory.

Ontological position

Ontology is concerned with the nature of the phenomenon or nature of the reality that a researcher intends to study (Saunders et al., 2009; Mason, 2002). The central point of orientation here is the question of whether social entities have a reality external to social actors, or whether they can and should be considered social constructions built up from the perceptions and actions of social actors. These positions are frequently referred to as objectivist or constructivist (Bryman and Bell, 2007). Objectivist ontology sees social phenomena and their meanings as existing independently of social actions, whereas constructivist ontology infers that social phenomena are produced through social interaction and therefore are in a constant state of revision (Bryman and Bell, 2007). This study adopted a combination of objectivist and constructivist perspectives, in order to add more depth and breadth to the analysis (Fielding and Fielding, 1986)

4.4.2. Research approach

In order to improve the data analysis process this study combines elements of both deductive and inductive research approaches. The deductive approach formulates the theory first and then seeks out data to confirm or disconfirm this theory. The inductive approach begins with the data first and then formulates a theory based on the data gathered.

4.4.3. Research strategy

Research strategy can be defined as the way in which the research objective can be questioned (Naoum, 2007). Strategies represent options and choices for the researcher. They promote, but are not in themselves methods for collecting data. There are eight common types of research strategy in social science, namely: experiment; survey; case study; grounded theory; ethnography; action research; cross sectional; and longitudinal studies (Saunders et al., 2009; Yin, 2009). Each research strategy has its own specific

approach to collecting and analysing empirical data, as well as associated advantages and disadvantages. None is more appropriate than the other for research purposes (Yin, 2009).

A survey research strategy was used as this study in order to effectively collect in depth data that could be inferred to the population as a whole. A further two main considerations for adopting the survey research strategy were:

1. The situation or conditions could not be manipulated during the study to see how people would react: the context and the events of knowledge sharing cannot be controlled. Therefore an experimental research strategy was not suitable for this study.

2. Case studies would not allow wide generalisations.

As a consequence a questionnaire survey and semi-structured interviews were selected as an appropriate research strategy for this study.

4.4.4. Research choice

There are two research choices: 1) mono method and 2) multiple methods (Figure 4.3). A mono method study applies only one type of research method, either quantitative or qualitative, while a multiple methods study applies more than one method. A differentiation can be made within multiple method designs between multi-method research (multiple qualitative or quantitative methods) and mixed methods research (integration of quantitative and qualitative methods) (Creswell and Clark, 2011).

Several definitions exist for mixed methods research, however Creswell and Clark (2009: p. 5) define it as: "... a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone".
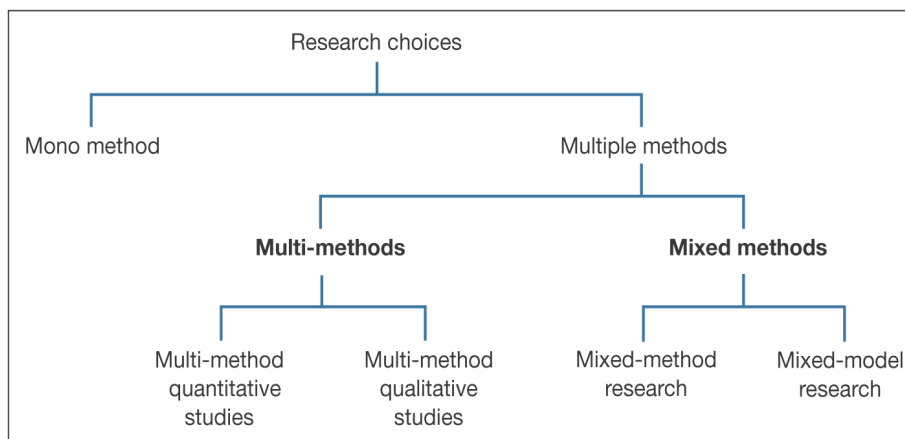
Figure 4.3: The research choices

(Source: Saunders, 2009)

Writers such as Moser and Kalton (1971), Barbie (1973) and Bouchard (1976), as cited in Egbu (1994), have argued that a combination of research choices is often more useful than a single one, since the different techniques yield different kinds of data, allowing a more comprehensive analysis of the phenomenon studied. Neuman (2011) suggested that it is better to look at something from several angles in order to get a fix on its true location. Just using quantitative data would be a positivist approach and would not be practical due to the large sample that would be required. An open qualitative approach would fit with an interpretive approach and could be undertaken by semi-structuring the interviews and combining with quantitative data. This combination of research choices would also mitigate, to a certain extent, the differing weaknesses in both methods (Amaratunga et al., 2002). Limitations in one method could be compensated for by the strengths of a complementary one (Marshall and Rossmann, 1999).

The use of a mixed method approach allowed multiple triangulations to take place. The two data collection techniques reciprocally helped in understanding and analysing the context and concept of knowledge sharing in small, medium and large contractors in Malaysia. Edwards and Holt (2009) explained that triangulation could be applied either by the triangulation of data, investigators, theories, methodology, and/or by multiple triangulation. Table 4.4 outlines the five main types of triangulation, varied according to the nature of the component type (or mix) and the methods of triangulation used within this study.

Table 4.4 : Types of triangulation

Type ID	Description(s)	Short explanation	Methods used in the study
Data	Data triangulation	Entails gathering data through several sampling strategies, so that slices of data at different times and social situations, as well as on a variety of people, are gathered.	Data was collected from 3 different management levels (top, middle and junior managers)
Investigator	Investigator triangulation	More than one observer is employed in data collection and/or data interpretation	_
Theory	Theoretical triangulation	More than one theoretical scheme or theoretical standpoint is employed to interpret the phenomenon (e.g. via data)	Theories from another discipline are used to explain a situation. Comparison of general literature on knowledge management, knowledge sharing, performance measurement with empirical evidence
Method	Methodological triangulation	More than one method of data collection and/or analysis is employed (e.g. may include a mix of quantitative and qualitative sources)	Use questionnaire survey and semi-structured interviews The use of content analysis and SPSS for analysing data
Multiple	Multiple triangulation / Hybrid triangulation	Any combination of different observers, perspectives, data sources, theories, methodologies, etc., used in the same investigation	_

Source: Adapted from Edwards and Holt, (2009)

4.4.5. Time horizon

There are two types of time horizons to choose between when performing research: cross-sectional studies and longitudinal studies. A cross-sectional research design was used due to time and cost constraints. A longitudinal study approach was not suitable as changes in knowledge sharing approaches over time were not a subject of this study.

Based on the discussion above, the summary of the research methodology is shown in (Table 4.5).

Table 4.5 : Summary of research methodology

Methodology issues	Contents		
Research Design			
Survey type	Cross sectional		
Research methods	Mixed methods (qualitative and quantitative methods)		
Unit of Analysis	Organisations (contractor)		
Respondents	Top, middle and junior level of managers for each organisation		
Data Collection	Pilot study Semi-structured interviews	Main study	
		Semi-structured interviews	Postal questionnaires
Period of study	Jun - July 2009	Oct-Dec 2010	Oct-Dec 2010
Databases	CIDB Directory 2009	• Malaysian construction Industry Award (MCIEA 2009) • CIDB Directory	• Malaysian construction Industry Award (MCIEA 2009) • CIDB Directory
Interview time	30-35 minutes	30 to 60 minutes	
Recording instrument	Digital Dictaphone	▪ Digital Dictaphone ▪ Call graph for Skype	Excel Database
Sampling procedure	Pilot study Semi-structured interviews	Main study	
		Semi-structured interviews	Postal questionnaires
Type of sampling	-	-	Non Probability sampling
Sampling strategy	Snowball sample	Purposive and Convenience sample	Purposive and Convenience sample
Sample Location	• Malaysian construction organisations (contractor) • Malaysia		
Sample size	21 organisations	19 organisations	1000 questionnaires
Total number of interviews	• 21 organisations (7 large, 7 med, 7 small) • 21 managers	• 19 organisations (7 large, 5 med, 7 small) • 28 managers	384 usable questionnaires (38.4% return rate)
Data Analysis			
Analysis	Content Analysis	Content Analysis	Statistical analysis (Descriptive, Spearman's coefficient of correlation)
Analysis tools	Manual coding	Manual coding	SPSS 16

4.5. Data collection techniques and procedures

4.5.1. Data collection techniques

There are many different ways of collecting data, depending on the nature of the research. The techniques may be grouped into two categories: quantitative, and qualitative (Neuman, 2011). Some techniques are more effective when addressing specific kinds of questions and topics. Taking into consideration the possible data to be collected in order to achieve the research aims (see Section 1.5 in Chapter 1), a combination of qualitative and quantitative techniques to collect both in-depth and generally applicable data were employed. The combination of semi-structured interviews and questionnaire survey data collection techniques enabled methodological triangulation and a richer understanding and analysis of the concept of knowledge sharing in SMEs and large construction organisations in Malaysia.

4.5.2. Unit of analysis

The unit of analysis for this study was an organisation. In the context of the study, a construction organisation referred to private contractors. The embedded units were individuals within the organisations. An organisation was defined as either an independent business unit within a larger company, or a standalone organisation. Organisations were primarily considered in terms of their sizes – small, medium and large. However, the classification guidelines and benchmarks to categorise organisations into "small", "medium", and "large" groupings remain highly context specific (Sedera, 2009). The numbers of employees for a small organisation varies by country and by industry. The European Commission (2007) clarified that the size of an organisation could be measured in terms of number of employees, annual turnover and balance sheet. In this study, the organisational size was measured by the number of employees, as this information was easily accessed, and because this study dealt primarily with organisational knowledge to which employees are the main contributors. However, Akintoye, and Fitzgerald (2000) and Newbould and Wilson (1977) have concluded that the choice of size measure is flexible and it does not matter very much in practice which measure are adopted as most measures highly correlate with each other. Newbould and Wilson (1977) cited in Egbu (1994) are of the view that for practical reasons, only one measure should be chosen.

Organisations having fewer than 250 employees were classified as SMEs, while those with more than 250 employees were classified as large. SMEs were further categorised into micro enterprises, small enterprises and medium sized enterprises (Table 4.6).

Table 4.6 : Size of organisation definition

Enterprise categories	Headcount (Number of persons expressed in annual work units	Turnover	Or	Balanced sheet total
Medium	< 250	= €50million		= €43million
Small	< 50	= €10million		= €10million
Micro	< 10	= €2million		=€ 2million

Source: European Commission (2007)

4.5.3. Data collection procedures

4.5.3.1. Identification of the population sample and selection of a sample frame

There were a number of considerations that had to be contemplated in order to select the sample. The underlying implication of carrying out quantitative analysis was that inference would be made from the data that could be transferred to the total population. Therefore, it was important to make sure that the sample was large enough. In this study, it was discovered that 69,490 contractors were registered with the Malaysia CIDB (refer Table 2.13 in Chapter 2), making it impossible to use the entire dataset (Sekaran, 2003).

As there was such a large number of contractors within the Malaysia construction industry, and because of the difficulties in tracing the contractors that implemented formal knowledge management practices, a convenience sampling procedure was undertaken to select companies who were willing to be included in the main study (refer Table 4.12). According to Kumar (1999), the justification of using convenience sampling is based on the researcher's judgment. In other words, the respondents selected were the ones whom the researcher thought could provide the best information and were willing to be included in the study. It is noted that convenience sampling is frequently undertaken in business research (Zikmund, 2000).

The selection criteria for both questionaire survey and semi-structured interview was that the companies:

1. Had active contractors registered with CIDB (unit of analysis in this study) and the contact person was from management (embedded unit of analysis in this study)

2. Employed best practices in knowledge management and knowledge sharing, and/or were involved in various stages of knowledge management

3. Were still in business

4. Were carrying out building and civil engineering works

5. Met the criteria of the definition by European Commission for construction sectors

6. Gave their agreement to be a part of both the semi-structured interview and the survey questionnaire sessions.

As of the year 2012, Malaysia had 69,490 registered local contractors with CIDB and almost 27,000 active contractors. An active contractor was defined by CIDB as a "local contractor who has projects during the period their registration is in force. These contractors have experience and are serious about construction" (CIDB, 2010). It was assumed that the opinions of these contractors represented the present situation and attitudes towards knowledge sharing within contractor organisations. Of the list of active contractors, 350 organisations were chosen to participate in the research.

Having identified the target population, the next step was to obtain a suitable population sample frame. A study sample may produce more reliable results (Sekaran and Bougie, 2010) as fatigue and data collection errors are reduced. Several efforts were made to obtain a suitable list of contractors in Malaysia. Among the companies or professional bodies contacted were the Malaysia Small and Medium Industries Development Corporation (SMIDEC), CIDB, the Department of Statistics Malaysia (DOSM) and the Security Commission Malaysia (SCM). However, in some organisations (SMIDEC, DOSM & SCM) desired information, such as the number of employees or annual turnover, were unobtainable due to confidentiality. Additionally the Malaysia CIDB only listed professional staff, excluding those in supporting roles, making it very difficult to discover the number of permanent employees within the organisation.

The Department of Statistics Malaysia (DOSM) was contacted in order to obtain information on the numbers of employees and on the annual turnover of contractors. Regrettably, the information sought could not be obtained due to confidentiality.

The Security Commission Malaysia (SCM) was also consulted. SCM had the annual turnover data for its Malaysian registered companies but it did not have detailed information on the number of employees in each organisation. Data on annual turnover was available for purchase however it was deemed uneconomical to spend money on this.

CIDB Malaysia Directory.   Currently, CIDB does not categorise contractors in Malaysia according to number of employees (Subsection 2.4.2 in Chapter 2). The yearly updated CIDB directory lists all the registered contractors in Malaysia based on grade of registration, region, state, status, and works' specialisation. Although the directory lists all contractors, it is impossible to ascertain which of the contractors practise knowledge sharing initiatives. As there was such a long list of contractors in the directory it was considered uneconomical to contact each individual organisation to ascertain whether they carry out knowledge sharing initiatives or not.

Malaysia Construction Industry Excellence Award (MCIEA). Other attempts made to obtain a suitable population sample frame including looking at the CIDB list of contractors involved in the best practices excellence award (see Figure 4.4). Best-practice organisations could easily describe how sharing knowledge contributes to business goals. Their experiences should be learned by others and shared. There were 50 contractors listed in the MCIEA category in 2008 and 2009, and these covered a wide range of organisational sizes.

Figure 4.4 : Malaysian Construction Industry Excellence Award Categories

The human resource departments of all 50 contractors in MCIEA were contacted via email and telephone to ensure they fitted in with the study's selection criterion. Of these, 19 contractors agreed to be involved in this study. These consisted of seven large, five medium and seven small organisations. This sample does not claim to be a structured, representative sample of SMEs and large Malaysian construction contractors.

Managers in the context of this study were categorised by their position as listed below, as there are no standardised management titles in Malaysia:

1. Top managerial level, for example, CEO/Director/Managing Director/General Manager/Board of Executives, whom are responsible for strategic policies and operational management and, may be expected to have an overall strategic insight (OECD Knowledge Management Survey, 2002). They were considered to be the best addressees because they oversaw the companies' operations and were likely to be the ''thought'' leaders for knowledge sharing initiatives.

2. Mid-level management, for example, Project Director/Project Manager/Engineer/Quantity Surveyor/ Senior Manager/Human Resource Manager/IT Manager/Knowledge Manager/Quality Manager. These individuals were selected because they were involved in the day-to-day running of business and construction projects, and had in-depth knowledge of the organisation. Middle managers were those in charge of facilitating the different knowledge conversion processes as well as the learning processes of human groups and work teams that they were responsible for. They were an important link for the successful implementation of knowledge management initiatives and in helping to achieve the desired strategic outcome of superior organisational performance (Purcell et al., 2003; Currie and Procter, 2001).

3. Junior-level management, for example, Site Personnel/Site Supervisor/Site Agents/Site Managers/Sub-Agents undertook more direct supervisory roles, often with specialised responsibilities.

These employees regularly have needs to share their knowledge in the course of performing their jobs. The questionnaire survey and the semi-structured interviews were able to cover multiple viewpoints by sampling employees from these different levels. Various aspects of hierarchy, culture and functions were represented by the diverse range of respondents.

4.5.4. Semi-structured interviews

As qualitative research is usually operated with small samples of people, nestled within their context and studied in-depth and the tendency for the research to be purposive rather than random (Huberman and Miles, 2002), the sampling of respondents was carried out by carefully identifying the respondents from the list identified during the questionaire survey. The key criteria for the selection were discussed in Subsection 4.5.3.1 of the thesis.

The semi-structured interviews were carried out in two phases: the pilot study and the main study phase. Robson (2006) stated that there are three generic forms of interview: unstructured, semi-structured and fully structured, and the different types of interview can link, to some extent, to the 'depth' of response sought. The semi-structured interviews with Malaysian contractors were designed to achieve these specific objectives:

- To elicit any critical issues that need to be addressed within knowledge management processes in addition to those that have been identified within the specific literature review and synthesis.

- It is not only help elicit more detailed responses but also attain in-depth understanding of the underlying reasons and motivations for people's attitudes, preferences or behaviour towards knowledge sharing.

- To get a feel of what was going on, so as to understand better the nature of the problem.

- To discover if they supported the findings from the questionnaire survey; to validate and compare some of the results obtained from the questionnaire analysis, as well as the results from the views of 49 managers.

Semi-structured interviews covered a broad range of positions within organisations from junior (devoted to projects) to senior (concerned with business orientation). Such a spread allowed investigation of a variety of views and opinions regarding knowledge sharing, because each group of participants was able to have a legitimate, but different, interpretation of the area under study. By looking at the points of view from these different levels, the semi-structured interviews were able, not only to compare the way different people viewed situations, but also to develop better lines of inquiry in order to check out emergent themes and patterns as the interviews progressed (Easterby-Smith et al., 2008).

4.5.4.1. Reasons for choosing the telephone interview approach

This study employed a telephone interview approach, the main advantage of which was the low cost. Face-to-face interviews are usually too expensive to when attempting to reach dispersed sample. Oppenheim (1996) asserted that face-to-face interviewers spent only about one-third of their time in conducting interviews, the remainder of their time being taken up by travel and by locating respondents. In contrast, telephone interviews generally offer a more economical solution. Groves and Kahn (1979), as cited in Roberts (2007), estimated the cost of a telephone survey in their comparison study to be less than half that of a face-to-face survey. Moreover, telephone interviews enabled the researcher to gather data quickly and relatively easily from the appropriate respondents. The sessions were also conducted briefly, another important benefit. This method of interviewing was an effective way of narrowing the field of applicants to those who would be offered a personal interview. The telephone interview could also overcome geographical distance, as happened in this case, because the data was collected in Malaysia while the research was carried out from the UK.

4.5.4.2. Appropriate number for interviews

The number of interviewees is not critical in a qualitative study. According to Patton (1990), "there are no rules for sample size in qualitative inquiry. Sample size depends on what you want to know, the purpose of the inquiry, what's at stake, what will be useful, what will have credibility, and what can be done with available time and resources" (Patton, 1990: p.244). He also stated, "the validity, meaningfulness, and insights generated from qualitative inquiry have more to do with the information-richness of the cases selected and the observational/analytical capacities of the researcher than with sample size" (Patton, 1990: p.185). In this study, selecting appropriate participants who could provide plentiful information in representing the views of people in organisations was considered more important than the number of interviewees. Following this, individuals with sufficient knowledge and experience in the field of knowledge management and knowledge sharing were selected as appropriate interviewees for this study.

The interviews in the main study involved 19 organisations. Before the interviews, Managing Directors or Human Resource Managers from each organisation arranged one to three people to be interviewed on an individual basis. At least one key person in each company who had knowledge of knowledge management was contacted for an interview.

To provide a managerial perspective, as well as a holistic organisational perspective, six top managers, 16 middle managers and six junior managers were formally interviewed. Table 4.7 presents a profile of the organisations that participated in the main study, while Table 4.8 shows the spread of interviews conducted.

Table 4.7 : A profile of the participating organisations in the semi-structured interviews

Size of organisations	Head count	No. of organisations
Small	Less than 50	7
Medium	50 - 250	5
Large	More than 250	7
Total numbers of interviews		19

Table 4.8 : A profile of the managerial level involved in the semi-structured interviews

Management level	Job category	No. of interviews conducted
Senior management	General Manager	5
	Vice president	1
Middle management	Project Manager	6
	Planning Engineer	2
	HR manager	4
	Quantity Surveyor	4
Junior management	Site supervisor	6
Total numbers of interviews		28

4.5.4.3. Interview process

Before the interview process started, a list of questions was prepared to ask the respondents (Appendix B). The semi-structured interview questions were checked by the researcher's supervisor, five colleagues at the researcher's institution (University of Salford, UK) and practitioners in the Malaysian construction industry. The result of these discussions proved to be useful and led to the refinement of the interview questions for the pilot study and main study phase. Pilot interviews were conducted before the study began in order to test the interview questions and to hone the interviewing skills as recommended by Creswell (2009). The respondents were contacted to ask their permission to be interviewed over the telephone. Before the interview, the aims and purposes of the research were communicated using various media to ensure the respondents were at ease and clear about the aim of the

interview. E-mails were sent to the organisations/link persons who expressed a willingness to approach potential respondents.

Interview sessions via telephone were arranged in advance taking into consideration the suitability of time and place. This was to ensure that the respondents were ready, calm and without distraction from the surroundings. Arrangements were made by an earlier conversation with the persons involved and through personal and official contacts. Respondents' names were kept confidential and the actual names were replaced immediately during the interview with a code or with other pseudo names as agreed by the participants themselves (Table 4.9).

Each interview lasted for about one hour and was undertaken in the respondents' office rooms in the morning (between 9.00am to 11.00am Malaysian time and 2.00am to 3.00am UK time) and in the evening after office hours (between 4.00pm to 6.30pm Malaysia time and 8.00am to 10.30am UK time). The interviews were scheduled for the convenience of the interviewees. Most of the respondents preferred to be interviewed either in the early morning or in the late afternoon. This was to make sure they were focussed on the issues discussed and to minimise disruptions in their working schedules.

Most of the interview sessions were conducted via free-calling on Skype, and there were also a few calls to landlines and mobile phones which incurred a small fee. Interview sessions were recorded using a free Skype recorder called 'call graph' and manually backed-up by placing a digital Dictaphone near the built-in speakerphone on the laptop. The quality of the voice connection was not an issue, particularly with Skype and VoIPCheap.

4.5.4.4. Recording

Permission was obtained from the respondents to record each interview session. The semi-structured interviews were digitally recorded for accuracy so that any extra information that was not noted down at the time of the interview could be later transcribed for further analysis. Gray (2004: p. 227) affirmed that the use of tape recording is vital in conducting interviews as it helps the researcher record essential data, while permitting them to concentrate on the process of listening, interpreting and re-focusing the interview. During the telephone interview, it was important to get the respondent to talk freely in order to obtain information and cover all of the areas during the interview. Questions were prepared beforehand, but as the interviews progressed and more issues arose, additional relevant

questions were inserted naturally into the flow of the interview. The interview file from call graph and digital Dictaphone were transferred onto a laptop immediately after the interview and then named with a numeric code (Table 4.9).

After carrying out the interviews, the recording was carefully listened to and transcribed verbatim. A second careful listening accompanied by the typed transcription was performed to ensure full agreement between the recorded and the transcribed data. This was undertaken to ensure the reliability of both the data and interpretations. In order to become familiar with the data, the interviews were manual transcribed rather than relying on software. The number and categories of interviews conducted is given in Table 4.9.

Table 4.9 : Number and categories of interviewees involved

Managerial level	Job category	No. of interviews conducted	*Codes for interviewees
Top	General Manager	5	TL1, TL2, TS1, TS2, TS3
	Vice President	1	TM1
Middle	Project Manager	6	ML1, ML3, ML4, MM2, MM5, MS4
	Planning Engineer	2	ML5, MM3
	HR Manager	4	ML4, ML6, MM4, MM2
	Quantity Surveyor	4	MM1, MS2, MS4, MS5
Junior	Site supervisor	6	JL1, JL7, JM1, JS3,JS6, JS7

*Code for interviewees

T/L/M/S/1/2/3 etc = Top/ Large/Medium/Small/ company 1/2/3 etc

M/T/M/S/1/2/3 etc = Middle /Large/Medium/Small/ company 1/2/3 etc

J/T/M/S/1/2/3 etc = Junior /Large/Medium/Small/ company 1/2/3 etc

4.5.5. Questionnaire survey

The questionaire were distributed to 1000 respondents. The respondents were selected randomly. In selecting the contractors for the survey, only Malaysian contractors were considered, contractors were selected from CIDB directory. The directory contains a list of SMEs and large contractors. The list is equipped with the address, telephone and fax numbers of the contractors. Some of the companies listed cannot be contacted by phone or by fax. Companies with no phone or fax numbers and no e-mail address are deemed 'uncontactable' for the purpose of the survey. A postal questionnaire technique was used in this study due to the geographical spread of contractors across Malaysia. This allowed a greater number of subjects to be contacted in a limited time period in comparison with other techniques, such as interviews. Additionally it ensured anonymity of the respondents

in order to encourage frankness when answering the questions (Robson, 2002). However the weaknesses of the method cannot be ignored. The biggest disadvantage with postal questionnaires is non-response or a low response, which reduces the effective sample size and can introduce bias (Robson, 2006). Several strategies were used for maximising the response rate to the questionnaire Table 4.11.

4.5.5.1. Questionnaire development

Due to the lack of empirical research in knowledge sharing within Malaysian construction organisations (Subsection 2.4.4 in Chapter 2), developing a reliable questionnaire for this research was very important. Initially the design of the questionnaire was developed based on the review of the existing literature, as well as by referencing knowledge sharing information and questionnaires from organisations in construction and other sectors.

The first step in designing the questionnaire was to base it upon prior research studies in knowledge management activities (Wong, 2009; Bishop et al., 2008; Wei and Mohammed, 2007; Moffett, 2003; Egbu et al., 2001; Liebowitz, 1999; Skyrme and Amidon, 1997). The questionnaire was based on these knowledge management activities, practices, challenges and attitudes. Questions were included to examine how contractors shared their knowledge in their organisations. In this research, a five-point Likert scale, one of the accepted methods of measuring attitudes toward independent variables, was used as a simple method to explore contractors' perceptions towards knowledge sharing approaches. A Likert scale using a mean index formula (Majid and McCaffer, 1997) measures the respondents' view on given questions. A five-point Likert scale was used as previous research indicates that a five-point scale works well and that any increase, such as to seven or nine points on a rating scale, does not improve the reliability of the ratings (Elmore and Beggs, 1975 as cited in Zainol and Wan Daud, 2011). A long scale may be cognitively difficult for respondents, while a short scale may be cognitively easy but may not differentiate respondents' opinions sufficiently (Weisberg et al., 1996). The scaling and interpretation adopted in this research survey are shown in Table 4.10.

Table 4.10 : Rating system for the study

Question	Scale				
	1	**2**	**3**	**4**	**5**
Part 2	Highly used	Used	Fairly used	Less used	Not used at all
Part 3	Very challenging	Challenging	Fairly challenging	Less challenging	Not challenging at all
Part 4	Very ready	Ready	Fairly ready	Less ready	Not ready at all
Part 5.1	Very important	Important	Fairly important	Less important	Not important at all
Part 5.3	Very high level of contribution	Some contribution	Little contribution	Low level contribution	No contribution at all
Part 6	Very influential	Influential	Fairly influential	Less influential	Not influential at all

The questionnaire used a combination of closed and open-ended questions. The respondent was asked to mark their response using either a tick (questioning in part 1) or to circle the appropriate answer for questions in parts two to six. For open-ended questions (questionnaire part five - section 5.2), the respondents were requested to rank the three most important approaches to knowledge sharing in their organisations and to give reasons why these were important to their organisation. The questionnaire (Appendix A) consisted of six parts:

Part One - general information about respondents including current job title/position; number of full-time employees working in the organisation; length of time of involvement or employment in local construction organisations; and the length of time of employment with their current employer.

Part Two - covered different knowledge-sharing approaches employed within the organisation. The starting point for the questionnaire was a list of formal and informal approaches that could be used in sharing knowledge within the organisation. The respondents were requested to circle the appropriate box to indicate the extent to which these approaches to knowledge sharing were currently practised in their organisation.

Part Three – questions that explored the main challenges faced in the 'setting-up' and implementation of knowledge-sharing approaches. A list of challenges that was thought relevant was listed based on the secondary data received.

Part Four - ascertained the level of readiness of organisations to 'set-up' and implement knowledge-sharing approaches.

Part Five – consisted of three sections:

Section 5.1 required the respondents to express their perception on the significance (importance and benefits) of knowledge-sharing approaches in organisations. Based on the review of literature and on the pilot study findings, 10 important variables that could be acquired from knowledge-sharing approaches in organisations were listed. The respondents were requested to indicate the importance of each variable. Although the degree of importance varied within organisations, the questionnaire was expected to elicit a general assessment of the importance of knowledge sharing in organisations.

Section 5.2 asked the participants to rank a set of statements indicating the three most important knowledge-sharing approaches in their organisation and to give reasons for their importance in the organisation. Respondents were able to answer freely, unrestricted by the choices provided by the researcher in question 5.1.

Section 5.3 provided a list of ten variables and respondents were asked to indicate the extent to which knowledge-sharing approaches in their organisation contributed to the organisational performance. The respondents were requested to indicate the contribution of each variable.

Part Six – investigated the degree of influence that organisational structure, culture and human resource practices played in the implementation of knowledge sharing. The respondents identified variables that they perceived as being likely to contribute to factors influencing the implementation of knowledge sharing by responding on a designated scale.

4.5.5.2. Questionnaire measurement

Measurement is a procedure in which a researcher assigns numerals (numbers or other symbols) to empirical properties (variables) according to rules (Naoum, 2007). There are four levels of measurement (nominal, ordinal, interval and ratio) and the collected data should fall within one or more of these levels. The level of measurement limits the statistical measures that can be used. The contractor's perceptions survey was a rating scale, and therefore the study employed an ordinal scale for the questionnaire measurement.

4.5.5.3. Pre-testing questionnaire

To refine the questionnaire, a pre-test study was conducted. Yin (1994) distinguished between 'pilot test' and 'pre-tests'. He viewed the former as helping 'investigators to refine their data collection plans with respect to both the content of the data and the procedures to be followed'. Meanwhile a 'pre-test' is a formal 'dress rehearsal' in which the intended data collection plan is used as faithfully as possible, and is perhaps closer to the usual meaning of a pilot study. According to Robson (2006) and Dillman (1978), pre-testing of a questionnaire should be carried out and should include different groups, such as colleagues and potential users of the data. A questionnaire can be pre-tested on a small population sample, mainly to make sure that the instructions, questions, and scale items are clear; to avoid jargon or specialist languages; and also to avoid negative, personal questions, double barrelled and leading questions (Easterby–Smith et al., 2008). The intention of undertaking pre-testing was to further refine the questionnaire in order to improve its overall readability, the clarity of its questions, the reliability, format, and appropriateness of the measures and scales used, the effectiveness of the questions, and the time taken to complete the survey, as well as to elucidate any other possible issues that might have lead to improvements. Data collected during pre-testing also allowed the researcher to measure the internal validity of the scales.

In the context of this study, pre-testing was conducted in order to get feedback about the audience's understanding of the questionnaire and provided some valuable insights. The initial draft of the eight-page questionnaire was critically reviewed by the researcher's supervisor, five academics from within the fields of construction management at the University of Salford and ten Malaysian construction organisations practitioners, to ensure that the individual items and the overall format were easily understood. This helped increase the clarity of the questions to avoid interpretation errors. The ten practitioners selected for the pre-test study were broadly representative of the type of respondent to be interviewed in the main study. A sample size of 16 was deemed to be sufficient for the purpose of pre-testing the questionnaire, particularly considering the time constraints of this study. To gain an accurate and valid critique of the questionnaire, organisational members at top, middle and junior management were selected as part of the pre-test group. This gave an insight into any issues of concern within organisational, group and individual levels. The sample group was chosen for three main reasons: 1) their background

characteristics; 2) the researcher knew each contact person personally and; 3) their e-mail addresses were readily available.

The questionnaire was organised in eight pages. Although it was rather long, the questions were straight forward and the pre-test study revealed that it would take approximately 15 to 20 minutes to complete the questionnaire. Fifteen questionnaires were returned with comments and a final version of the questionnaire was prepared based on these. Only minor changes were required, mostly in the wording of the questions. As a final step, responses obtained during the pre-test were coded and analysed. This final pre-testing exercise took place over a period of approximately one month (1st - 25th September, 2010).

4.5.5.4. Questionnaire administration

The questionnaire distribution occurred on 20th October and 15th December 2010. The researcher contacted respondents in advance to explain the objectives of the study and to seek their cooperation. The respondent's name, initial and titles were obtained from an earlier contact with the administration or the human resource manager in the construction organisation. The details on where to return the questionnaire appeared both in the covering letter as well as on the questionnaire itself. The respondents were given eight weeks to complete the questionnaires. The questionnaire was accompanied by a letter that provided information about: the researcher; the study; the purpose of the survey; the aim of the research; its importance to both the organisations and the construction industry; the deadline by which the questionnaire needed to be returned; and what the results would be used for. It also promised a guarantee of confidentiality and/or anonymity.

Non-response

Several strategies were used to maximise the response rate to the postal questionnaire (and, thereby, to increase reliability). Among the attempts to increase the response rate were:

- Pre-contact: organisations were contacted by telephone and email in advance with the aim of checking their address, confirming the number of employees and asking for the names of three different levels of managers (top, middle and junior managers).

- Sponsor: the name of the University of Salford appeared in the mailed questionnaire to inspire feelings of reliability and respect.

- Appeal: brief explanation of the aim of the research and the important role of the respondent in enabling its realisation.

- Stimulus: a summary of the survey results was promised (and later sent) as a kind of reward and in gratitude for their co-operation.

- Format: using a questionnaire that consisted of eight pages. Saunders et al. (2003) advised that questionnaires should be limited in length to between six and eight pages; otherwise the return rate may be adversely affected.

- Covering letter: a covering letter was included in order to explain the aim and objectives of the research and to ensure confidentiality.

- Sending questionnaires by mail with clear instructions on how to answer the questions.

- Reminders: questionnaires were followed up with a personal telephone call and the researcher organised multiple rounds of follow-ups to request questionnaire returns.

- Stamped and self-addressed envelopes were provided.

Follow-up efforts were conducted via telephone one week after the questionnaire was sent in order to check the organisations had received it, and to encourage a response. Fifty-six responses were received in the two weeks after the questionnaires were sent out. Five weeks after the initial mailing, a second reminder was sent out along with a new copy of the questionnaire. In week five, 148 more responses were received, with a total of 407 responses received by eight weeks after the initial mail out. Of these, 23 forms were incomplete and were thus disregarded (Table 4.12). The remaining 384 surveys were answered properly and completely with usable data, providing a response rate of 38.4% (Table 4.12). This is regarded as relatively high, since the respondents were managers with a high workload.

When considering the statistics for response rates Owen and Jones (1994) considered an average questionnaire return rate of 30% as satisfactory. They suggested that "on average, a response rate of 20 percent of questionnaires returned without reminders is considered satisfactory, while 40 percent is exceptionally good". Alreck and Settle (2004) stated that "mail surveys with response rates over 30 percent are rare". Finally, this rate is considered good because academic surveys conducted in Malaysian subjects are not known to have a high response rate (Westwood and Everett, 1995). Based on the above views, the response rate to this questionnaire was well above the acceptable level and provided a sample

population sufficient to allow statistical testing. The completed questionnaires received yielded sufficient data sets for the research objectives to be successfully achieved.

Table 4.11 : Action taken to increase return rate

Distribution	Timing (P-day)	Send	Responses	%	Date P-day
Posting date	20 Oct 2010	1000	-		20 Oct 2010
First stage	29 Oct 2010 7 days after postal date check that organisations have received it		-		P-day + 7 days (week 1)
First reminder	10 Nov 2010 15 days after postal date/ 3 weeks follow-up letters/ email to those who have not yet replied		56	5.6	P-day + 15 days (week 2)
Second reminder	24 Nov 2010 25 days after postal date/ 5 weeks follow-up letters/email to those who have not yet replied. Sent out a new copy of the questionnaire		148	14.8	P-day + 25 days (week 5)
Third reminder	08 Dec 2010 35 days after postal date/ 7 weeks follow-up letters/ email to those who have not yet replied		125	12.5	P-day + 35 days (week 7)
Finish	15 Dec 2010 43 days after postal date Finish		78	7.8	P-day + 40 days (week 8)
Total to date		1000	407	41	

P day= postal day

Table 4.12 : Response rate

	Selected respondents
Population	69,490
Sample	1000
Unusable responses	23
Usable responses	384
Usable response rate	38.4%
Total responses	407
Total response rate	40.7%

4.5.5.5. Data collection - postal questionnaire survey

This section provides background information of the participants in terms of: current job title/position numbers of full-time employees work in organisation, years of experience working/involved in Malaysian construction industry, and years of experience working in the current employment.

a)   Current job title/position

Table 4.13 presents the spread of responses between three different levels of managers. Respondents were categorised into three position groups, these were; group 1 (senior level manager); Group 2 (mid level manager); Group 3 (junior level manager). In term of responses received by level of management, the highest proportions of the respondents fall in group 2 (mid level of managers) followed by group 3 (junior level of managers), and group 1 (senior level managers). Table 4.13 and Figure 4.5 shows that 68 (18%) of the respondents who participated in this study were senior level of managers, 202 (52%) were mid managers, and 114 (30%) were junior managers. Thus, this sample showed a fairly good mixed of respondents between top, mid and junior managers in different size of organisations which indicates a non-biased sample.

Table 4.13 : Current job title/position of the participants

		Frequency	Percent	Cumulative Percent
Valid	Senior level manager	68	17.7	17.7
	Mid-level manager	202	52.6	70.3
	Junior-level manager	114	29.7	100.0
	Total	384	100.0	
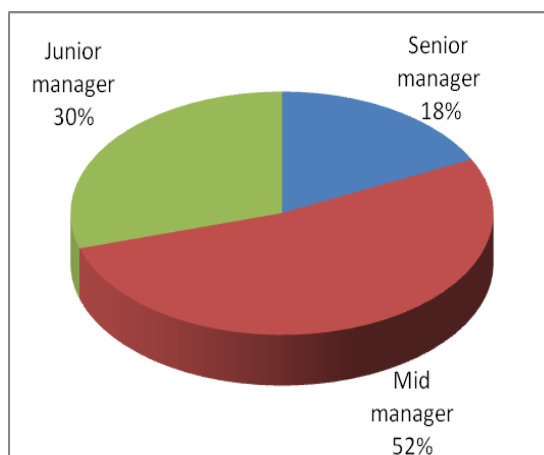
Figure 4.5: Participants position involved in the study

Figure 4.5 shows the low response from senior manager level participates in the survey. This could indicate that a majority of the senior level managers sample population truly do not keen to participate in the survey due to the commitment in work and time constraint.

b)   Number of full-time employees work in organisation

Table 4.14 presents the distribution of survey respondents by size of organisations based on number of employees. Participants were categorised into six group size of organisation, these were; group 1 (1-10 employees); Group 2 (11-20); Group 3 (21-50 employees); Group 4 (51-100 employees); Group 5 (101-250 employees); and Group 6 (More than 250 employees). The number of full-time employees in Table 4.15 can be further regroup to the size of organisation based on the European Commission definition. Table 4.15 shows that the organisations were divided into three groups, small, medium and large organisations. From the Figure 4.5, we can observed that 7% of the respondents were part of organisation having more than 250 employees and can be considered as large organisation, 93 % were part of organisation having less than 250 employees (SMEs). From the result it is shows that many of the participants were from SMEs. It gives a true picture of the contractor's in Malaysia and the relevance of including such SMEs in this study. Since the data was gathered from different sizes of organisations (small, medium and large), there seems to be no bias favour of any specific size of the contractor.

Table 4.14 : Size of organisation according to numbers full-time employees work in organisation

	Number of employees	Frequency	Percent	Cumulative Percent
Valid	1-10	84	21.9	21.9
	11-20	105	27.3	49.2
	21-50	105	27.3	76.6
	51-100	41	10.7	87.2
	101-250	24	6.3	93.5
	More than 250	25	6.5	100.0
	Total	384	100.0	

Table 4.15 : Different size of organisations involved in the study categorised based on European Commission definition

	Number of employees	Frequency	Percent	Cumulative Percent
Valid	Small (Less than 50)	294	76.6	76.6
	Medium (51-250)	65	16.9	93.5
	Large (More than 250)	25	6.5	100.0
	Total	384	100.0	
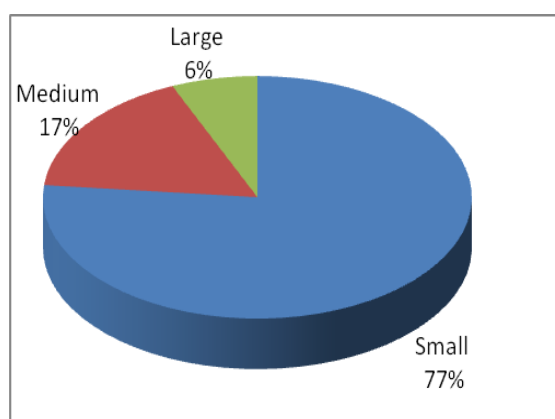
Figure 4.6: Size of organisation

In term of size of organisation, the majority of the contractor companies (as shown in Table 4.15 and Figure 4.6) are small. One of the main reasons is because the small construction companies might be a subsidiary of a large corporation or those which have already established good relationship with corporate clients or other large international contractors.

c)   Years of experience involved/worked in Malaysian construction industry

The range of personal experience of the respondents in terms of number of years involved or worked in the Malaysian construction industry is between 1 to more than 20 years as indicated in Table 4.16. In terms of work experience in Malaysian construction industry, more than half (83%) of respondents have experience between 1-10 years. Whilst, 17% of the respondents have more than 10 years working experience and are all familiar with the main issues surrounding knowledge sharing. 7% of them are senior level manager, 8% represents mid level manager and 2% represent junior level manager (Figure 4.7).

As can be seen from the Table 4.16 and Figure 4.7, it can be conclude that the respondents who answered the questionnaires are those have enough knowledge about the organisational structure, culture and strategies of organisations; with extensive working experiences and those holding responsible positions in the various sizes of organisations. Their answers to the questionnaires give a high level of credibility in terms of their opinions regarding the issues raised in the questionnaires.

Table 4.16 : Length of time involved/worked in the Malaysian construction industry and position cross tabulation

Length of time involved / worked in the Malaysian construction industry	Position			Total	Percent	
	Senior manager	Mid manager	Junior manager		Percent	Cumulative Percent
Less than 1 year	3	33	23	59	15.4	15.4
2-5 years	16	93	61	170	44.3	59.6
6-10 years	24	46	21	91	23.7	83.3
11-15 years	19	24	4	47	12.2	95.6
16-20 years	5	4	3	12	3.1	98.7
More than 20 years	1	2	2	5	1.3	100.0
Total	68	202	114	384	100.0	
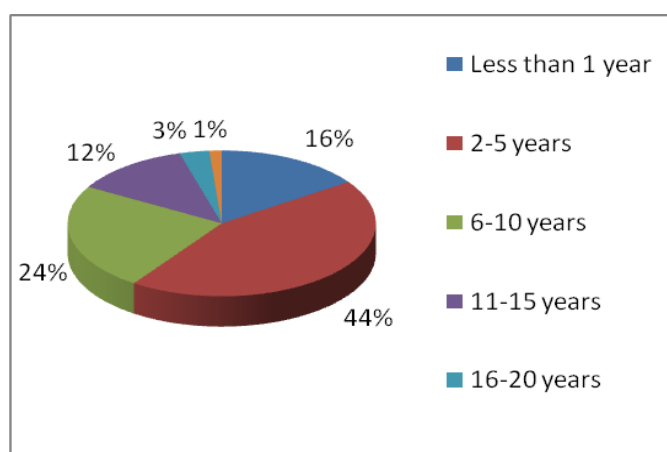
Figure 4.7: Years of experience in Malaysia construction industry

d)   Years of experience in the current employment.

More than half (53%) of the respondents had been employed for 5 years or less with their organisation. Almost half (47%) of the respondents had been employed for six or more years, with one third (20%) having been employed in their organisation for more than 10 years (Table 4.17). This shows that respondents have been with their organisation long enough to make reasonable insights into how knowledge sharing works in their work environment. It is therefore is believed that the responses are highly reliable and that the opinions show the companies' general situations in knowledge sharing.

The nature of the construction industry is different to other industries, such as the manufacturing or retail sector, where processes and the working environment are well defined and controlled (Gann, 1996). Generally all employment in the construction industry is of a casual, temporary nature, employees often work remotely, which work security is unknown. The breakdown for responses according to years of experience in the current employer is shown in Tables 4.17 and 4.18 below.

Table 4.17 : Length of time worked with the current employer

	Length of time	Frequency	Percent	Cumulative Percent
Valid	Less than 1 year	82	21.4	21.4
	2-5 years	122	31.8	53.1
	6-10 years	102	26.6	79.7
	11-15 years	43	11.2	90.9
	16-20 years	35	9.1	100.0
	Total	384	100.0	

Table 4.18 : Cross tabulation size of organisation and length of time worked with the current employer

Size of organisation	Number of employees	Length of time worked with the current employer (years)					Total
		≥1	2-5	6-10	11-15	16-20	
Smal	Less than 50	56	89	76	40	33	294
Medium	51-250	14	25	22	2	2	65
Large	More than 250	12	8	4	1	0	25
	Total	82	122	102	43	35	384

This section has analysed of survey questionnaire response data gathering the general information which includes: current job title/position, full-time employees work in organisation, years of experience in Malaysian construction industry and years of experience in the current employment. Additionally, based on the respondents' job position and years of experience, the information provided by the respondent, is considered reasonable, trustworthy and representing the opinions of the population in the Malaysian construction organisations. Overall, the sample of respondents appeared to be quite diverse, representing people from various demographic groups, management hierarchical levels, and experiences.

In summary, 40 organisations and 49 managers participated in the interviews while 350 organisations and 384 managers participated in the postal questionnaires, giving an overall total of 390 participating organisations and 433 participants (Table 4.19).

Table 4.19 : Total number of participants in this study

Techniques of data collection	Number of participants	Number of organisations
Pilot Interviews	21	21
Main study interviews	28	19
Postal questionnaires	384	350
Total	433	390

4.5.6. Objectives of the study and how they are addressed through the data collection method

The Table below shows how the objectives are addressed through the data collection methods used (Table 4.20). The link between the research objectives, the semi-structured interviews, the questionnaire survey, and the literature review section is given in

Table 4.21.

Table 4.20 : Objectives of the study and the mode of investigation

Objectives	Method of investigation			
	Literature review	Semi –structured interview: pilot study	Semi-structured interview: main study	Questionnaire survey: main study/validation
To critically review the literature and document the perceptions of construction organisations (small, medium and large) towards knowledge-sharing approaches.	✓	✓	✓	
To appraise and document the different approaches employed by construction organisations for knowledge sharing.	✓	✓	✓	✓
To explore and document the main challenges that face construction organisations in the 'setting-up' and implementation of knowledge-sharing approaches.	✓	✓	✓	✓
To specifically explore the readiness of organisations to 'set-up' and implement knowledge-sharing approaches.	✓	✓	✓	✓
To investigate the significance (importance and benefits) of knowledge sharing, and the extent to which knowledge sharing contributes to organisational performance.	✓	✓	✓	✓
To specifically investigate the degree of influence that organisational structures, culture and human resource practices play in the implementation of knowledge sharing in an organisation.	✓	✓	✓	✓
To develop a conceptual model that encapsulates the key factors that impact upon the successful implementation of knowledge sharing in an organisation.	✓	✓	✓	✓
To validate the proposed conceptual model.				✓

Table 4.21 : The link between the research objectives and the data collection techniques.

Research objectives	Section: Literature	Section: organisation of the semi-structured interview: exploratory stage	Section: organisation of the questionnaire	Section: organisation of the semi-structured interview: pilot study	Contribution to the thesis
To critically review the literature and document the perceptions of construction organisations (small, medium and large) towards knowledge sharing approaches.	Chapters 1, 2, 3	_	_	_	• The thesis provides a typology of the knowledge, knowledge sharing, integrating the existing body of knowledge • The thesis provides a comparison of the perceptions of SMEs and large construction organisations in regard of knowledge sharing approaches.
To appraise and document the different approaches employed by construction organisations for knowledge sharing.	Chapter 4	Question 2	Part 2	Question 2	• Provides a 'valid' and 'reliable' picture of the current practices of construction organisations in sharing knowledge • Provides list of approaches to knowledge sharing
To explore and document the main challenges that face construction organisations in the 'setting-up' and implementation of knowledge sharing.	Chapter 6	Question 3	Part 3	Question 3	• The thesis identifies the challenges faced by construction organisations in setting up and implementing knowledge sharing
To specifically explore the readiness of organisations to 'set-up' and implement knowledge sharing.	Chapter 7	Question 4	Part 4	Question 4	• The thesis identifies the readiness of construction organisations to 'set-up' and implement knowledge sharing
To investigate the significance (importance and benefits) of knowledge sharing, and the extent to which knowledge sharing contributes to organisational performance.	Chapter 8	Question 5	Part 5	Question 5	• The thesis identifies the significance of knowledge-sharing approaches to organisation performance.

Table 4.21: The link between the research objectives and the data collection techniques (continued).

Research objectives	**Section: Literature**	**Section: organisation of the semi-structured interview: exploratory stage**	**Section: organisation of the questionnaire**	**Section: organisation of the semi-structured interview: pilot study**	**Contribution to the thesis**
To specifically investigate the degree of influence that organisational structures, culture and human resource practices play in the implementation of knowledge sharing in an organisation.	Chapter 9	Question 6	Part 6	Question 6	• The thesis identifies the organisational factors influencing the implementation of knowledge sharing in organisations.
To develop a conceptual model that encapsulates the key factors that impact upon the successful implementation of knowledge sharing in an organisation.	Chapter 10	_	_	Question 7	• The thesis develops a model in relation to the successful implementation of knowledge sharing in organisations
To validate the proposed conceptual model.	Chapter 11	_	_	_	• The thesis validate the proposed model

4.6. Data analysis techniques

The data gathered was analysed qualitatively and quantitatively (Subsection 4.6.1 and 4.6.2). Qualitative techniques were applied to make sense of meanings. Content analysis was used to analyse the semi-structured interviews whilst descriptive and inferential statistics were used for the analysis of the questionnaire survey. Statistical Packages for Social Sciences (SPSS) software was used to analyse the data quantitatively.

4.6.1. Qualitative data analysis via content analysis

One of the challenges in qualitative research is data analysis. Literature describes a number of tools and techniques (Miles and Huberman, 1994) that must be selected based on the objectives of the research. Since the research at this stage was more exploratory than confirmatory in nature, "content analysis" for analysing the interview transcripts was chosen. Fourth-nine interviews were conducted and there were over a hundred pages of interview transcripts to analyse. The collected data was coded and analysed using content analysis, based on the guidelines provided by Gillham (2000), and Strauss and Corbin (1998). Data from the interviews were analysed immediately after each interview to identify constant and regular themes. The inductive process was used as Yin (1994) suggested, looking for consistent themes that emerge from the data, and was supplemented by the deductive process to ensure the data was not misconstrued or misinterpreted. This overall iterative approach was used successfully within an interpretive methodological paradigm to identify clusters and emergent themes or categories whilst maintaining the richness of the data (Huberman and Miles, 2002).

Manual coding was used in this research instead of computerised coding. Manual coding entail reading text and extracting user-specified information deemed relevant to its content and / or context (Carley, 1990). However, as Morris (1994) claims, manual coding in content analysis is more reliable, but time consuming. The following are the main reasons for coding data manually, in this research study.

- Number of interviews conducted was fairly low (49)

- There were different groups of participant involved

- The interviewees were asked a different number of question (refer to Appendix B). The different groups of participants used different words on the same subject e.g. information management for word knowledge management)

The findings from the review of literature were also taken into account when analysing the content of the transcribed interview data. This allowed synthesising the literature to identify and divergence of theory vs. practices, if any.

4.6.2. Quantitative data analysis via statistical techniques of analysis

The quantitative aspects of the responses to the questionnaire were analysed using SPSS version 16, in the University's mainframe computer. SPSS was chosen for this research as its software was the easiest to learn and use, and it had a data editor that resembled. SPSS providing familiarity to the researcher. It could also perform most of the general statistical analysis required, which was well suited and adequate for this particular research. Another important reason why SPSS was chosen was because it could easily create and customise graphs that could be pasted into other documents such as Word, Excel or Powerpoint. The data collected from the survey was analysed using non-parametric statistical or 'ranking' tests. These differ from parametric tests in that, the assumption made, or conclusion drawn, are regardless of the shape of the population, whereas parametric tests assume that the scores are drawn from a normally distributed population (Siegal, 1956). All usable response data was analysed using these tools.

Several types of statistical analysis were undertaken (Table 4.23). A descriptive analysis was performed in order to describe the data in a meaningful way, for example, the number of employees in an organisation, or the number of years of experience a participant had in the construction industry. Descriptive statistics such as mean, percentages and frequencies were used in the study.

An inferential statistical analysis (e.g. Spearman correlation) was carried out to check whether the scores could be inferred to the general population (all contractors in Malaysia). In this study, the Spearman correlation test was used as follows:

- The Spearman's rank correlation coefficient was used to determine the relationship between two quantitative variables measured in an ordinal scale. For example, the relationship between knowledge sharing approaches and the size of the organisation.

- As a result of the non-normal nature of the data distribution, a Spearman's Rho correlation was used instead of the Pearson correlation, as Salkind (2004) stated, "when the data is ordinal, the suitable test for correlation is Spearman's rank coefficient".

Correlation coefficients indicate the strength of the association between the variable under investigation. The sign (+ or -) indicates the direction of the relationship. The value can range from -1 to +1, with +1 indicating a perfect positive relationship, 0 indicating no relationship, and -1 indicating a perfect negative or reverse relationship (Hair et al, 2006). The interpretation for the value of a correlation coefficient can be found by referring to the work undertaken by Salkind (2004) (Table 4.22). Table 4.23 summarises the data analysing method used for this study.

Table 4.22 : Interpreting a correlation coefficient

Size of correlation	Coefficient general interpretation
.8 to 1.0	Very strong relationship
.6 to 0.8	Strong relationship
.4 to 0.6	Moderate relationship
.2 to 0.4	Weak relationship
.0 to 0.2	Weak or no relationship

Source: Salkind (2004)

Table 4.23 : Summary of the data analysis methods used

Data collection techniques	Analysing method	Analysing techniques	Software
Semi-structured interview	Coding	Content analysis	Manually
Questionnaire survey	Descriptive statistics	Comparison of mean Calculation of frequency Cross tabulation	SPSS 16
	Inferential statistics (non parametric test)	Spearman's coefficient of correlation	SPSS 16
	Normality	Kolmogorov-Smirnov test	SPSS 16

Normality

In order to test for the normal distribution of response data, a Kolmogorov-Smirnov test for all dependent and independent variables was conducted. In this study, all of the items were confirmed not to be normally distributed, therefore, a non-parametric test was used. Although normality of variables is not always required for analysis, the solution is usually improved if the variables are all normally distributed (Pallant, 2001). Since the variables indicated a significant result (sig. value ≤ 0.05) and, ordinal data was used in this study, non-parametric techniques were considered more suitable for the analysis. Table 4.24 shows the result of the normality test on the variables. The significant p-value is less than 0.05 indicating the data is not normally distributed.

Table 4.24 : Tests of normality

Items	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Formal approaches	.060	384	.002	.987	384	.002
Informal approaches	.081	384	.000	.988	384	.003
Challenges in setting up	.066	384	.000	.987	384	.002
Challenges in implementing	.049	384	.027	.991	384	.022
Readiness to set up	.067	384	.000	.993	384	.091
Readiness to implement	.086	384	.000	.989	384	.006
Important of knowledge sharing	.083	384	.000	.975	384	.000
Contribution of knowledge sharing	.074	384	.000	.977	384	.000
Organisational Structure	.113	384	.000	.961	384	.000
Organisational Culture	.085	384	.000	.974	384	.000
Human resource practices	.121	384	.000	.962	384	.000

a. Lilliefors Significance Correction

The elaboration and findings of the data collected from the questionnaire will be discussed further in Chapter 5-9.

4.7. Issues regarding validity and reliability of the data

According to Eriksson and Wiedersheim-Paul (2001), there are two common measurement problems that researchers need to consider when determining if a study has been successful or not. These are validity and reliability. Both ideas help to establish the truthfulness, credibility, or believability of findings (Neuman, 2011).

4.7.1. Validity

To ensure the validity of the data this study employed:

- Triangulation of data: data was collected through multiple sources. The quantitative survey was used to gather basic data while a qualitative approach was also used in the form of semi-structured interpretive interviews to collect supporting data (Subsection 4.4.4).

- Document analysis interviewee check: the data was checked by summarising what the interviewees had said at appropriate stages of the interviews.

- Semi-structured interview questions checked by the researcher's supervisor, by peer examinations and by practitioners in the Malaysian construction industry (Subsection 4.5.4.3).

- To establish content validity, the questionnaire was refined through rigorous pre-testing. The pre-testing focused on instrument clarity; question wording and validity (Subsection 4.5.5.3)

- Use of multiple analysis techniques were reported in detail in order to provide a clear and accurate picture of the techniques used in the study (Section 4.6).

The aim of utilising these validity strategies in this study was to ensure external validity and to provide rich, substantial, detailed descriptions so that anyone interested in transferability would have a solid framework for comparison (Merriam, 1988).

4.7.2. Reliability

Reliability is often used in quantitative studies that are connected to positivism. It suggests that the same thing can be repeated or can recur under identical or very similar conditions (Neuman, 2011). A measure is considered reliable if it produces the same result whenever it is repeated (Sarantakos, 2005).

For this study, an analysis was performed to test the internal consistency reliability. This form of reliability is used to judge the consistency of results across items on the same test by comparing test items that measure the same construct. Internal consistency can be measured in a number of ways. Cronbach's alpha coefficient was chosen, as suggested by Sekaran (2003) as the most commonly accepted approach for assessing the reliability of a multi-item scale (using SPSS). The alpha coefficient ranged in value from 0 to 1. It was used to describe the reliability of the instrument for multi-point formatted scales (i.e., 1 = highly used to 5 = not used at all). The closer that Cronbach's alpha is to 1, the higher the internal consistency reliability (Sekaran, 2003). The consistency of the respondents' answers to all items was assessed. Nunally (1978) recommended that the minimum acceptance standard of internal consistency reliability is 0.70. Price and Mueller (1986) noted that 0.60 is generally viewed as the minimum acceptance level. In generic terms, the threshold of acceptance of reliability coefficients as equal to as or greater than 0.60 has been used as the point of reference for most research work. The cut-off point for reliability is taken as 0.70 α value as suggested in literature (Santos, 1999; Nunnally, 1978). Table 4.25 shows the overall α value is 0.833 and demonstrates that the internal consistency for the entire scale was good and thus the results were considered to be reliable and consistent (Nunnally, 1978). This means that the constructs are statistically reliable, and the results of this research reflect the actual opinions of practitioners in Malaysian contractors. Thus all items are retained for further analysis.

Table 4.25 : Overall reliability statistics

Constructs	Reliability Statistics	
	Cronbach's α	N of Items
Formal approaches	0.888	12
Informal approaches	0.822	7
Challenges in setting up	0.878	10
Challenges in implementation	0.882	11
Readiness to set-up	0.923	11
Readiness in implementation	0.918	10
Importance	0.920	11
Benefit	0.927	10
Organisational structure	0.744	4
Organisational culture	0.772	5
Human resource practices	0.851	4
Total	0.833	95

4.8. Research ethical considerations

Ethical concerns are likely to occur at all stages of research (Saunders et al., 2009). Research ethics relate to questions on how the researcher formulates and clarifies the research topic, designs and gains access to collect data, processes and stores the data, analyses data and writes up the research findings in a moral and responsible way (Saunders et al., 2009). Most of Saunder's general ethics issues were adhered to in this study. These include:

Voluntary participation: the co-operation of potential respondents was obtained through e-mail and telephone, followed by a letter (see Appendix D) to the organisations/link persons who had expressed a willingness to approach potential respondents. All participants were given the opportunity to withdraw from the study at any point or to refrain from answering specific questions. A consent form was completed by each participating organisation and individual acknowledging participation was voluntary (see Appendix F).

Informed consent: a thorough approach was put in place to obtain the consent of each participant organisation and individual. Accordingly, prior to data collection, a formal letter was sent that explained the objectives of the research and data collection methods, and the intention to publish the findings. It discussed confidentiality and other related issues (see Appendix F and G). In addition, the researcher sought permission to record the interviews from each respondent (Section 4.5.4.4).

Avoidance of harm: The basic ethical principle governing data collection is that no harm should come to the respondents as a result of their participation in the research (Oppenheim, 1996). According to Sarantakos (2005), participants could be at risk of three types of harm: physical, mental or legal. In this study, physical harm was not considered a potential risk because the data collection was done by distance. Personal questions and sensitive issues were not explored and subjects were treated respectfully, eliminating the risk of mental harm. Legal harm was also not considered as a potential risk because participant's rights were not violated and confidentiality was maintained.

Confidentiality: The primary ethical concern was privacy and confidentiality in using the information gathered. Confidentiality was required to protect the privacy of participants (Miles and Huberman, 1994; Yin 1994). Care and due diligence were

exercised through all personal exchanges to respect and maintain the privacy and confidentiality of the interview participants (Miles and Huberman, 1994). For the survey questionnaire and interview, identification numbers were allocated to each response which was used for the report analysis rather than names. Names with matching identification numbers were kept in a separate, confidential database table, accessible only to the researcher. Participants were assured that the information obtained from them would be kept strictly confidential and used for research purposes only. Gathered data would not be made available to any third party or used in any published material. An assurance that responses would be kept confidential may well have contributed to the candid nature of the responses.

Anonymity was agreed upon for all participating companies and for individual participation. The anonymity in both data collection methods was maintained. The real names of the organisations, locations and personal information does not appear in this thesis nor in any other publications, but has been substituted by pseudonyms. In order to contextualise quoted materials presented in this thesis, an attribute of the respondents (such as position and seniority) that matter to the argument will be provided in order that anonymity does not destroy the context of the data.

A completed Ethical clearance checklist was submitted to the University of Salford Ethical Advisory Committee before the data collection commenced. This study received ethical clearance from the University of Salford.

4.9. Research methodological framework

The research methodological framework (Figure 4.8) consisted of three main stages: the establishment of the research problem; the research methodological design; and the data analysis and write up. The solid black arrows indicate the formal sequence of the study. As Remenyi et al. (1998) asserted "Research is almost always complex for each step to follow from the previous step in the planned and desired way the first time it is attempted". The dotted lines therefore represent the retracing of previous steps by the researcher in order to undertake revisions based on the reflections made during the progress of the study.
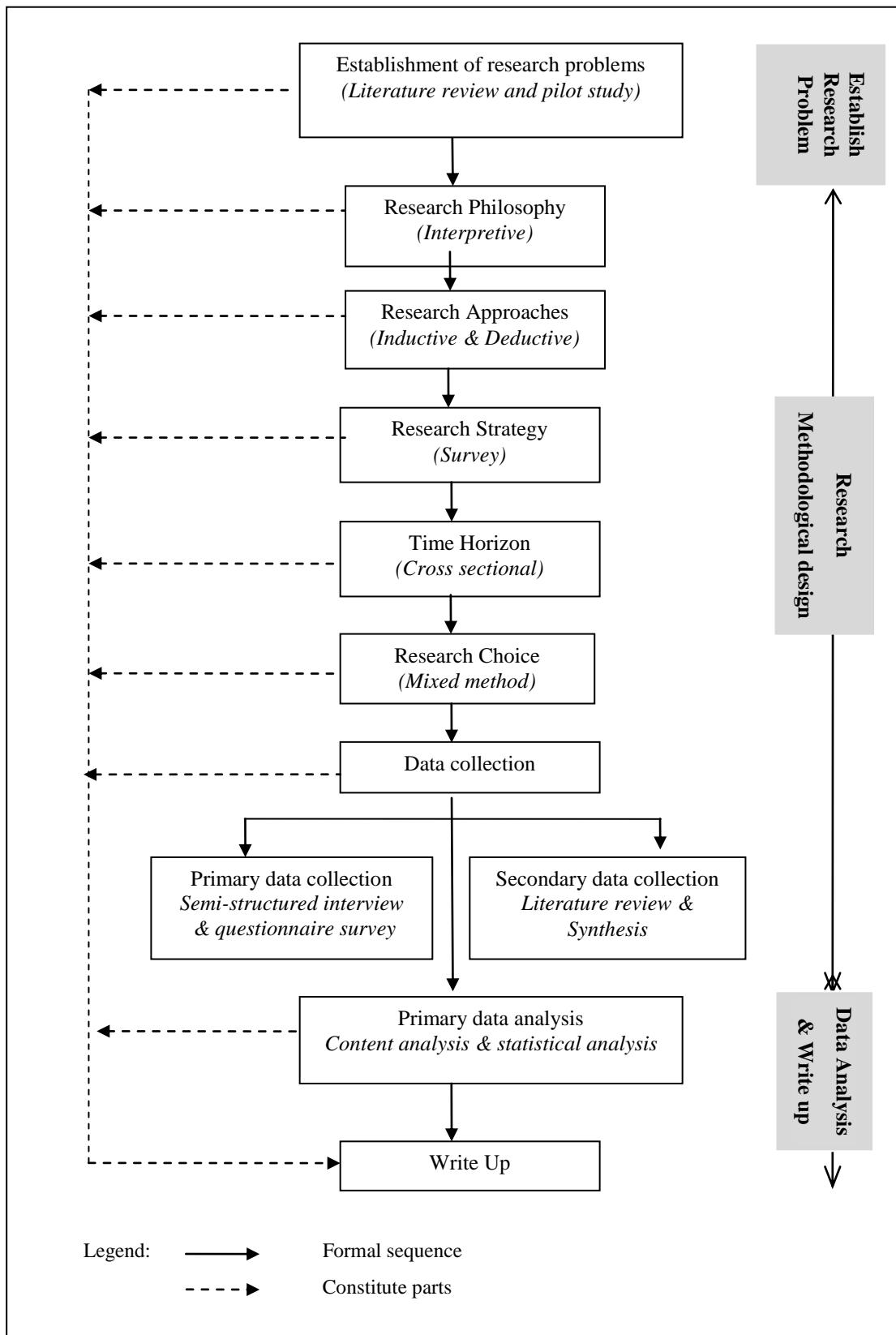
Figure 4.8: The research methodological framework

4.10. Stage 3 – Output (Validating and refining the Knowledge Sharing Model)

Finding of stage 1 (review of literature and interview from the pilot study), stage 2 (semi structured interviews and questionnaire survey) of the study highlighted the need for knowledge sharing model. These findings also assisted in identifying the contents of the knowledge sharing model. Discussion on the developing and validating knowledge sharing model is given in Chapters 10 and 11.

4.11. Conclusions and recommendations

This chapter presented the key issues and decisions that needed to be made in the research design. It started by describing the research process and the range of research methodologies. Subsequently, the need for a mixed method approach for this research was discussed.

The research methodological framework of this study can be broadly divided into four major phases: the establishment of the research problem; the research methodological design; identification of the population sample, selection of a sample frame and the data collection; and the data analysis and write up.

A thorough literature review and a pilot study enabled the development of the research problem. In the pilot study, data was collected through semi-structured interviews with twenty-one (21) construction organisations, the outcome of which guided the selection of the sample for main data collection. Saunders et al.'s (2009) research process onion model was explored while identifying the research philosophy, approach, strategy, choice, and data collection method. A mixed method research model was used in order to capture the best of both quantitative and qualitative approaches. The unit of analysis used in this research is Malaysian construction organisations (contractor) undertaking civil and building works.

In the first section of the data collection, a questionnaire was developed incorporating the variables identified from the extant literature and confirmed by the interviews. A total of 1000 questionnaires were sent out to construction organisations in Malaysia, using a sample of three different sizes of organisation (small, medium and large construction organisations) and different managerial levels (top, medium and junior). The response rate of 38.4% from the questionnaire was considered to be excellent.

The second section of the main study was exploratory and inductive, aligned to an interpretive paradigm. Semi-structured interviews of twenty-eight (28) individuals were used to gather perceptions regarding the phenomena under consideration. The results of the interviews were used to support and cross-validate the questionnaire findings. The response rate of 89% from the interviewed respondents was also considered excellent and encouraging. The different data analyses employed in the study were also documented. Any limitations that could influence the research process at any stage, whether at the beginning of sampling or even after data tabulation, was anticipated and dealt with within reason. The methodology adopted in the present study might be useful to other researchers who are interested in exploring knowledge sharing in other construction organisations.

The next chapter reveals the findings of the exploratory knowledge-sharing survey conducted in the Malaysian construction organisation.

CHAPTER 5.   APPROACHES TO KNOWLEDGE SHARING

5.1. Introduction

This chapter presents some of the common approaches to knowledge sharing used by Malaysia construction organisations. This is followed by the extent to which they are used by SMEs and large Malaysia construction organisations. A review of selected knowledge sharing literature is provided. The chapter also analyses and presents data on approaches to knowledge sharing from both the questionnaire survey and semi-structured interviews. Overall, Chapter 5 addresses the second objective of the study (Table 1.1 in Chapter 1): "To appraise and document the different approaches employed by construction organisations and managers for knowledge sharing".

Accordingly, the chapter is structured with seven main sections:

- Section 5.2 introduces formal and informal approaches for knowledge sharing.

- Section 5.3 addresses the results regarding the formal approaches to knowledge sharing employed by construction organisations at the aggregate and dis-aggregate level.

- Section 5.4 presents the results regarding the informal approaches to knowledge sharing employed by construction organisations at the aggregate and dis-aggregate level.

- Section 5.5 presents the results regarding the formal approaches to knowledge sharing used by managers at the aggregate and dis-aggregate level.

- Section 5.6 presents the results regarding the informal approaches to knowledge sharing used by managers at the aggregate and dis-aggregate level.

- Section 5.7 concludes by summarising the key findings of the study.

5.2. Knowledge-sharing approaches in construction organisations

Studies on knowledge sharing have largely centred on the perceptions of organisations in advanced countries (Subsection 2.4.4 in Chapter 2). However, little attempts have been made to empirically investigate its current adoption status in developing countries such as Malaysia. This section presents the results of an exploratory knowledge sharing survey conducted in the Malaysian construction organisation.

A broad range of knowledge-sharing approaches is mentioned in the literature (Section 3.4 in Chapter 3). For example, much is stated about the use of formal approaches to knowledge sharing (i.e. information technology, mentoring, training, leadership etc. as important considerations for its accomplishment) and informal approaches to knowledge sharing (i.e. face-to-face social interaction, personal relationships, social events etc.). However, there seems to be a paucity of empirical evidence about the most used knowledge-sharing approaches in construction organisations, and the extent to which these approaches are used. It is therefore the purpose of this part of the study is to appraise and document the different formal and informal approaches employed by construction organisations for knowledge sharing in order to:

1. Facilitate better understanding of approaches to knowledge sharing in construction organisations.

2. By understanding how knowledge is being shared in organisations, the management of organisations would be able to identify the different forms of approaches that take place to share knowledge in the organisation and how it could be enhanced for the organisation's benefit.

3. Appropriate knowledge-sharing approaches which are relevant for construction organisations will help them to keep in mind the important issues that should be dealt with when designing and implementing a knowledge-sharing initiative.

4. Formal and informal approaches to knowledge sharing that are currently not being practised or not emphasised in the organisation could receive more attention and focus from the management.

5. The research findings are able to assists the construction organisations to understand better the various approaches to knowledge sharing so that action can be taken to overcome unwarranted gaps. In addition, this study may provide insights to

SMEs and large construction organisations on how to properly frame their knowledge management strategies and activities in the right perspectives, and serving as a guideline to discover and to further observe the importance of above mentioned approaches to knowledge sharing within an organisation in improving organisational performance.

From the list of approaches to knowledge sharing, (Section 3.4 in Chapter 3), the respondents were asked to indicate the extent to which the 12 formal and 7 informal approaches are currently employed in their organisation. In order to assist respondents to understand the questions, definitions of formal and informal approaches to knowledge sharing were provided in the questionnaire (Appendix A). In the context of present study, formal approaches to knowledge sharing is defined as initiatives that are well defined, structured, systematically organised; using formal knowledge-sharing approaches and usually presented in written forms. Such initiatives often embody policies transpiring the life span of an organisation and should ideally not be rigid so as to accommodate changes that may occur in tandem with the organisational environments. It reflects internal knowledge within an organisation and aspires towards continued improvement. An informal approach to knowledge sharing is defined as initiatives that are unstructured, non-organised in form, occurring in ad hoc fashion and often undocumented or labelled as knowledge management. It reflects internal networking knowledge and occasionally results from external communications with the aim of improving internal knowledge sharing. Informal knowledge-sharing approaches may occur spontaneously without any official assistance from the management.

The statistical analyses are undertaken using the Statistical Package for Social Science (SPSS 16) software and are discussed in two major parts. Part 1 consists of 2 sub stages:

1. The extent to which formal approaches to knowledge sharing are used by Malaysian construction organisations is presented at the aggregate level, i.e. the overall mean values of the responses.

2. The dis-aggregate level deals with the means, which are ranked based on their level of use. Detailed comparisons of the ranking order are made based on different size of organisation (small, medium and large).

Data for the different informal approaches used to knowledge sharing will also be presented.

Part 2 of the analysis explores the underlying relationships among formal and informal approaches to knowledge sharing and different size of organisation (small, medium and large) by means of Spearman's correlation coefficient.

Another dimension is taken into account in order to explore in more detail, the extent to which formal and informal approaches are used by different levels of managers. Managers' perceptions, through semi-structured interviews, were sought regarding the use of approaches to knowledge sharing associated with different size of organisation.

The first step in the analysis was to collate how respondents had ranked their organisation's knowledge-sharing approaches on a five-point scale: "highly used", "used", "fairly used", "less used" and "not used at all". These approaches were coded 1, 2, 3, 4 and 5 respectively. The categories of "highly used", "used", were combined to form "most highly used/used". Average scores were then computed from the ordinal coding of these data.

Tables 5.3 and 5.4 represent the overall mean scores and the ranking of the survey respondents at the aggregate level on the extent to which formal and informal approaches to knowledge sharing are used. As the mean score increases, the use of formal and informal approaches to knowledge sharing decreases. By taking the rankings and converting this to a score, statistical analysis enabled the creation of the tables below.

5.3. The extent to which formal approaches to knowledge sharing are used by Malaysian construction organisations.

5.3.1. The extent to which formal approaches to knowledge sharing are used by Malaysian construction organisations: aggregate level

In the context of the present study, the definitions and terms used for variables associated with formal approaches to knowledge sharing are given in Table 5.1 below.

Table 5.1 : Characteristics of formal approches to knowledge sharing used in organisations.

Formal approaches to knowledge sharing	Terms used
Use of internet technologies to encourage staff members to interact and share knowledge with each other and the rest of the organisation	Internet technologies
Use of intranet technologies to encourage staff members to interact and share knowledge with each other and the rest of the organisation.	Intranet technologies
Use of mentoring for experienced employees to share their knowledge, experience and expertise with less-experienced colleagues.	Mentoring
Use of an open and conducive environment for employees to share ideas and concepts (e.g. an environment that promotes trust and cooperation, teamwork and continuous learning)	Open and conducive environment
Use of training to improve coaching to enhance knowledge-sharing initiatives.	Training
Use of recruitment and selection of individuals with appropriate skills and attitudes as part of knowledge-sharing initiatives.	Recruitment and selection
Use of clear communication channels to promote the value and benefits of sharing knowledge (e.g. reports, news bulletins, e-mail etc.).	Communication channels
Use of flexible organisational structure to increase the level of employees' involvement in the sharing of knowledge.	Flexible organisational structure
Use of a performance measurement system to evaluate the effectiveness and contributions of knowledge-sharing initiatives.	Performance measurement system
Use of an appraisal and reward system to motivate employees to share knowledge in the organisation.	Appraisal and reward system
Employ a knowledge leader or champion to be responsible for knowledge-sharing initiatives	Knowledge leader or champion
A written knowledge-sharing policy is in place as a part of knowledge-sharing initiatives.	Knowledge-sharing policy

The results relating to the extent to which formal approaches to knowledge sharing are used in construction organisations are shown in Table 5.2. Almost 64% of the survey respondents were of the view that internet technology is most highly used/used in knowledge-sharing in their organisations. This is closely followed by mentoring (55%), an open and conducive environment (54%), intranet technologies (53%), and training to improve coaching (53%). Approaches such as use of recruitment and selection for knowledge sharing (49%), use of clear communication channels for knowledge sharing (48%), use of an appraisal and reward system for knowledge sharing (46%), and use of a performance measurement system for knowledge sharing (44%) were still not widely used by the respondents. This implies that the approaches undertaken by them were more 'operational-oriented rather than having a 'strategic' focus (Wong, 2008). Probably the respondents were relying on it as a faster route to accomplish knowledge-sharing initiative (e.g. using internet and intranet to share or capture knowledge electronically in repositories), without first building a strong foundation to support and sustain it (e.g. use recruitment and selection of individuals with appropriate skills and attitudes as part of knowledge-sharing initiatives, and use of a performance measurement system to evaluate the effectiveness and contributions of knowledge-sharing initiatives). While the three least used formal approaches to knowledge sharing are: Knowledge leader or champion (44%), flexible organisational structure (43%) and a knowledge-sharing policy, which scored much lower (40%).

Table 5.2 : The extent to which formal approches to knowledge sharing are used.

Formal approaches to knowledge sharing	Highly used	Used	Fairly used	Less used	Not used at all
	%				
Internet technologies	24.0	40.4	20.3	11.7	3.6
Mentoring	16.9	38.0	31.0	11.2	2.9
Open and conducive environment	13.8	40.6	30.7	13.0	1.8
Intranet technologies	21.4	31.5	26.8	11.2	9.1
Training to improve coaching	13.8	39.1	33.3	10.4	3.4
Recruitment and selection	9.4	39.3	35.2	11.5	4.7
Clear communication channels	11.2	37.2	30.5	14.8	6.3
Appraisal and reward system	12.0	33.9	27.3	15.1	11.7
Performance measurement system	10.4	33.6	31.8	13.5	10.7
Knowledge leader or champion	13.3	30.5	25.5	21.6	9.1
Flexible organisational structure	8.6	34.6	36.2	18.0	2.6
Knowledge-sharing policy	8.6	31.3	31.5	17.7	10.9

Table 5.3 : Mean scores for formal approaches to knowledge sharing employed by organisations: aggregate level.

Formal approaches to knowledge sharing	Overall (N=384)	
	Mean	Rank
Internet technologies	2.31	1
Mentoring	2.45	2
Open and conducive environment	2.48	3
Training	2.51	4
Intranet technologies	2.55	5
Recruitment and selection	2.63	6
Communication channels	2.68	7
Flexible organisational structure	2.71	8
Performance measurement system	2.80	9
Appraisal and reward system	2.81	10
Knowledge leader or champion	2.83	11
Knowledge-sharing policy	2.91	12

Meaning of scale (the extent of use)

1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all)

Table 5.3 represents the overall mean scores and the ranking given by the survey respondents of the formal approaches to knowledge sharing employed. As mean score increases, the level to which formal approaches to knowledge sharing are employed decreases. The data shows that the overall mean scores range from 2.31 to 2.91. This means that all twelve formal approaches to knowledge sharing are significant and fall in the category 'used'. Generally, the mean value indicates that there is an extensive use of formal approaches to knowledge sharing by Malaysian construction organisations.

From the data it is evident that the main formal approach that emerged as most highly used or used is the use of internet technologies to encourage staff members to interact and share knowledge with each other and the rest of the organisation. Over half (sixty four per cent) of the respondents indicated that internet technologies are the most highly used or used formal approaches to knowledge sharing, with a mean value of 2.31. This indicates that businesses in the construction industry now utilise information and communication technology. The internet is recognised among construction organisations as a useful and effective tool for knowledge sharing (Egbu and Botterill, 2002). The internet is especially commonplace in such environments for the effective sharing of knowledge and information.

The interviews with the 49 managers revealed that the internet is the most highly used or used approach for knowledge sharing because it is cheap, easy to access and easy to handle. It was found that all the construction organisations in this study have established their own internets at very minimal cost. This, support the study done by Botha, (2004) that the cost efficiency of utilising internet technology has opened the door for organisations to use this same technology to share information and knowledge within the organisation. Another possible explanation is that internet technologies for sharing knowledge are already in place and available to staff. Everyone has thus become familiar with them. This familiarity and confidence with a wider range of internet-based applications has led to a greater willingness to share knowledge online. Moreover, due to the nature of the construction industry covering different geographical areas, the role of the internet for the support of information, knowledge sharing and communication appears to be crucial, because geographical heterogeneities can be overcome by online tools (Andriessen et al., 2002). Hence, the use of internet technology should be available to members in organisations to improve communication and knowledge sharing indirectly.

From the semi-structured interviews with 49 managers, it can be concluded that all allow their staff to use the internet for work purposes (subject to usage policies that restrict the use of corporate IT facilities for certain types of activities). Some examples of how sharing knowledge occurs on the internet in the present study include: electronic tendering or e-tendering (preparing tendering documentation and conducting tenders for employers and obtaining, processing and submitting tenders), on-line bidding for overseas projects, compiling documents and drawings in a softcopy format and quotations from suppliers.

The results of this study are consistent with those of Wong (2008), Symonds et al.'s (2003), Egbu and Botterill (2002). Wong (2008) found that all the respondents (100%) in the Malaysian manufacturing and service sectors use information technology (e.g. the internet and intranet) to share and transfer knowledge. Symonds et al.'s (2003) study of 410 private and public corporate businesses in New Zealand also found that the internet is the most used IT for knowledge sharing. The finding is also consistent with the work of Egbu and Botterill (2002), who revealed that the most frequently used techniques and technologies for managing and sharing knowledge in construction organisations in the UK are the telephone, the internet and intranet.

Mentoring, where experienced employees share their knowledge, experience and expertise with less-experienced colleagues, was ranked the second most highly used or used formal approach to knowledge sharing by over half (fifty five per cent) of the respondents (Tables 5.2 and 5.3). This could be because it is a cost-effective way to share knowledge in an organisation. Mentoring can be used to influence knowledge sharing in a variety of ways (Subsection 3.4.1 in Chapter 3). In the context of the present study, it was found that mentoring helps new graduates (or new employees) to solidify their theoretical knowledge by learning from experienced colleagues. For example, a mentor (senior employee) will make sure that a junior (new employee) learns everything that is required in the job. By matching new or inexperienced employees with more experienced senior personnel, the intangible, tacit knowledge of the industry or organisation can be passed on effectively (Collin, 2004). It allows the newer employees to grow without learning the hard way and creates a bond between them and the mentor. As one of the respondents stated:

"We have senior QS, junior QS and training QS. So senior will teach and share their knowledge with junior and indirectly, the juniors can gain some knowledge through mentoring (discussions/meetings) with the seniors".

However, the interviews with the 49 managers revealed that many construction organisations have still not established formal mentoring. By not doing so they also fail to capitalize on the experience and knowledge that seasoned personnel can pass on (Serrat, 2009). By revealing that mentoring has a positive effect on creating a knowledge-sharing culture, it is recommended that practitioners should foster and support formal mentoring for knowledge sharing. This formal mentoring needs to be recognised by top management. APQC (1994–2002) suggests that knowledge can best be shared if employee mentors are selected in the department to guide and teach colleagues or junior employees.

Use an open and conducive environment for employees to share ideas and concepts (e.g. an environment that promotes trust and cooperation, teamwork and continuous learning) is another formal approach to knowledge sharing. Over half (fifty four per cent) of the respondents ranked an open and conducive environment the third most highly used or used formal approach to knowledge sharing (Tables 5.2 and 5.3). This finding is consistent with the work done by Mahmood and Ali (2011), mentioned in Subsection

3.4.1 in Chapter 3. Employees must feel emotionally free and safe to develop trust among them and within the organisation in order to be able to learn and share knowledge, which in turn is promoted by an open and conducive environment. One of the respondents stated:

"So far I would say we do not have a problem in knowledge sharing. I'm proud to tell you that we have few staff that has been with us for almost 10, 20 years. Trust is there. Here, I refer trust as an expectation that staff will perform a particular action. We always sit and discuss on project. Teach one another. Sometimes manager also takes care of our personal problem. With the family relationship, our relationship is close and harmony and we have no problem to share knowledge".

In order to create an open environment in which employees feel comfortable sharing their knowledge and using others' knowledge, an atmosphere of trust and cooperation, teamwork and continuous learning must be developed. The most effective and efficient way to do this is to set up activities during which people can learn together. Support from top management is definitely required for the adoption of knowledge sharing. The management should create an environment to promulgate, motivate and encourage employees to collaborate and share knowledge. It is through trust that individual members of project-based organisations can be motivated to share their experiences and exploit their creativity (Egbu and Botterill, 2002).

Use of training to improve coaching in enhancing knowledge-sharing initiatives was ranked the fourth most highly used or used formal approach to knowledge sharing by over half (fifty three per cent) of the respondents (Tables 5.2 and 5.3). In the context of the present study, several forms of training to improve coaching in enhancing knowledge-sharing initiatives were found to have been used, for example:

1. Inviting key people from outside the organisation to make presentations, which staff can discuss with them.

2. Training by working in subgroups so that everyone can meet a lot of people and learn as much as possible.

3. Peers assisting people who have difficulty with the topic discussed.

4. Inviting people to talk about their stories/experiences/best practices relating to the topic discussed.

The interviews also revealed that the benefits of training include:

1. More active learning.

2. Access to a multitude of resources.

3. Fuller, deeper discussion.

4. The chance to liaise and network among the different stakeholders.

5. Integrate other ways to share knowledge.

6. Access to a pool of different experiences from which employees can learn.

One of the respondents stated:

"Staffs need continuous learning so that they are equipped with the latest information which will ensure that we will not be left behind. I believe that training is a good platform for the learning process to take place and hopefully learning and knowledge sharing will become a culture in this organisation".

By revealing that training is important in enhancing knowledge-sharing initiatives, it is crucial that construction organisations have a proper training programme to enable managers and employees to gain knowledge and contribute to the creation and sharing of knowledge in the organisation. It should be systematic, continuous and ongoing. Appropriate and focused training programmes (e.g. CPD events, other short courses, in-house programmes such as mentoring, coaching, job rotation) are important for successful knowledge sharing.

The construction organisations also has to be more proactive regarding formalised training for the purpose of knowledge sharing and have a specific allocation. Issues such as the importance and benefits of having knowledge management or formal knowledge sharing are crucial. Managers also need to attend the training so that he/she will know the importance of having formal knowledge sharing. Staff will also have a clear role regarding knowledge sharing.

The use of intranet technologies to encourage staff members to interact and share knowledge with each other and the rest of the organisation was ranked as the fifth most highly used or used formal approach to knowledge sharing by fifty three per cent of the respondents. This may be because the intranet (an internal internet) is seen as a user-friendly and cost-effective means of leveraging the knowledge of the organisational

members. Moreover, the different geographical distance between the headquarters and project sites makes using the intranet to share knowledge significant. This is reflected in the statements one of the managers from large organisation:

"We have been using intranet share point since 2002. When it realised that the distance from its headquarters to each project site had become a major obstacle in objective achievement. Long ago, we used database system but it was so complicated. Intranet share point is easier to be used and easy to access too".

The interviews with 49 managers revealed that, generally, the intranet is designed to serve the internal informational needs of the organisation's members. As one of the respondents stated:

"If implemented well and if people are trained and educated in its use, intranet technology for knowledge sharing is good. Not only can you find the information and knowledge you need quickly and effectively but you can post your knowledge on the system for access by others in the organisation".

The intranet can be used for many purposes and in many ways depending on the size of the organisation. Basically, Intranet was used as a means of storing and disseminating information and share knowledge. In this study it was found that construction organisations use the intranet to share issues such as:

1. Administrative – calendars, emergency procedures, meeting room bookings, procedure manuals and the latest news about staff membership.

2. Dissemination of corporate documents – retrieve annual reports, corporate information and documents, health and safety and emergency procedures/manuals, business plans, client/customer lists, document templates, branding guidelines, mission statements, organisational performance, minutes of meetings.

3. Financial – annual reports and organisational performance.

4. IT – virus alerts, tips on dealing with problems with hardware, software and networks, policies on corporate use of email and internet access and a lists of online training courses and support.

5. Marketing – competitive intelligence with links to competitor websites, corporate brochures, latest marketing initiatives, press releases, presentations.

6. Human resources – appraisal procedures and schedules, employee policies, expenses forms and annual leave requests, staff discount schemes, new vacancies, guidelines for dress codes, vacation policies and benefit plans, motivation story, downloading application forms for attending training or conferences.

7. Individual projects – current project details, team contact information, project management information, project documents, time and expense reporting.

8. External information resources – route planning and mapping sites, industry organisations, research sites and search engines.

However, there were a number of problems identified with regard to the use of the intranet within the organisation. These included a lack of standardisation of the system, practical difficulties in accessing the intranet from site offices, the lack of incentives to use and update information to the intranet, and not all employees were allowed to add their knowledge to the intranet themselves. The employees responsible for the intranets were the only people who could add or remove information. This impacted very negatively on the implementation of discussion forums and bulletin boards as well as the dissemination of information among staff.

The discussion above shows that the intranet is an important medium of communication and widely used in certain organisations to promote knowledge sharing. It is recommended that construction organisations should extensively and effectively use the intranet to allow the sharing of knowledge to perform better. However, the role of specialist websites (web-master) is necessary to maintain the facilities of intranet technology. As suggested by Wang (1999), if the intranet is maintained the employees can achieve effective knowledge sharing.

The use of the recruitment and selection of individuals with appropriate skills and attitudes as part of the knowledge-sharing initiative was ranked the sixth most highly used or used formal approach to knowledge sharing (with a mean value of 2.63). In this study, it was revealed that the recruitment and selection of new employees varies according to the level at which the appointment is made. For example, some respondents stressed the level of detail required according to job classification (the decision is based on an assessment of the candidates' knowledge, skills and competences, and or refers to their work experience), and some stressed the selection

test (considering individuals' multi-skills, flexible workforce, exceptional talent and potential and fit with team or organisation). It is recommended that organisations need to pay attention to selecting valuable workers who will contribute and share knowledge and skills with others.

Use of clear communication channels to promote the value and benefits of sharing knowledge was ranked as the seventh most highly used or used formal approach to knowledge sharing. Forty eight per cent of the respondents considered communication channels to be the most used approach in their organisation to promote the value and benefits of sharing knowledge (Tables 5.2 and 5.3). This could be due to the geographical separation of sites, both from one another and from the headquarters, which has a detrimental effect on the sharing of knowledge because of the importance placed on social networks and contacts. There is a range of communication channels available in this study for communication within construction organisations, the project team and with external participants. The objective is to share information, knowledge, thoughts, concerns, feelings etc. in the most efficient way. For example, email, PC or web chat services, circulars, newsletters, project newsletters, websites, documentation and formal communication are controlled through specific processes and media; time sheets, progress reports and change requests are some of the uses and channels of communication found in this study. Koulopoulos and Frappalo (1999) found that communication affects knowledge sharing. Hence, clear and effective communication in knowledge sharing is vital. It is recommended that construction organisations should encourage formal interaction (communication) between employees. Adequate communication can also deepen mutual understanding of each other, and enhance the degree of participation in the business operation, thus enhancing trust, teamwork and continuous learning in the organisation.

As one of the respondents stated:

"The clearer the communication channel, the better it enables the customisation of information to suit the context and the more it enables interactions to seek clarification and aid further reinterpretation of the knowledge".

The use of flexible organisational structures to increase the level of employee involvement in the sharing of knowledge was ranked as the eighth most highly used or used formal approach to knowledge sharing. This may be because generally in Malaysia, companies follow a vertical hierarchical structure where authority is directed from the top (Subsection 9.3.3.2 in Chapter 9), hence it limits active knowledge - initiatives and communication between employees or between employees and managers (Creed and Miles, 1996). Studies by Al-Alawi et al. (2007) and Riege (2005) show that for knowledge sharing to happen, a more flexible organisational structure is needed.

The use of a performance measurement system to evaluate the effectiveness and contribution of knowledge-sharing initiatives was ranked as the ninth most highly used or used formal approach to knowledge sharing. The interviews with 49 managers revealed that their organisations do not directly provide a formal performance measurement system to evaluate the effectiveness and contribution of knowledge-sharing initiatives. This may be because it is difficult to measure the direct benefit of using knowledge sharing and too difficult to assess the benefit which knowledge-sharing initiatives can bring about. As one of the respondents stated:

"In my view, knowledge sharing is difficult to be assessed directly. We have no specific reward for knowledge sharing. However, in long term, we can see the result of knowledge sharing, for example reducing in staff turned over. I myself have been with this company for 21 years. Many other senior staff has been in this company".

However, looking at the three least used formal approaches to knowledge sharing, namely an appraisal and reward system, appointing a knowledge leader or champion, and a knowledge-sharing policy, there is agreement amongst all sizes of organisation.

The use of an appraisal and reward system to motivate employees to share knowledge in the organisation is rated as the third least used formal approach to knowledge sharing, with a mean value of 2.81. This means that in most organisations, an appraisal and reward system to motivate employees to share knowledge in the organisation is not widely used. Interestingly, the interviews with 49 managers revealed that organisations do offer rewards such as promotion, bonuses and higher salary. However, the results from the interviews also show that there is no written criterion for rewarding people. The organisations do not provide any direct formal reward system for employees to increase their willingness to share their knowledge. This result supports the work done

by Robinson et al. (2005b) on knowledge management practices in four large construction organisations in the UK, which revealed that none of the construction organisations have reward schemes for knowledge sharing. This is reflected in the statements of the managers:

Small organisation

"This company do not align rewards with knowledge sharing. However, we do have motivate employees in doing their job such as a yearly bonus based on the performance, leisure trip for all staff, flexibility in office hour. However, the bonus and reward depends on the project and economy situation at that time. The managers treat the staff like a family and very flexible. All this incentive makes us happy to work, happy to share our knowledge and to stay longer with this company".

Medium organisation

"There is no reward purposely for knowledge sharing. However, knowledge sharing is part of KPI. Every vice president or managers need to share their knowledge with their subordinate. It is KPI for VP or managers".

Large organisation

"We don't have special approach to motivate staff to share their knowledge. We do have salary increment and bonus but it is not official profit sharing. Reward and recognition will base on the company performance. Our family ties are quite strong and we are very committed with our work. When you have incentive, you will fill you working for company as well as yourself. We are family orientated, we worked as a team. If you teach staff the company will earn, you also earn. If project run smoothly and complete on time, we will get bonus, incentive will come back to us. If the project successful deliver and bring profits to the company, staff will be rewarded. By having such motivation, staff will be fully utilised whatever knowledge they have. If we do not share or hoard our knowledge it will affect the project performance, project will delay, fail to complete on time and company do not earn money to run business and you won't get anything".

All the organisations involved in the study conduct annual performance appraisals of the staff whereby senior manager sits down with individuals to review their performance over the previous year, using it as an opportunity to plan their training and development for the year ahead. However, there are different methods for appraising employee performance. Most of the people surveyed said that they are not evaluated by management based on their willingness to share knowledge with others in their organisation. For the most part, people share knowledge on their own, without formal recognition. Interestingly, one of the large contractors appraise their staff under the following headings: job knowledge, problem solving ability, quantity/quality of work/task management, training requirements, communication skills, adaptability, business knowledge and achievement of goals set previously. This is reflected in the statement of one manager:

"There are key performance indicators in the performance appraisal. Knowledge sharing is one part to evaluate staff achievement. However, we do not use the word knowledge sharing specifically. Indirectly, the staffs are encouraged to increase their knowledge by attending as many training sessions. At least three training session needs to attend by staff in a calendar year and will be given 85% marks. The more training attended the higher scores they will get. In this company, we offer many training sessions. Every beginning of the year we will make analysis on self-evaluation in which staff will be suggested/given the opportunity to attend training in any area that they lack, such as leadership and so on".

This result may be because an appraisal and reward system for knowledge sharing is difficult to operate in the construction context. As suggested by Carrillo et al. (2004), even if there is a performance appraisal scheme in place, it is not so easy to identify the reward culture, as many construction organisations do not directly reward their personnel for sharing information and knowledge. It is considered to be divisive because much depends on teamwork, and individual team members' contributions cannot be distinguished from shared knowledge.

People must be rewarded for their knowledge. In order to motivate employees to share their knowledge, it is suggested that construction organisations might need to use a formal performance appraisal and reward system. Recent research has proved that the use of rewards for knowledge sharing is successful in increasing knowledge sharing in

the organisation (Yu et al., 2007). Hence, it is recommended that a performance appraisal and reward system must be designed to encourage knowledge-sharing behaviours, so that people know that one aspect of the performance appraisal is linked to knowledge sharing, and they will certainly like to ensure that they do not get a low rank for this dimension. The need to create more structured rewards and appraisal systems to encourage employees and managers to change their behaviour is no doubt necessary in construction organisations. Rewarding and recognising these behaviours sends a strong signal to the employees that the organisation values knowledge sharing. As such, the findings may extend prior literature by indicating that employees' knowledge sharing success is significant when their efforts/behaviours are formally recognised.

Employing a knowledge leader or champion to be responsible for knowledge-sharing initiatives was ranked as the second least used formal approach to knowledge sharing by forty four per cent of the respondents. Through the semi-structured interviews with 49 managers, an attempt was made to ascertain the reasons for the low ranking of this variable. It was found that more than 82 per cent (40 of the 49 managers) indicated that no formal role exists for the responsibility of formal knowledge management and they do not have a specific department or unit in charge of knowledge sharing. A possible explanation for this is that a knowledge manager or similar position is still not commonly appointed in practice. As claim by DeTienne et al. (2004), the position of knowledge leader is relatively new because knowledge management itself is a very young field.

The semi-structured interviews revealed that construction organisations have difficulty in identifying who the knowledge leader or champion is, as the role or mission of the knowledge leader or champion is not clear. In addition, the managers perceive that knowledge sharing is part of everyone's job. The respondents also claimed that their organisations cannot afford to hire a knowledge leader or champion due to financial constraints, and the company is too small for such a function.

As one of the respondents stated:

"To make an investment in formal knowledge management/knowledge-sharing approaches, we need to depend on our financial too. We can't afford to spend on infrastructure, resources and time because we are uncertain with the ongoing projects for long terms. This is important for comp's survival".

The finding is consistent with the work done by Van der Spek and Spijkervet (1997), who conducted a survey of 27 European firms from a wide cross-section of industry (telecommunications, software / IT-services, fast moving consumer goods, consulting and automotive sectors). They found that half of the companies reported two reasons for not having a knowledge leader or champion: i) the board thinks that there is no added value; and ii) the company is too small for such a function. However, fourteen out of the 40 organisations had developed a specific role for a knowledge leader or champion. They recognised the important contribution that the management of knowledge can make in project environments and how this then links to the wider organisational base.

It is, however, recommended that when planning the implementation of formal approaches to knowledge sharing, it is useful to have a focal point (e.g. a knowledge leader or champion) to "lead the charge". However, it is not essential, and the need for this position may be transitory once the knowledge-sharing discipline is embedded in the organisation's culture and processes. It should not be made a separate portfolio, but the knowledge leader or champion should encourage development of knowledge-sharing qualities in individuals throughout the organisation.

Having a written knowledge-sharing policy in place as part of the knowledge-sharing initiative was ranked as the least used formal approach to knowledge sharing (twelfth), with a mean value of 2.91. This result supports the work done by Wong (2008) on knowledge management adoption in the Malaysian manufacturing and service sectors, which revealed that developing strategies for knowledge management were still not widely adopted by the respondents. In addition, Syed-Ikhsan and Rowland (2004) examined the availability of a knowledge management strategy in the Malaysian Ministry of Entrepreneur Development. The study revealed that the Ministry does not have any specific knowledge management strategy.

Interestingly, the interviews with the 49 managers validated the findings from the questionnaire. Most construction organisations are not aware of any knowledge-sharing policies or strategies, but many felt that the introduction of one was worth considering, and could contribute to improving the overall performance of their organisations. The managers responded that a knowledge-sharing policy was not of concern. They also noted that their organisations do not have a formal knowledge-sharing policy, as they do not have a specific department or unit in charge of knowledge sharing. This may be because a formal knowledge-sharing policy is something new to construction organisations. Other possible explanations could be that people are too busy with their own job and they need to have specific staff to take care of a knowledge-sharing policy and hence, according to them, a knowledge-sharing policy will increase their burden. As one of the respondents stated:

"As for now we are more concentrate trying to get as much project as we could in order to run the business. We try to develop our system over the years but because of the busy and as it not that important so we just let it to be done without any planned, systematic and authorised formal approaches to knowledge sharing. There was no so-called formal knowledge-sharing policy. We didn't much care about formal knowledge-sharing policy".

Of the fourteen large organisations that participated in this study, only half of them have any form of vision and mission statement for knowledge management initiatives. However, some elements of knowledge-sharing approaches were evident in all organisations that participated in the study. There is a call for real and urgent attention to the role of management in establishing an infrastructure that can actually bring about change and implement the organisation's mission, vision and strategy with respect to knowledge sharing in construction organisations. The importance of expressing the vision to the rest of the organisation is paramount. There is an urgent need for a long-term vision to be incorporated in the corporate strategy of organisations. This is only achievable if the mission towards knowledge sharing is fully understood in the organisation. It is very important to have a formal knowledge-sharing policy that is well understood by all employees. This will help the employees to be aware of what kinds of knowledge need to be managed and shared by them. Having a well-defined knowledge-sharing policy will help the organisation to store and access the right information and knowledge for the benefit of the staff and the organisation.

Having considered the extent to which formal approaches to knowledge sharing are used at the aggregate level, the next section focuses on the different formal knowledge-sharing approaches at the dis-aggregate level, namely in small, medium and large organisations. Discussions related to the formal approaches to knowledge sharing are presented in the following subsection.

5.3.2. The extent to which formal approaches to knowledge sharing are employed by construction organisations: dis-aggregate level

The approach adopted in analysing data at the aggregate level will also be employed at the dis-aggregate level for small, medium and large construction organisations. As the mean score increases, the extent to which formal approaches to knowledge sharing are used decreases. Table 5.4 presents a mean value comparison of the different formal approaches to knowledge sharing according to size of organisation (small, medium and large construction organisations).

Table 5.4 : Mean score of formal approaches to knowledge sharing employed by organisations: dis-aggregate level.

Formal approaches to knowledge sharing	Small (N=294)		Medium (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Internet technologies	2.32	1	2.18	1	2.44	1
Mentoring	2.40	2	2.60	5	2.60	4
Open and conducive environment	2.46	3	2.63	6	2.44	2
Training to improve coaching	2.50	4	2.48	3	2.64	5
Intranet technologies	2.56	5	2.43	2	2.76	8
Recruitment and selection	2.65	6	2.55	4	2.56	3
Clear communication channels	2.66	7	2.74	8	2.76	7
Flexible organisational structures	2.71	8	2.72	7	2.76	6
Performance measurement system	2.77	9	2.91	10	3.00	10
Appraisal and reward system	2.79	11	2.77	9	3.08	11
Knowledge leader or champion	2.77	10	3.14	12	2.76	9
Knowledge-sharing policy	2.86	12	3.06	11	3.12	12

Meaning of scale (the extent of use)

1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all)

Overall, Table 5.4 shows that the majority of respondents within SMEs and large organisations ranked the internet, mentoring, an open and conducive environment, and training to improve coaching as the most used formal approaches to knowledge sharing. However, there are some differences between the companies' ranking that probably arise from their differences in size.

The survey results reveal that the use of internet technology has spread significantly within SMEs and large organisations in Malaysia. This technology is very useful for making organisational knowledge available to geographically dispersed staff members and is therefore used by many organisations. However, the level of internet usage is different in organisations of different sizes. Whilst some organisations allow unrestricted access to the internet, the majority place restrictions on staff, especially in small firms (Table 5.4). A closer look reveals that employees in SMEs consistently use two tools to accomplish their jobs: browsers and email. This has a positive implication for management education, training and, as all managers should be able to have reasonable access to internet-based learning resources, be it technical information, formal academic course material and other education and development material. It is recommended that there must be appropriate awareness and training provided for employees if the organisation is to implement the internet for knowledge sharing. Organisations can employ skilled personnel, or engage consultants to provide this service; in this way, the organisation can benefit from the success of an integrated system. This may help improve the rate of organisational learning, thus helping the organisation to make the transition within a relatively short time. As one of the respondents stated:

"Sharing knowledge is something that people do well. When people can do this successfully, everyone benefits. Individuals benefit from learning what others know. The group benefits by elevating their level of education and accomplishing more together. In short, the internet is allowing people to share information between each other not only more thoroughly, but also faster".

The use of mentoring for experienced employees to share their knowledge, experience and expertise with less-experienced colleagues (mentoring) was ranked the second most used approach to knowledge sharing by small organisations. Medium organisations, however, ranked it fifth and large organisations ranked it fourth. One possible explanation for this is that when there are many employees (medium and large organisations), organisations may have difficulty getting enough mentors to do the job and thus avoid the use of mentoring to develop employees to share knowledge. This finding supports the study of Saari et al. (1988) who surveyed management training practices in US companies and revealed that organisational size (using the number of employees as the indicator) had no significant effect on the use of any of the training

approaches except for mentoring. They found that correlation results indicate that the larger the organisation the less likely mentoring is relied upon.

As such, it is recommended that construction organisations should look into providing sufficient reward and motivation to encourage people to share knowledge. This is consistent with the study of APQC (1994-2002) on mentoring; they found that 60% of the employees who were mentoring were doing it because they were intrinsically motivated to share knowledge; they thought it was the right thing to do and they got personal satisfaction by doing it.

Medium organisations ranked training to improve coaching as the third most used formal approach to knowledge sharing, with a mean value of 2.48. Small organisations ranked it fourth (a mean value of 2.50) and large organisations ranked it fifth (a mean value of 2.64). The result shows that regardless of the organisation's size, they find ways to educate employees, coach them on the job, and show them new ways of learning and interacting with each other through training. Most large organisations involved in the study believe that knowledge gained from training should be shared with other organisational members. Hence, employees who were sent to professional training programmes and conferences were required to come out with training modules, conduct in-house training and update and inform the management of the outcome of the conferences and seminars. This is reflected in the statements of the managers:

Small organisation:

"As the staff returned from the training, they will share their knowledge/info with the others like safety approaches at sites. They will bring along catalogues, sample and brochure which can be used as a reference. The staff will let me know the latest info /issue that had been told during the training. We then will transfer / share the info to the rest of the staff".

Medium organisation.

"So far, even we do not attend training on knowledge sharing purposely; whatever training we attend or lead is with the intention to gain new knowledge and share with staff so that it would help staff to be more knowledgeable in their work. We have a schedule on what training to be done that year. Sometimes the training is at ad hoc basis and it depends on the requirement on that time. But safety training is a must and

we always go for the training. For example, we attend training done by JKR (Public Work Department) and CIDB. CIDB will ask the contractors to submit certificates to prove that their staffs are competent and accountable for the job. So we need to send staff for training on those reasons. We have certain target that we try to achieve for ISO and CIDB requirements".

Large organisation.

"Usually the staff will be asked to present and share knowledge that they had gained with those in the same department. Through presentation the staff will share and exchange their opinion regarding certain issues. We strongly encourage our staff go for training and development. We'll send them for courses which are crucial and critical such as leadership, contract management, project management and purchasing. For site management, trainings on safety are the most important and frequently done".

The use of the recruitment and selection of individuals with appropriate skills and attitudes as part of the knowledge-sharing initiative was ranked the sixth most highly used or used approach to knowledge sharing by small organisations. Medium organisations, however, ranked it fourth and large organisations ranked it third. The perceptions of the managers were sought on the extent that the recruitment and selection of individuals with appropriate skills and attitudes as part of knowledge sharing initiatives was used. It was found that the different approaches to human resource practices by organisations of different sizes include different ways of recruiting and selecting new staff. SMEs rely more often on informal procedures. Possible explanations is that the use of informal procedure in recruitment and selection because this method is convenient, inexpensive, and directly controllable by the organisation (Cardon and Stevens, 2004). This may also imply a lower relevance of formal degrees or certificates. On the other hand, fitting within the current workforce is much more important for smaller enterprises. Generally, SMEs have a tendency to utilise informal methods of recruitment (e.g. walk-ins and newspaper advertisements) and selection (e.g. face-to-face interviews, application forms and reference checks) as effective methods of employing people. The finding support previous study done by Kotey and Slade (2005) in Australia, and Cassellet al. (2002) in the UK. They found that word-of-mouth was the main source of recruitment in SMEs. This is reflected in the statements of the managers:

Small organisation.

"We recruit and select suitable candidates base on knowledge/experience that they have for the particular vacant positions. New or fresh graduate staff will be trained by senior staff. This learning culture has been practised in our company".

Medium organisation.

"Normally we selected people based on their personality. We prefer somebody that is willing to learn and not people that know everything. We don't mind to employ fresh grads. When we hire people, we have to consider what we can give them and in return what can they offer. As I said we will choose people who are willing to learn. There is doesn't matter whether it is a senior or junior staff because at the same time even if you are senior there's a lot of new things you don't know or forget. For example, we get a new job on slope work. We still new on that and learn more new things. It is good to have staffs or subcontractors or suppliers that willing to teach and share their knowledge".

Large organisation.

"For knowledge management or knowledge-sharing initiatives, I think that it is important for the company to recruit and select only the knowledgeable ones. Especially those in top and middle level of management. Knowledgeable head departments will produce knowledgeable staff too. We are not afraid to hire the fresh grads because our head department will always ready to help and sharing knowledge with them. This learning environment we have been practising for so long".

Communication is a vital part of organisational activity and IT has a central role to play in the communications of the organisations (Egbu, 2000). Although IT has been extensively used for communication in SMEs, the use of IT as a knowledge-sharing technology is still limited. This may be due to the lack of awareness about knowledge sharing in SMEs; apart from knowledge sharing, financial limitations and also weaknesses in education and training hinders gaining skills in IT in SMEs.

However, looking at the four least used formal approaches to knowledge sharing, namely a performance measurement system, an appraisal and reward system, having a knowledge leader or champion and having a knowledge-sharing policy in Table 5.4, it can be observed that there is agreement amongst small, medium and large organisations.

This clearly indicates that performance measurement systems, appraisal and reward systems, knowledge leaders or champions and knowledge-sharing policies are not commonly employed in small, medium and large Malaysian construction organisations. With respect to use of a performance measurement system to evaluate the effectiveness and contributions of knowledge-sharing initiatives, its low level of use is understandable since assessing knowledge sharing is a difficult task (Wong, (2008). Particularly, establishing measures or indicators to evaluate knowledge sharing is not easy. This is because the benefits and returns accrued from knowledge sharing initiatives are not always tangible and is difficult to quantify (King, 2009: Malhotra, 2002). The respondent organisations might still be struggling to perform this activity and thus, it was under used. With this study, it is envisaged that top management would have a better understanding of the role and importance of knowledge sharing in enhancing organisational performance (King, 2009).

The low adoption level of appraisal and reward system might reflect that giving incentives to employees in order to stimulate their knowledge sharing initiatives has not yet become an integral part of the organisations' culture. Unless employees are motivated to share and apply knowledge, they will keep and hoard it. For successful knowledge sharing, both knowledge push and pull must occur (Wong, 2008). In other words, employees must not only have the willingness to share and contribute their know-how, they must also posses the tendency to search and seek for knowledge (Agarwal and Poo, 2006). Hence, provision of rewards or incentives is crucial in order to motivate employees to exemplify all the positive knowledge related behaviours.

It is now important to identify whether the size of organisation has an impact on the results discussed above. In other words, to ascertain if larger organisations employ more formal approaches than smaller organisations. This was investigated using Spearman rho.

In this study, the hypothesis documented is:

H1: There is a relationship between size of organisation and the extent to which formal approaches to knowledge sharing are used.

Table 5.5 : Spearman Correlation Coefficient Test for the relationship between different size of organisation and the use of formal approaches to knowledge sharing

			Size of organisation	Formal Approaches
Spearman's rho	Size of organisation	Correlation Coefficient	1.000	.089
		Sig. (2-tailed)	.	.081
		N	384	384
	Formal Approaches	Correlation Coefficient	.089	1.000
		Sig. (2-tailed)	.081	.
		N	384	384

Table 5.5 shows that there is no significant positive correlation between the two variables (rho = 0.089, n = 384, $p \geq 0.05$). This means that there is no sufficient evidence to suggest that the larger the size of the organisation the more formal approaches to knowledge sharing is employed. The result reveals that the size of organisation does not impact on the formality of the approaches. The null hypothesis is not rejected. The next analysis looks at the different informal approaches to knowledge sharing used in organisations.

5.4. The extent to which informal approaches to knowledge sharing are used by Malaysian construction organisations.

5.4.1. The extent to which informal approaches to knowledge sharing are used by Malaysian contractors: aggregate level

The results relating to the extent to which informal approaches to knowledge sharing are used in organisations are shown in Table 5.6. From the data, it is evident that the most used informal approaches for knowledge sharing are face-to-face social interactions (60%) and personal relationships (56%). These are closely followed by social events (55%), communities of practice (51%), conducive workplace settings (51%) and spontaneous informal communication. The least used informal approaches to knowledge sharing in construction organisations are spontaneous informal communications (48%) and storytelling (27%).

Table 5.6 : The extent to which informal approaches to knowledge sharing are used.

Informal approaches to knowledge sharing	Highly used	Used	Fairly used	Less used	Not used at all
	%				
Face-to-face social interactions	11.5	47.7	32.6	6.8	1.6
Personal relationships	11.5	44.5	31.8	10.7	1.6
Social events	13.0	41.7	27.9	14.8	2.6
Conducive workplace settings	12.0	39.1	32.8	12.8	3.4
Community of practice	8.3	42.7	34.9	11.2	2.9
Spontaneous informal communication	7.6	40.1	39.6	11.2	1.6
Storytelling	5.7	21.6	38.5	21.9	12.2

Meaning of scale (the extent of use)

1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all)

Table 5.7 : Informal approaches to knowledge sharing employed by Malaysian construction organisations: aggregate level

Informal approaches to knowledge sharing	Overall (N=384)	
	Mean	Rank
Use of face-to-face social interactions to informally share ideas and knowledge.	2.39	1
Use of personal relationships to build trust and strengthen employees' relationships to enhance the sharing of knowledge informally.	2.46	2
Use of social events such as lunches, drinks and dinners to provide informal settings to allow people to socialise, talk together and share knowledge.	2.52	3
Use of conducive workplace settings in terms of office layout for talking and sharing knowledge informally with colleagues and meeting people (e.g. pantry, communal area, meeting space, library etc.).	2.57	4
Use of a community of practice to encourage work interactions and the sharing of ideas, experiences and knowledge informally.	2.58	5
Use of spontaneous informal communications to encourage social interaction for smooth knowledge sharing.	2.59	6
Use of storytelling in a workshop setting to stimulate informal knowledge sharing.	3.13	7

Meaning of scale (the extent of use):

1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all)

The study also investigated the level to which informal approaches to knowledge sharing are used in construction organisations. Table 5.7 presents the overall mean scores and the ranking of the survey respondents of the extent to which informal approaches to knowledge sharing are used. Of the seven informal approaches to knowledge sharing available, six are regarded as 'used' based on the overall mean scores, being over 2.00; the remaining approach (storytelling) is also used and falls into the category 'fairly used', with a mean score of 3.13.

An inspection of Table 5.7 shows that over half (60%) of the respondents ranked face-to-face social interactions to informally share ideas and knowledge as the most highly used/used informal approach to knowledge sharing, with a mean value of 2.39. This suggests that conventional approaches to knowledge sharing are still highly used among construction organisations in Malaysia. This view is echoed by Bruce (2004), who remarks that face-to-face interaction is one of the oldest and still one of the most

effective means of sharing relevant and current information. This finding supports Abd-Rahman and Wang's (2010) study of Malaysian construction organisations, which showed that face-to-face meetings are frequent within organisations. Many authors found that face-to-face social interaction is widely applied not only in the construction industry but also among strategic commercial organisations (Clark, 1996; Wenger et al., 2002; Squier, 2006). Thus, this strongly indicates that face-to-face social interaction is a universally implemented knowledge-sharing approach.

Possible explanations are that face-to-face social interaction is one of the easiest ways to effectively share tacit knowledge. The example of face-to-face social interaction in this study was sharing technical knowledge between site engineers and staff. This technical knowledge was shared largely by word of mouth from one project to the next. Furthermore, face-to-face interaction with the person with the right skills and knowledge is considered to be the best source of valuable information for the future development of the company. People need to contact their colleagues personally if they are to understand and make best use of the available information and knowledge (Cohen and Prusak, 2001). As one of the respondents stated:

"Double check the meaning of the document through face-to-face interaction or phone calls, when they seek the other's knowledge".

Importantly, face-to-face social interaction was ranked as being the most used informal approach to knowledge sharing, supporting the notion that social interaction is a prerequisite for successful knowledge management (Davenport and Prusak, 1998).

The use of personal relationships to build trust and strengthen employees' relationships to enhance the sharing of knowledge was ranked the second most highly used or used informal approach (a mean value of 2.46) by fifty six percent (56%) of the survey respondents. The nature of construction work requires employees to work together either in pairs or teams. Therefore, coordination between these groups should exist, since sharing between construction employees relies on interaction and communication between each of the parties, leaving no room for isolated work. Thus, work organised on a task or craft basis provides a work environment which allows social integration and learning (Applebaum, 1981). Since this industry works on projects, construction employees/workers function as independent units. As a result, construction organisations rely upon relationships. Each individual seeks employment and makes

his/her own arrangements according to his/her personal network and contacts. It is recommended that organisations should make use of their existing informal networks. The managers should use these informal personal relationship networks to the extent of their potential, perhaps by making them official, providing more resources and rewarding them.

The use of social events such as lunches, drinks and dinners to provide informal settings to allow people to socialise, talk together and share knowledge is another most cited informal approach to sharing knowledge. It is apparent from Table 5.7 that fifty five per cent (55%) of the respondents rate social events as the third most highly used or used informal approach to sharing knowledge (with a mean value of 2.52 in Table 5.7). The reason for the popularity of social events and activities could possibly be that the staffs wants to meet or know each other's since construction organisations have several sites with different project teams and site staff. The excellent examples found in this study are that knowledge sharing happens during conversations and exchanges of ideas at the coffee machine, at dinners, lunches and commuting together to work or to a client. These social events allow person-to-person contact, which is one of the best ways to share knowledge even without a formal reward. The finding is supported by the studies of Supyuenyong et al. (2009) and Sturdy et al. (2006), which emphasise the importance of informal settings such as social events to allow people to socialise, talk together and share knowledge.

An inspection of Table 5.7 shows that having a conducive workplace setting in terms of office layout for talking and sharing knowledge informally with colleagues and meeting people was ranked as the fourth most highly used or used informal approach by half (51%) of the respondents (a mean value of 2.57 in Table 5.7). Some of the examples of conducive workplace settings in terms of office layout found in this study are pantries, communal areas such as corridors/reception, meeting spaces and libraries. This approach is used by most of the respondents because it encourages the social mingling of employees leading to the informal sharing of knowledge.

The use of a community of practice to encourage work interactions and the sharing of ideas, experiences and knowledge informally was ranked as the fifth most highly used or used informal approach by over half (51%) of the respondents (a mean value of 2.58). In this study, communities of practice are known by various names in

construction organisations, such as learning networks, thematic groups, technical groups, project clubs and project teams on similar projects.

The use of spontaneous informal communications to encourage social interactions for smooth knowledge sharing was ranked as the second least used informal approach to knowledge sharing (a mean value of 2.59). Through the semi-structured interviews with 49 managers, an attempt was made to ascertain the reasons for the low ranking of this approach. A possible explanation is that generally, organisation members are not aware of the importance of knowledge sharing. Thus, any knowledge-sharing approaches including spontaneous informal communications will not work. Knowledge sharing through informal communication in this study takes place during lunch, hallway interactions and phone calls. This also includes handwritten notes, text messages and anniversary recognitions and birthday cards to build rapport with their employees.

The use of storytelling in a workshop setting to stimulate informal knowledge sharing was ranked as the least used informal approach to knowledge sharing by twenty seven per cent (27%) of the respondents (a mean value of 3.13). One reason is that the respondents used storytelling in the organisation mainly for transferring work-related experience. Storytelling tends to impart an individual's personal tacit knowledge; thus, it can be seen negatively, as the stories circulated are probably not work-related and are therefore deemed as a waste of time. Another reason emerged for storytelling being least used: content and topic applicability. As one of the managers said: *"The attendance of the session depends on the topic and content. The topic must be interesting and gives purpose and objectives. If there is no benefit, then people will not come. The content must be relating with experience and not based solely on theoretical".*

It is recommended that organisations use storytelling to unveil unseen tacit knowledge and therefore connect knowledge with emerging contexts to create an environment for dialogue. The value of storytelling in the knowledge-sharing process should be given greater recognition.

Having considered the use of informal approaches to knowledge sharing at the aggregate level, the next section will focus on the different informal knowledge-sharing approaches at the dis-aggregate level, namely small, medium and large organisations.

5.4.2. The extent to which informal approaches to knowledge sharing are employed by construction organisations: dis-aggregate level

Table 5.8 : Informal approaches to knowledge sharing employed by Malaysian construction organisations: dis-aggregate level.

Informal Approaches to Knowledge Sharing	Small (N=294)		Med (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Face-to-face social interactions	2.37	1	2.42	2	2.60	1
Personal relationships	2.47	2	2.37	1	2.64	2
Social events	2.47	3	2.60	5	2.96	5
Conducive workplace settings	2.52	4	2.49	3	3.24	6
Community of practice	2.56	6	2.58	4	2.68	3
Spontaneous informal communications	2.55	5	2.68	6	2.84	4
Storytelling	3.04	7	3.43	7	3.44	7

Meaning of scale (the extent of use)

1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all)

Comparisons were made between different sizes of organisation in order to identify any variations to the above. Table 5.8 gives a mean value comparison of the use of informal approaches to knowledge sharing according to the different sizes of organisation. A closer look at Table 5.8 shows a substantial variation in the results for the different sizes of organisation. The ranks appear to be more or less similar for the use of face-to-face social interactions and the use of personal relationships. The findings support the study done by Egbu et al. (2005), who found that informal face-to-face social interaction is the most effective technique used in the sharing of knowledge in SMEs, where knowledge is tacit in nature. This concurs with the assertion of Leonard and Sensiper (1998) that the need for face-to-face interaction is often perceived as a prerequisite for the diffusion of tacit knowledge. In large organisations, the level of knowledge sharing is slightly limited because they rely more on formal discussions at management level. In SMEs, knowledge sharing relies mainly on social interactions.

The use of social events such as lunches, drinks and dinners to provide informal settings to allow people to socialise, talk together and share knowledge was ranked third by small organisations and fifth by both medium and large organisations. The use of social events is very relevant in the small organisation environment, where face-to-face

contact is still likely to happen quite often. This will allow values such as trust, integrity, honesty, integrity and transparency to be forged.

The use of a community of practice to encourage work interactions and the sharing of ideas, experiences and knowledge informally was ranked sixth, fourth and third by small, medium and large organisations respectively. A possible explanation is that, due to the limitations regarding information technology, an online community of practice in smaller organisations may not be available to enable the community to complete a task at a higher speed. Computer-based systems in general may also be more basic. However, in SMEs, one will probably find more communities of practice; although SMEs may not have many online communities of practice, they may have more face-to-face communities of practice. This is positive, as face-to-face contact in the world of communities of practice has been proven to strengthen social capital and make communities of practice more solid (Du Plesis, 2008). The results of this study are in line with Suresh (2006) study, which showed that communities of practice are the least used techniques for knowledge capture in SMEs. This finding indicates that most SMEs have fewer resources and hence less capacity to implement communities of practice to the same depth and breadth as large organisations. However, in this study, four large organisations indicated that they use communities of practice for knowledge sharing. However, looking at the least used informal approach to knowledge sharing, namely the use of storytelling in a workshop setting to stimulate informal knowledge sharing, it is observed that there is agreement amongst all sizes of organisation.

It is therefore necessary to test statistically of a significant correlation exists between the use of informal approaches to knowledge sharing and the size of organisations. In other words, to ascertain if small organisations used more informal approaches than larger organisations.

In this study, the hypothesis documented is:

H1: There is a relationship between size of organisation and the extent to which informal approaches to knowledge sharing are used.

Table 5.9 : Spearman correlation coefficient test for the relationship between the use of informal approaches to knowledge sharing and size of organisation.

			Size of organisation	Informal approaches
Spearman's rho	Size of organisation	Correlation Coefficient	1.000	.113[*]
		Sig. (2-tailed)	.	.026
		N	384	384
	Informal approaches	Correlation Coefficient	.113[*]	1.000
		Sig. (2-tailed)	.026	.
		N	384	384

*. Correlation is significant at the 0.05 level (2-tailed).

The Spearman correlation test in Table 5.9 shows that there is a significant positive correlation (rho = .113, n= 384, p = 0.026 ≤ 0.05) between the use of informal approaches to knowledge sharing and size of organisation. This means that smaller organisations use more informal approaches to knowledge sharing. However, the relationship is weak. In general, the result shows that while SMEs tend to use a similar range of formal approaches to knowledge sharing as those employed by larger firms (e.g. internet technology, mentoring, training, an open and conducive environment), these were organised on a less formal basis.

For further descriptive analysis, the five most used formal and informal approaches to knowledge sharing are selected and combined from each of SMEs and large construction organisations, as shown in Table 5.10. Detailed observations reveal that the selected approaches to knowledge sharing can be classified along two broad dimensions, i.e. IT-based (codification) and people-based (personalisation) approaches, as recommended by Hansen et al. (1999). This combination of approaches from both codification and personalisation represents a mixture of the IT and people aspects of knowledge-sharing criteria. In essence, it can be interpreted that internet and intranet technologies are IT-based knowledge sharing, whereas mentoring, face-to-face social interactions, personal relationships, open and conducive environments, spontaneous informal communications, training to improve coaching and recruitment and selection are people-based approaches to knowledge sharing. Given the above, it is recognised that SMEs and large construction organisations have awarded a combination of priority

ranking in both IT and people-based formal approaches to knowledge sharing as 'most highly used or used' in their organisations.

Table 5.10 : Formal and informal approaches to knowledge sharing employed by organisations.

Small		Medium		Large	
Knowledge-sharing approaches	Mean value	Knowledge-sharing approaches	Mean value	Knowledge-sharing approaches	Mean value
Internet technologies (formal)	2.32	Internet technologies (formal)	2.18	Internet technologies (formal)	2.44
Face-to-face social interactions (informal)	2.37	Personal relationships (informal)	2.37	Open and conducive environment (formal)	2.44
Mentoring (formal)	2.40	Face-to-face social interactions (informal)	2.42	Recruitment and selection (formal)	2.56
Open and conducive environment (formal)	2.46	Intranet technologies (formal)	2.43	Face-to-face social interactions (informal)	2.60
Personal relationships (informal)	2.47	Training to improve coaching (Formal)	2.48	Personal relationships (informal)	2.64

When comparing the used of formal and informal approaches for knowledge sharing in three size of organisations in Table 5.10, it is observed that, in general, SMEs tend to use a similar range of approaches for knowledge sharing as those employed by larger organisations (e.g. internet technologies, face-to-face social interactions, open and conducive environments, personal relationships), albeit on a less formal basis.

There should be cognition that these two approaches to knowledge sharing are vital and it is up to the organisation to look at the context in which they want to use these and the particular approaches they want to use. A policy or strategy to knowledge sharing in organisations should incorporate both formal and informal approaches, irrespective of the size of the organisation and which approach other similar sized firms are adopting. It draws in the issues of the appropriateness and relevance of an approach to knowledge sharing. Organisations should look more at the work, suitability, relevance, appropriateness and how vigorous issues around them warrant it. Organisations should be open-minded to using different approaches to knowledge sharing, and be able to look at the approaches they have used to see if they have added value. No one size fixes all

problems and the use of formal and informal approaches to knowledge sharing needs to be further refined and customised in order to meet the specific needs of every organisation.

It was found that no one theory best explains the usage of formal and informal approaches to knowledge sharing in organisations, and no particular approach should be reserved for a specific organisational size. The findings support Moffet and McAdam's (2006) argument that irrespective of organisational size, knowledge-orientated issues are applicable to all organisations, but the manner in which they are addressed differs slightly depending on organisational size (p. 221). Thus, it brings us to the contingency theory approach, in that the approaches used by organisations should be contingent upon the vigorousness of the factors in the organisation (no one best theory explains it). This study accepts the contingency view of knowledge sharing and recognises that different approaches to knowledge sharing are not mutually exclusive and no one approach is instinctively preferable to another. When improving knowledge sharing, one must consider the characteristics of the existing knowledge-sharing infrastructure and establish policies and strategies aimed at addressing the current and sustaining the future knowledge needs of the organisation necessary to achieve its strategic vision. It is suggested that both parties, i.e. the employer and employee, jointly undertake the drafting of the knowledge-sharing policy so that both parties can reach a consensus.

For further descriptive analysis, the use of formal and informal approaches to knowledge sharing by different managerial levels is compared in the next section.

5.5. The extent to which formal approaches to knowledge sharing are used by managers

5.5.1. The extent to which formal approaches to knowledge sharing are used by managers: aggregate level

Another dimension of the data analysis on the use of formal approaches to knowledge sharing is to ascertain the extent to which formal approaches to knowledge sharing are used by managers in organisations. Table 5.11 report on the extent to which formal approaches to knowledge sharing are used by managers at the aggregate level.

Table 5.11 : Different formal approaches to knowledge sharing used by managers: aggregate level.

Formal approaches to knowledge sharing	Overall (N=384)	
	Mean	Rank
Internet technologies	2.31	1
Mentoring	2.45	2
Open and conducive environment	2.48	3
Training to improve coaching	2.51	4
Intranet technologies	2.55	5
Recruitment and selection	2.63	6
Clear communication channels	2.68	7
Flexible organisational structures	2.71	8
Performance measurement system	2.80	9
Appraisal and reward system	2.81	10
Knowledge leader or champion	2.83	11
Knowledge-sharing policy	2.91	12

Meaning of scale (the extent of use)

1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all)

The approaches ranked at or near the top of the tables are highly used. Conversely, those approaches ranked at the bottom are relatively least used. A closer observation of Table 5.11 shows that the highest ranked formal approach to knowledge sharing used by managers is internet technologies, with a mean value of 2.31. Interestingly, the use of a written knowledge-sharing policy has a mean value of 2.91. This denotes that a written knowledge-sharing policy is the least used formal approach to knowledge sharing by managers.

Comparisons were then made between different managerial levels in order to identify any variations to the above. Table 5.122 gives a mean value comparison of the extent to which formal approaches to knowledge sharing are used according to the different levels of managers.

5.5.2. The extent to which formal approaches to knowledge sharing are used by managers: dis-aggregate level

Table 5.12 : Formal approaches to knowledge sharing used by managers: dis-aggregate level

Formal approaches to knowledge sharing	Senior Managers (N=68)		Middle Managers (N=202)		Junior Managers (N=114)	
	Mean	Rank	Mean	Rank	Mean	Rank
Internet technologies	2.24	1	2.37	1	2.25	1
Mentoring	2.49	2	2.41	2	2.50	3
Open and conducive environment	2.51	3	2.45	3	2.54	5
Training to improve coaching	2.56	4	2.50	4	2.49	2
Intranet technologies	2.57	5	2.57	5	2.51	4
Recruitment and selection	2.66	6	2.66	6	2.54	6
Clear communication channels	2.78	7	2.68	7	2.61	7
Flexible organisational structures	2.82	8	2.73	9	2.61	8
Performance measurement system	3.06	12	2.69	8	2.85	11
Appraisal and reward system	2.97	11	2.74	10	2.82	10
Knowledge leader or champion	2.88	9	2.82	11	2.81	9
Knowledge-sharing policy	2.94	10	2.86	12	2.98	12

Meaning of scale (the extent of use)

1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all)

The analysis continued to discover the extent to which formal approaches to knowledge sharing are used by managerial levels (Table 5.12). From the results it can be seen that all senior managers, middle managers and junior managers ranked internet technology as a highly used formal approach to knowledge sharing. There are several possible explanations for this result. There are a variety of requirements for internet usage. Senior managers use the internet to search for information and share knowledge to help with their business planning. Middle managers use the internet because they need more detailed information to help them to share, monitor and control business or project activities. Junior managers with operational roles need information to help them carry out their duties. Generally, the interviews revealed that the main purpose of connecting

to the internet is to access emails in which information and documents are shared and/or exchanged.

Intranet technology was ranked as the fifth most used formal approach by senior and middle managers, and fourth by junior managers. The interviews found that senior and middle managers use the intranet several times a day; however, junior managers said that they use it several times a week. Senior and middle managers responded in a similar manner that they use it for communication and collaboration by sending and receiving e-mails and faxes, policies and procedures and access to databases and other updates. However, junior managers used it less; they indicated that they just use it for checking their emails and browsing the staff page. It was found that two of the large organisations involved in the study provide BlackBerry devices to project managers, resident engineers and managing directors, on which they can share information and knowledge via SMS and e-mail.

For senior and middle managers, mentoring was ranked as the second most used formal approach to knowledge sharing, but junior managers ranked it third. Senior and middle managers were seen to have a critical role as mentors in encouraging knowledge sharing. A study by Collin (2004) indicated that senior employees often acted as mentors to junior managers. In most cases, knowledge sharing often occurs in mentoring relationships (Sackmann and Friest, 2007). Hence it is not surprising that senior and middle managers rated them as they did.

Manager also needs to attend the training so that he will know the importance of having formal knowledge sharing. Staff also will have a clear roles regards the knowledge sharing.

However, looking at the three least used formal approaches to knowledge sharing, namely appraisal and reward systems, knowledge leaders, and knowledge-sharing policies, in Table 5.12, it can be seen that there is agreement at all levels of management. It is now important to identify whether the level of manager has an impact on the results discussed above. An attempt was made to establish if there is a significant relationship between the use of formal approaches to knowledge sharing and managerial level by means of the Spearman correlation coefficient. As management level increases from junior to senior, it is expected that the use of formal approaches to knowledge sharing will increase.

In this study, the hypothesis documented is:

H1: There is a relationship between managerial level and the use of formal approaches to knowledge sharing.

Table 5.13 : Spearman correlation coefficient test for a relationship between managerial level and the use of formal approaches to knowledge sharing.

			Position	Formal approaches
Spearman's rho	Position	Correlation Coefficient	1.000	-.018
		Sig. (2-tailed)		.729
		N	384	384
	Formal approaches	Correlation Coefficient	-.018	1.000
		Sig. (2-tailed)	.729	
		N	384	384

Table 5.12 shows that there is no significant negative correlation between the two variables (rho = -0.018, n = 384, p ≥ 0.05). This means that there is insufficient evidence to suggest that the higher the managerial level the less formal approaches to knowledge sharing are used. The result reveals that managerial level does not impact on the formality of the approaches. The null hypothesis is not rejected. Perhaps this is an indication that higher level managers do not necessarily use more formal approaches than lower level managers. The next analysis looks at the different informal approaches to knowledge sharing used in organisations by different managerial levels.

5.6. The extent to which informal approaches to knowledge sharing are used by managers

5.6.1. The extent to which informal approaches to knowledge sharing are used by managers: aggregate level

Table 5.14 : Informal approaches to knowledge sharing used by managers: aggregate level.

Informal approaches to knowledge sharing	Overall (N=384)	
	Mean	Rank
Face-to-face social interactions	2.39	1
Personal relationships	2.46	2
Social events	2.52	3
Conducive workplace settings	2.57	4
Community of practice	2.58	5
Spontaneous informal communications	2.59	6
Storytelling	3.13	7

Meaning of scale (the extent of use)

1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all)

A closer observation of

Table 5.14 shows that the highest ranked informal approach to knowledge sharing used by managers is face-to-face social interactions, with a mean value of 2.39. Interestingly, the use of storytelling has a mean value of 3.13. This denotes that storytelling is the least used informal approach to knowledge sharing by managers. Taking all the above into consideration, and even though there were some slight deviations, overall, the following can be recognised as the most used informal approaches to knowledge sharing by construction managers: 1) Face-to-face social interactions, 2) Personal relationships, and 3) Social events.

It is now important to recognise whether the different levels of manager have an impact on the result discussed above. Comparisons were then made between the managerial levels in order to identify any variations to the above. Table 5.14 gives a mean value comparison of the extent to which informal approaches to knowledge sharing are used according to managerial level.

5.6.2. The extent to which informal approaches to knowledge sharing are used by managers: dis-aggregate level

The approach adopted in analysing the data at the aggregate level is also employed at the dis-aggregate level for senior, middle and junior managers respectively. As mean score increases the extent to which informal approaches to knowledge sharing are used decreases. Table 5.15 presents a mean value comparison of the different informal approaches to knowledge sharing used according to managerial level.

Table 5.15 : Informal approaches to knowledge sharing used by managers: dis-aggregate level

Informal approaches to knowledge sharing	Senior Managers (N=68)		Middle Managers (N=202)		Junior Managers (N=114)	
	Mean	Rank	Mean	Rank	Mean	Rank
Face-to-face social interactions	2.29	1	2.44	1	2.38	1
Personal relationships	2.31	2	2.53	3	2.44	2
Social events	2.46	5	2.52	2	2.56	3
Conducive workplace settings	2.37	3	2.60	5	2.62	5
Community of practice	2.57	6	2.58	4	2.57	4
Spontaneous informal communications	2.43	4	2.62	6	2.64	6
Storytelling	3.07	7	3.12	7	3.18	7

Meaning of scale (the extent of use)

1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all)

The results presented in Table 5.15 do not show any significant variation with the findings presented in Table 5.15. The senior managers have identified conducive workplace settings higher (ranked third) than social events. The junior managers, however, have ranked social events higher than conducive workplace settings. Likewise, even though there are some slight deviations, the three most used informal approaches to knowledge sharing, irrespective of their order of ranking, remain unchanged. This suggests that the responses do not differ according to managerial level.

It is now important to recognise whether managerial level has an impact on the results discussed above. In other words, to ascertain if junior managers used more informal approaches than senior managers. The underlying relationship between the use of informal approaches to knowledge sharing and managerial level by means of the Spearman correlation coefficient.

In this study, the hypothesis documented is:

H1: There is a relationship between managerial level and the use of informal approaches to knowledge sharing.

Table 5.16 : Spearman correlation coefficient test for a relationship between managerial level and the use of informal approaches to knowledge sharing.

			Position	Informal approaches
Spearman's rho	Position	Correlation Coefficient	1.000	.027
		Sig. (2-tailed)		.594
		N	384	384
	Informal approaches	Correlation Coefficient	.027	1.000
		Sig. (2-tailed)	.594	
		N	384	384

Table 5.15 shows that there is no significant positive correlation between the two variables (rho = 0.027, n = 384, p > 0.05). This means that there is insufficient evidence to suggest that the lower the managerial level is the less formal approaches to knowledge sharing are used. The result reveals that managerial level does not impact on the informality of the approaches. The null hypothesis is not rejected.

Overall, it can be seen that there is no one specific managerial level that stands out, in either SME or large, as used the most formal or informal approaches to knowledge sharing. The results obtained so far in this chapter, have implications to top managers as a strategic decision maker. For top managers, it would beneficial to choose which knowledge-sharing approaches that gives the most important or benefits to the organisation. In other words, what is the aim of the organisation try to achieve by implementing knowledge-sharing approaches.

The managers agreed that knowledge sharing is important in construction firms whereby training, intranet is perceived as important by interviews, this variables is the most critical knowledge sharing required in contractor firms to survive in the construction business.

It has an implication for investment in knowledge sharing:

- Formal and informal approaches to knowledge sharing are important for any knowledge management strategy. Organisations that have implemented knowledge management strategies seem to have realised that if formal and informal approaches to knowledge sharing are not carefully selected, the likelihood of success is very limited. This requires the careful selection of approaches to knowledge sharing based on the organisations' needs and the functions that these can perform.

- Managers need to realise, however, that a particular knowledge-sharing approach or specific managerial action will not suit all organisations and that there are differences to be expected between large organisations and SMEs. The formal and informal approaches to knowledge sharing employed in the organisation should be tailored according to the size of the organisation and the managerial levels involved. As such, the implementation of knowledge-sharing goals and strategies in an organisation's strategic planning and thinking will vary greatly.

- Managers should conduct a review of their current approaches to knowledge sharing to access the comprehensiveness of the approaches and identify any gaps. In addition, the organisation should have mechanisms that encourage employees to share knowledge and reward them for new ideas. The organisations should use best practices when implementing.

- When organisations are trying to invest in knowledge-sharing initiatives, they should not invest because other organisations use that approach. Rather, organisations should look at approaches more in terms of function, suitability, relevance, appropriateness and how vigorous the issues around the organisation warrant it.

5.7. Conclusions and recommendations

This section presents a detailed analysis of the data collected from the questionnaire survey and semi-structured interviews. It explores and documents the different formal and informal approaches to knowledge sharing employed by Malaysian construction organisations based on the perceptions of three different sizes of organisation, namely small, medium and large, and make propositions about how size affects the portfolio of approaches suitable for each organisation. It also presents the perceptions of different levels of managers, namely senior, middle and junior managers, in construction organisations. A thorough analysis of the formal and informal approaches to knowledge sharing presently used and their level of use in construction organisations have been discussed. From the analysis, it can be concluded that various approaches have been used by the construction organisations in Malaysia to share knowledge. The conclusions that follow from this part of the study can be documented as follows:

1. This study identified twelve formal approaches to knowledge sharing that are presently employed in Malaysian construction organisations as well as the extent of their use. These formal approaches to knowledge sharing are:

- Internet technologies

- Mentoring

- Open and conducive environments

- Intranet technologies

- Training to improve coaching

- Recruitment and selection

- Clear communication channels

- Appraisal and reward systems

- Performance measurement systems

- Knowledge leaders or champions

- Flexible organisational structures

- Knowledge-sharing policy

2. The top three highly used/used formal approaches to knowledge sharing by the construction organisation are:

- Internet technologies

- Mentoring

- Open and conducive environments

3. The result also shows that respondents was ranked least used formal approaches to knowledge sharing are:

- Appraisal and reward systems

- Knowledge leaders or champions

- Knowledge-sharing policy

4. There is no significant positive correlation between the size of the organisation and the formal approaches to knowledge sharing used. In other words, large organisations do not necessarily use more formal approaches to knowledge sharing than small organisations.

5. This study identified seven informal approaches to knowledge sharing that are presently employed in Malaysian construction organisations as well as the extent of their use. These informal approaches to knowledge sharing are:

- Face-to-face social interactions

- Personal relationships

- Social events

- Conducive workplace settings

- Community of practice

- Spontaneous informal communications

- Storytelling

6. The top three highly used or used informal approaches to knowledge sharing by the construction organisation are:

- Face-to-face social interactions

- Personal relationships

- Social events

7. Similarly, the findings revealed three informal approaches to knowledge sharing that are least employed by construction organisations. These are:

- Community of practice

- Spontaneous informal communications

- Storytelling

8. There is a positive significant correlation between the size of the organisation and the informal approaches to knowledge sharing employed by construction organisations. This means that there is sufficient evidence to suggest that smaller organisations use more informal approaches to knowledge sharing. However, the relationship is weak.

9. Furthermore, the study also identified three formal approaches to knowledge sharing that are highly used or used by managers. These are:

- Internet technologies

- Mentoring

- An open and conducive environment

10. From the data it is evident that the least used formal approaches to knowledge sharing by managers are:

- Appraisal and reward systems

- Knowledge leaders or champions

- Knowledge-sharing policy

11. There is no significant relationship between managerial level and the formal approaches to knowledge sharing employed. This means that there is insufficient evidence to suggest that the higher the managerial level the more formal approaches to knowledge sharing are used. The result reveals that managerial level does not impact on the formality of the approaches.

12. This study suggests that there are three most highly used or used informal approaches to knowledge sharing by managers. These are:

    - Face-to-face social interactions

    - Personal relationships

    - Social events

13. This study suggests that there are three least used informal approaches to knowledge sharing by managers. These are:

    - Community of practice

    - Spontaneous informal communications

    - Storytelling

14. There is no significant positive correlation between managerial level and the informal approaches to knowledge sharing employed. The result reveals that managerial level does not impact on the informality of the approaches.

15. It can be seen that there is no one specific managerial level that stands out, in either SME or large, as used the most formal or informal approaches to knowledge sharing. The results obtained so far in this chapter, have implications to top managers as a strategic decision maker. For top managers, it would beneficial to choose which knowledge-sharing approaches that gives the most important or benefits to the organisations. In other words, what is the aim of the organisations tried to achieve by implementing knowledge-sharing approaches?

16. Overall, it is essential that appropriate knowledge-sharing approaches are put in place and incorporated into any organisation's business strategy if the organisations are to continuously improve its organisation performance.

The discussion in this chapter has addressed the second objective of this current study, which is "to appraise and document the different approaches employed by construction organisations and managers for knowledge sharing".

The challenges faced by construction organisations and managers in setting up and implementing knowledge-sharing approaches are discussed in detail in the next chapter.

CHAPTER 6. CHALLENGES ASSOCIATED WITH SETTING UP AND IMPLEMENTING KNOWLEDGE-SHARING APPROACHES

6.1. Introduction

The focus of this chapter is to report the findings related to the challenges faced by construction organisations in setting up and implementing knowledge-sharing approaches. The findings are elaborated using some of the results gleaned from the questionnaire survey and semi-structured interviews from both the pilot and main study. The discussions laid out in this chapter are also substantiated with findings from a thorough review of the literature. Overall, Chapter 6 aims to fill the third objective of the study: "To explore and document the main challenges that face construction organisations and managers in the setting up and implementation of knowledge-sharing approaches". Accordingly, the chapter is structured as follows:

- Section 6.2 reviews the literature on the challenges faced by organisations in setting up and implementing knowledge-sharing approaches.

- Section 6.3 presents the analysis of the empirical data in relation to the challenges faced in setting up knowledge-sharing approaches in organisations at the aggregate and dis-aggregate levels.

- Section 6.4 presents the findings regarding the challenges faced in implementing knowledge-sharing approaches in organisations at the aggregate level and dis-aggregate level.

- Sections 6.5 presents the findings regarding the challenges faced in setting up knowledge-sharing approaches by managers at the aggregate and dis-aggregate levels.

- Section 6.6 presents the findings regarding the challenges faced by managers in implementing knowledge-sharing approaches at the aggregate and dis-aggregates levels.

- Section 6.7 concludes by summarising the key findings of the study.

6.2. Challenges associated with setting up and implementing knowledge-sharing approaches.

The adoption and the implementation of a selected knowledge-sharing approach is not always a straight forward task. The challenge to the managers in the selection between the formal and informal approaches to knowledge sharing is to come up with a correct assessment of the conditions (such as organisational culture and structure) prevailing. There can be restrains that hinder the adoption and implementation process. Previous research suggests that there are a number of challenges associated with knowledge sharing in construction organisation settings (Subsection 2.3.4 in Chapter 2). An understanding of the challenges is vital in order to identify their root cause and to come up with a more resilient strategy to share knowledge (Mohamed and Anumba, 2004). If these challenges are effectively addressed, construction organisations stand to derive many benefits such as:

- The challenges to setting up and implementing knowledge-sharing approaches can be better understood by the management, especially the top management in construction organisations. This is crucial to ensure that top management commitment to knowledge sharing in the organisation is enhanced if not continued (Davenport et al., 1998).

- An understanding of the challenges faced by organisations in setting up and implementing knowledge-sharing approaches will assist in identifying both the responsibilities and the level of training needed.

- Managers will be provided with a clear understanding and awareness of the various challenges to setting up and implementing knowledge-sharing approaches and how they can be best overcome. Hence, relevant and appropriate policies and procedures can be developed and implemented for the effective sharing of knowledge.

A list of common challenges faced by organisations in setting up and implementing knowledge-sharing approaches has been derived from a thorough review of the literature on knowledge management and knowledge sharing (Subsection 2.3.4 in Chapter 2). The proposed challenges are obtained from the studied by Isa and Haddad, (2008); Carrillo and Chinowsky, (2006); Dainty et al. (2005); Carrillo et al. (2004);

Egbu (2004a; 2004b); Robinson et al. (2001a). This list was then modified after the interviews with 49 managers from 40 construction organisations. Overall, ten challenges faced by construction organisations in setting up knowledge-sharing approaches and eleven challenges faced by construction organisations in implementing knowledge sharing approaches were identified. Each of these variables will be discussed in turn in the subsequent sections. From the list of 22 challenges, the managers were asked to indicate the extent to which they perceive them as being associated with setting up and implementing knowledge-sharing approaches in their organisations. Quantitative variables provide many possibilities to analyse the data collected for this study. The mean value is the most useful and convenient way to compare various populations. The rankings of the results based on the challenges in setting up and implementing knowledge-sharing approaches are shown in related tables in this chapter.

The first step in the analysis was to collate how respondents ranked their company's challenges to setting up and implementing of knowledge-sharing approaches on a 5-point Likert scale: 1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging) and 5 (Not challenging at all). The categories of 'very challenging' and 'challenging' were combined to form 'most challenging'. Overall, the analyses were carried out based on two major parts. Part 1 consists of 2 sub stages:

- The first stage presents the results of the extent of the challenges associated with setting up knowledge-sharing approaches by construction organisations at the aggregate level, which deals with overall mean values of the responses.

- The second stage deals with the means, which are ranked based on the extent of the challenges associated with setting up knowledge-sharing approaches at the dis-aggregate level (small, medium and large contractors).

Part 2 of the analysis presents the underlying relationships between the extent of the challenges in setting up knowledge-sharing approaches and different sizes of organisation by means of the Spearman Correlation Coefficient. Data for different challenges associated with the implementation of knowledge-sharing approaches will also be presented. Discussions related to the various challenges to setting up and implementing knowledge-sharing approaches are presented in the following subsections.

6.3. Challenges associated with setting up knowledge-sharing approaches.

6.3.1. The extent of the challenges associated with setting up knowledge-sharing approaches: aggregate level

In the context of the present study, the definitions and terms used for the variables associated with the challenges to setting up knowledge-sharing approaches are shown in Table 6.1 below.

Table 6.1 : Challenges to setting up knowledge-sharing approaches.

Challenges to setting up knowledge-sharing approaches	Variables
Developing a knowledge-sharing strategy and integrating it into the company's goals and strategic approach.	Developing a knowledge-sharing strategy
Providing a clear understanding of what knowledge is vital to the organisation future prosperity.	Providing a clear understanding of what knowledge is vital
Developing concise methodologies or 'blueprints' that address the meaning of knowledge-sharing practices.	Developing concise methodologies
Justifying and gaining management support and commitment for a budget for the development of a knowledge-sharing strategy.	Justifying and gaining management support
Creating a culture of trust and openness to encourage knowledge sharing.	Creating a culture of trust and openness
Setting up an appropriate technology infrastructure to support knowledge-sharing practices.	Setting up an appropriate technology infrastructure
Creating flexible organisational structures to provide employees with easy access to the knowledge they need.	Creating flexible organisational structures
Creating clear lines of communication to raise awareness of knowledge sharing among employees.	Creating clear lines of communication
Preparing to deal with new/different processes as part of knowledge-sharing initiatives within the organisation in terms of business efforts, especially how the business is to be operated.	Preparing to deal with something new/different processes
Providing a favourable physical layout of the workspace to stimulate informal knowledge sharing among employees (e.g. pantry, open office, meeting room, etc.).	Providing a favourable physical layout of the workspace

The results relating to the extent of the challenges associated with setting-up knowledge-sharing approaches in the organisation are shown in Table 6.2.

Table 6.2 : The extent of the challenges associated with setting up knowledge-sharing approaches in the organisation.

Challenges to setting-up	Very challenging	Challenging	Fairly challenging	Less challenging	Not challenging at all
	%				
Developing a knowledge-sharing strategy	11.7	40.6	38.5	6.8	2.3
Preparing to deal with something new/different processes	10.4	39.8	38.8	9.6	1.3
Providing a clear understanding of what knowledge is vital	9.1	39.6	40.1	9.9	1.3
Creating a culture of trust and openness	12.0	36.7	36.5	11.7	3.1
Setting up an appropriate technology infrastructure	12.2	32.6	40.4	13.3	1.6
Justifying and gaining management support and commitment for a budget	11.5	33.6	40.6	12.8	1.6
Creating flexible organisational structures	9.9	33.9	39.6	14.6	2.1
Developing concise methodologies or 'blueprints'	11.5	32.0	41.9	12.2	2.3
Creating clear lines of communication	9.4	31.5	41.9	15.1	2.1
Providing a favourable physical layout of the workspace	8.1	28.9	41.4	18.0	3.6

Table 6.3 : Mean score of the challenges associated with setting up knowledge-sharing approaches: aggregate level.

Challenges In Setting Up Knowledge-Sharing Approaches (Organisation level)	Overall (N=384)	
	Mean	Rank
Developing a knowledge-sharing strategy	2.47	1
Preparing to deal with new/different processes	2.52	2
Providing a clear understanding of what knowledge is vital	2.55	3
Creating a culture of trust and openness	2.57	4
Setting up an appropriate technology infrastructure	2.59	5
Justifying and gaining management support and commitment	2.59	6
Developing concise methodologies or 'blueprints'	2.62	7
Creating flexible organisational structures	2.65	8
Creating clear lines of communication	2.69	9
Providing a favourable physical layout of the workspace	2.80	10

Meaning of scale (the extent of the challenge)

1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all)

Table 6.3 represents the overall mean scores and the ranking given by the survey respondents at the aggregate level for the extent of the challenges associated with setting up knowledge-sharing approaches. As mean score increases, the challenge in setting up knowledge-sharing approaches decreases. However, where two or more factors had the same mean, priority was given to the lowest standard deviation (SD) figure, since a lower SD indicated that the data was less spread out and therefore the average was more likely to be valid for the majority. By taking the rankings and converting this to a score, statistical analysis enabled the creation of Table 6.3 above.

An inspection of Table 6.3 shows that the overall mean scores range from 2.47 to 2.80. This means that all ten factors are significant and fall into the category of 'Challenging'. From the data it is evident that the respondents perceive developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach as most challenging (mean value =2.47), followed by preparing to deal with new/different processes as part of knowledge-sharing initiatives within the organisation in terms of business efforts, especially how the business is to be operated (mean value = 2.52) and providing a clear understanding of what knowledge is vital to the organisation's future prosperity (mean value = 2.55). Mid way down Table 6.3 shows that respondents

ranked creating a culture of trust and openness (mean value = 2.57), setting up an appropriate technology infrastructure (mean value = 2.59), justifying and gaining management support and commitment (mean value = 2.59), and developing concise methodologies or 'blueprints' (mean value = 2.62). While the bottom three were (see the lower portion of Table 6.3): creating flexible organisational structures (mean value = 2.65), creating clear lines of communication (mean value = 2.69), and providing a favourable physical layout of the workspace (mean value = 2.80). Discussions related to the above areas are given in the subsequent sections.

The result shows that, at the aggregate level, developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach was regarded as the most challenging aspect in setting up knowledge-sharing approaches, by fifty two per cent of the respondents, with a mean value of 2.47. The main reason, however why most companies do not reach their knowledge sharing goals probably due to the lack of understanding and appreciation of the full benefits associated with knowledge sharing. Lack of a clear connection between the knowledge management strategy and overall company goals is another reason (Riege, 2005). Moreover, lack of a clear purpose or shared language and meaning of knowledge management (knowledge sharing) in the construction industry is one reason why developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach is challenging (Egbu, 2004). In addition, the availability of budget, infrastructure, as well as the number of staff is considered one of the crucial elements of developing knowledge sharing strategy. The result of this study is in line with the study done by Yim et al. (2004), which indicates that the major hurdle in implementing knowledge-sharing initiatives in the construction industry is the formulation and implementation of a knowledge-sharing strategy.

In the discussion of effective knowledge management, Davernport and Prusak (1998) emphasise the importance of establishing a link between knowledge sharing and strategy: "Knowledge management coexists well with business strategy, with process management, with staying to close to your customer, and so forth. It can help you to do a variety of things you are already doing better. Ultimately, knowledge management work needs to be blended in with these other activities or it's unlikely to be effective" (p.163).

A strong vision prevents organisations from losing sight of their corporate objectives, helping the success of knowledge sharing to become more quantifiable and measurable. According to Sunasee and Sewry (2002), the implementation of an organisation's knowledge-sharing strategy is only likely to contribute to the achievement of the organisation's goals and outcomes if it is aligned to the overarching business strategy of the organisation. Thus, it can be recommended that construction organisations need to make sure that their knowledge-sharing strategy is in line with the wider organisational strategic objectives, because it is very much influenced by the nature of the business of the organisation. Ndlela and Du Toit (2001) suggest that the knowledge-sharing strategy should visibly support the business objectives. The organisation's policy on the implementation of knowledge sharing should be clearly stated and explained to the employees.

Preparing to deal with new/different processes as part of knowledge-sharing initiatives within the organisation in terms of business efforts, especially how the business is to be operated was ranked as the second most challenging aspect of setting up knowledge sharing approaches in the organisation, with a mean value of 2.52 (Table 6.3). Half (50%) of the respondents indicated that it is very challenging or challenging to prepare to deal with something new/different, and this is not surprising, because having a knowledge-sharing initiative is a relatively new concept for construction organisations (DeTienne et al., 2004; Robinson, et al., 2001a; Carrillo et al., 2002). By the time the new wave comes, construction practitioners or even high-level managers resist or refuse to bring about any changes to their current systems (Li and Poon, 2009). This may be is because it is human nature to resist change. The extent of resistance differs from person to person (Davis and Songer, 2008). There are many reasons why people resist change. Dent and Goldberg (1999) propose some reasons why people resist change. These include inertia, misunderstanding, fear of a poor outcome and failure. In view of this resistance to change, some authors suggest various solutions to overcome it, e.g. education, coercion, political support, manipulation and discussion (Table 6.4).

Table 6.4 : The possible causes of resistance to change and strategies to overcome it.

	Kreitner (1992)	Griffin (1993)	Aldag & Stearn (1991)	Schremerhorn (1989)	Dubrin & Ireland (1993)
Causes of resistance					
Surprise	x				
Inertia	x				
Misunderstanding	x	x	x	x	
Emotional side effects	x	x	x	x	
Lack of trust	x	x	x	x	
Fear of failure	x				x
Personal conflicts	x	x	x	x	
Poor training	x				
Threat to job status or security	x	x	x	x	x
Workgroup break-up	x	x	x	x	
Fear of poor outcome					x
Fear of change					x
Uncertainty		x	x	x	
Strategies for overcoming					
Education	x	x	x	x	
Participation	x	x	x	x	x
Facilitation	x	x	x	x	
Negotiation	x	x	x	x	x
Manipulation	x	x	x	x	x
Coercion	x	x	x	x	
Discussion					x
Financial benefits					x
Political support					x

Source: Dent and Goldberg, 1999

The next challenge faced by construction organisations in setting up knowledge-sharing approaches is providing a clear understanding of what knowledge is vital to the organisation's future prosperity. This was ranked as the third most challenging by forty nine per cent (49%) of the survey respondents with a mean value of 2.55. Despite the growing awareness of the benefits of knowledge sharing, the accessibility of knowledge is still limited. Smith (2001) notes that the major challenges currently facing organisations are how to select the 'right' information from numerous sources and subsequently transform it into useful knowledge. If too much time is wasted looking for knowledge that could be easily accessed, companies end up losing their competitive advantage (Rosen et al., 2007; Riege, 2005). There should be a clear understanding of what knowledge is vital to the organisation's future prosperity. In this regard,

construction organisations should carefully identify what the knowledge is, where it is, who has it and who needs it. Once this is clear, they should define and prioritise the key features and identify appropriate approaches that can be used to set up knowledge-sharing initiatives. Understanding what those four things are is essential to sharing knowledge successfully.

Another challenge faced by construction organisations in setting up knowledge-sharing approaches is creating a culture of trust and openness to encourage knowledge sharing. This was ranked as the fourth most challenging by forty nine per cent (49%) of the survey respondents, with a mean value of 2.57. The 'knowledge is power' syndrome, a blame culture, friction between staff, lack of trust and lack of motivation are some of the challenging issues in the creation of an appropriate culture. The high ranking of creating a culture of trust and openness by construction organisations as a challenge is not surprising, since the average time frame of construction projects is just a few years in different geographic locations. The temporary nature of construction projects requires new resources such as new participants, materials, technologies and working methods to achieve a 'newborn' project. The complexity can make it extremely difficult for new project participants to coordinate disparate parties who may never have worked together before (De Saram, 2002).

According to Emmit and Gorse (2007), construction individuals and organisations have to be creative and ready to cooperate and coordinate through varying conditions. However, this ideal coordination rarely exists among construction organisations project participants. Even worse is the fact that participants are reluctant to share information and technical knowledge because they believe that the temporary time frame of construction projects often impedes the establishment of trust (Cheng et al., 2010). The managers need to create a supportive environment that is conducive to learning and exchanging ideas and knowledge (Garvin, 1993).

The results from the semi-structured interviews with managers also revealed that many construction organisations do not consider knowledge sharing to be an important asset, so they do not embed formal knowledge-sharing approaches in their culture, and employees do not see the importance of sharing knowledge with their colleagues. It is argued that the organisation culture itself does not support openness and the sharing of expertise. This finding is consistent with Egbu (2004), who found that UK construction

organisations do not promote a knowledge-sharing culture. According to Bollinger and Smith (2001), an inconsistent or non-existent culture of sharing may be present in many facets of an organisation leading to poor knowledge sharing and a lack of workplace openness and trust. However, culture is not only a challenge faced by construction organisations. For example, in a survey of 431 US and European organisations, culture was found to be the biggest impediment to knowledge sharing (Ruggles, 1998). Developing an organisational culture geared towards knowledge management and knowledge sharing should be one of the main concerns of top management. Liebowitz, (2001) and Scheraga (1998) and Wigg (1997) suggest that one way to overcome this is to create a knowledge-sharing culture that includes incentives and a reward system, role model and the like to motivate others to share their knowledge. Thus, construction organisations have to create an environment that will encourage a culture of trust and openness, where people feel comfortable and are willing to share their knowledge. A knowledge-oriented culture challenges people to share knowledge throughout the organisation (Gold et al., 2001; Davernport and Prusak, 1998).

While the use of internet and intranet technologies was ranked as a most highly used or used knowledge-sharing approach (Table 5.3 in Chapter 5), the survey respondents noted that setting-up an appropriate technology infrastructure to support knowledge-sharing practices is a challenge. It was ranked as the fifth most challenging aspect faced by construction organisations by forty five per cent (45%) of respondents, with a mean value of 2.59. As the benefits of a technology infrastructure to support knowledge sharing are still not clear to construction organisations, it is believed that they are reluctant to invest in setting up an appropriate technology infrastructure for knowledge sharing. This reasoning is also indicated in the interview data, where 40 out of the 49 interviewees comment that high cost is a restraining factor. Moreover, the low profit margins of construction organisations and their conservative nature have also led to reluctance to invest in knowledge-sharing initiatives and the infrastructure support required (Carrillo et al., 2004). Clearly, construction organisations need to rethink their approach in designing and developing a technology infrastructure for knowledge sharing.

Justifying and gaining management support and commitment for a budget for the development of a knowledge-sharing strategy was ranked as the sixth most challenge aspect by forty five per cent (45%) of the respondents, with a mean value of 2.59. To successfully implement knowledge sharing requires adequate funding, but this poses another challenge, as top management often resists an increased budget allocation for administrative purposes. Davenport (1997) emphasises the importance of financial commitment to knowledge management practices, which in many cases can be expensive. Hence, adequate resources to support knowledge sharing need to be allocated. Research done by Egbu (2004) highlights that knowledge management specialists are unlikely to get the resources they need until they can provide justification in terms of returns on investment. This is because the benefits and returns accrued from knowledge-sharing initiatives are not always tangible and are difficult to quantify (Williams, 2003; Malhotra, 2002). According to Carrillo et al. (2004), this line of thinking is rampant in the construction industry because their profit margins are low and they are conservative in nature. Management support and commitment is critical to the success of adopting knowledge-sharing initiatives (Egbu et al., 2005; Hung et al., 2005). If management lacks the dedication and support for knowledge-sharing initiatives, employees may misinterpret this behaviour and view knowledge sharing as unimportant, thus exerting minimal effort (Kabene et al., 2006). It is suggested that construction organisations should provide an appropriate budget which addresses resources, outside expertise, technology and subscriptions (access to additional information sources) as an indication of top management support and commitment to knowledge-sharing initiatives. Most of the interviewees in this study said that no specific budget had been allocated to the development of a knowledge-sharing strategy. As most construction organisations are only in the planning stage, the true forward budgets are unlikely to be established yet. This finding is consistent with the work done by Chong (2005), who found that many respondents cited a lack of budget and incentives as barriers to the successful implementation of knowledge management initiatives in their organisations.

Another challenge in setting up knowledge-sharing approaches is developing concise methodologies or 'blueprints' that address the meaning of knowledge-sharing practices. This was ranked as the seventh most challenging aspect by forty four per cent (44%) of the respondents, with a mean value of 2.62. This could be because currently there are no comprehensive systematic methodologies or 'blueprints' for construction organisations to share good practice across sites and organisational boundaries due to a lack of an integrated framework of knowledge management implementation (Shahrokhi, 2010; Kim and Gong, 2009; Daud and Hassan, 2008; Wong and Aspinwall, 2005). Knowledge management practices are relatively new in the Malaysian context, as most organisations are at the initial phase of formal knowledge management implementation (Abdul-Rahman, 2004). The interviews with managers in construction organisations revealed that many organisations find developing concise methodologies or 'blueprints' that address the meaning of knowledge-sharing practices challenging, because they do not determine clear goals for a comprehensive strategy before implementing knowledge-sharing practices. Lee (2001) suggests that if knowledge sharing is to take place, there must be "a clear, common vision and objectives which are pre-determined and agreed upon in advance". In this context, knowledge-sharing methodologies or 'blueprints' is defined as a series of documents published by the organisation to provide insight and guidance, allowing organisations to effectively share knowledge in support of their business objective. The 'blueprints' serve to provide data, information and expertise on approaches to setting up and implementing effective knowledge-sharing practices based on experience, lessons learned and state-of-the-art techniques. To make the 'blueprints' as useful as possible, the approaches and procedures must be based on the best practices used by the construction industry.

Creating flexible organisational structures to provide employees with easy access to the knowledge they need was ranked as the eighth most challenging aspect, with a mean value of 2.65. This is because organisational tends to be hierarchical and complex in the construction industry context (Subsection 9.3.2.1 in Chapter 9). A hierarchical organisation structure inhibits or slows down most sharing practices; hence, implementing knowledge sharing is a difficult task. However, creating a flexible organisational structure is not only a challenge faced by construction organisations Miller and Friesen (1983) indicate that developing and implementing an adequate structure is one of the most important challenges that entrepreneurs face. Knowledge

management theorists suggest that flexibility and a non-hierarchal structure are the best environmental factors for implementing knowledge-sharing initiatives. For knowledge to be shared effectively, construction organisations will have to make changes in terms of their organisational structure. Pinchot and Pinchot (1996) suggest that these shifts includes a move from individual work to team work, from functional work to project-based work, from single-skilled personnel to multi-skilled employees and from coordination from above to coordination among peers. The managers should encourage a non-hierarchal approach to knowledge, as the quality of ideas is more important that the status of the source.

The analysis of the data indicates that the creation of clear lines of communication to raise awareness of knowledge sharing is a challenge, and was ranked as the ninth most challenging aspect, by forty one per cent (41%) of respondents, with a mean value of 2.69. The effective communication of the knowledge-sharing strategy within an organisation is important as part of its effective implementation. Effective knowledge sharing requires an understanding of how people interact and communicate in a particular context. Effective communication, both verbal (the most common vehicle for sharing tacit knowledge) and written, is fundamental to effective knowledge sharing (e.g. Meyer, 2002; Hendriks, 1999; Davenport and Prusak, 1998). There is evidence to suggest that the failure to share knowledge in organisations is due to the failure to communicate knowledge-sharing strategies adequately with staff (Turban et al., 2006; Barth, 2000). Therefore, it is suggested that the selection of the media or communication channels depends on the target of group and desired dissemination activity (like creating awareness or understanding). These include email, discussion boards, mail, telephone, teleconferencing, flyers, electronic newsletters, publications, the environment and conferencing. Management should create an environment where open communication is encouraged (Goman, 2002), and should take the time to explain to the employees the value of sharing knowledge.

Interestingly, providing a favourable physical layout of the workspace to stimulate informal knowledge sharing among employees (e.g. pantry, open office, meeting room, etc.) was ranked as the least challenging aspect by thirty seven per cent (37%) of respondents, with a mean value of 2.80. This is possibly because investment to provide this is not identified explicitly as a knowledge management activity.

Having considered the challenges in setting up knowledge-sharing approaches at the aggregate level, the next section focuses on these challenges at the dis-aggregate level, namely at the small, medium and large organisation levels.

6.3.2. The extent of the challenges associated with setting up knowledge-sharing approaches: dis-aggregate level

This study also investigated the differences in perception of the challenges faced by construction organisations in setting up knowledge-sharing approaches at the dis-aggregate level. The approach adopted to analyse the data at the aggregate level is also employed at the dis-aggregate level. As mean score increases, the degree of challenge in setting up knowledge-sharing approaches decreases.

Table 6.5 : Mean score of challenges associated with setting up knowledge-sharing approaches: dis-aggregate level.

Challenges in setting up knowledge-sharing approaches (Organisation level)	Small (N=294)		Medium (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Developing a knowledge-sharing strategy.	2.45	1	2.48	1	2.72	7
Preparing to deal with something new/different processes.	2.52	3	2.51	2	2.44	1
Providing a clear understanding of what knowledge is vital.	2.52	2	2.62	5	2.68	4
Creating a culture of trust and openness.	2.56	4	2.60	4	2.60	3
Justifying and gaining management support and commitment.	2.57	5	2.65	6	2.72	8
Setting up an appropriate technology infrastructure	2.61	7	2.54	3	2.52	2
Developing concise methodologies or 'blueprints'.	2.61	6	2.65	7	2.72	6
Creating flexible organisational structures.	2.64	8	2.68	9	2.76	9
Creating clear lines of communication.	2.70	9	2.66	8	2.68	5
Providing a favourable physical layout of the workspace	2.77	10	2.91	10	2.92	10

Meaning of scale (the extent of the challenge):

1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all)

The mean values given in Table 6.5 present some distinctive results. SMEs have mean values ranging from 2.45 to 2.91. In contrast, large organisations have mean values of 2.44 to 2.92. This clearly indicates that the size of the organisation does not have much impact on the level of challenge in setting up knowledge-sharing approaches. Discussions related to the above area are given in subsequent sections.

At the dis-aggregate level, the result shows that SMEs ranked developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach as the most challenging aspect, while large organisations ranked it seventh. This means that SMEs face a greater challenge compared to large organisations in developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach. Most of these organisations lack the understanding and appreciation of the full benefits associated with knowledge sharing. According to Wong and Aspinwall (2004), the management of SMEs has to look after every aspect of the business, which gives them limited time to focus on the strategic issues relating to knowledge management. A way to address this problem would be to develop a knowledge-sharing culture and provide technology support for knowledge sharing. For example, there is a general agreement by the managers who are involved in the semi structured interviews from small, medium and large organisations that the *"organisation's policy on the implementation of a knowledge-sharing strategy should be clearly stated and explained to the employees"*.

Justifying and gaining management support and commitment for a budget was ranked the fifth, sixth and eighth most challenging aspect by SMEs and large organisations respectively. This means that smaller organisations have to face a greater challenge in justifying and gaining management support and commitment for a budget than larger organisations. This is not unusual, as for SMEs, setting aside a budget to spend on knowledge sharing (or on knowledge management per se) is often not feasible (Staplehurst and Ragsdell, 2010; Jun and Cai, 2003; OECD, 2002). Indeed, at the SME scale, a formal budget for knowledge sharing is often not necessary, as the regular and close contact between employees means that knowledge generally flows easily via informal approaches (e.g. face-to-face conversations and via supporting emails and documents). Generally, it can be deduced that justifying and gaining management support and commitment for a budget for implementing knowledge-sharing approaches

is lacking in SMEs, and one of the most important reasons is that they do not having enough financial resources.

While technology is not the most important aspect of knowledge sharing, it does play a crucial role in facilitating communication, collaboration and sharing among employees in an organisation. Setting up an appropriate technology infrastructure to support knowledge-sharing practices was ranked the seventh, third and second most challenging by small, medium and large organisations respectively. This means that larger organisations find setting up an appropriate technology infrastructure more challenging than smaller organisations. It is not surprising to find that employees in large organisations are overwhelmed by information from multiple sources. Advanced ICT tools are more commonly used in large organisations compared to SMEs (Dasgupta, et al., 1999). Sarvary (1999) suggests that large organisations with a large customer or client base tend to perceive a knowledge-sharing technology infrastructure as more useful and have a better chance of applying a knowledge-sharing system to build a sustainable competitive advantage. Past research has reported the impact of size in the adoption of technology infrastructures to support knowledge-sharing practices. For example, Thong (1999) reports that organisational size is positively related to the organisation's decision to adopt a technology infrastructure. Dasgupta et al. (1999) reported that larger organisations are more likely to adopt a technology infrastructure. Many interviewees in this study recognise that a technology infrastructure is an indispensable means of sharing knowledge. All the fourteen large organisations in this study have email, the intranet, groupware, faxing, teleconferencing and video-conferencing facilities available, albeit at varying degrees.

The other major challenge is the existing organisational structure. There is a general agreement between small, medium and large construction organisation that creating flexible organisational structures to provide employees with easy access to the knowledge they need is challenge. Most construction organisational structures are hierarchical in nature (Vines and Egbu, 2004). This creates several layers making it very difficult to adopt and share knowledge. The hierarchical nature of business basically hinders knowledge sharing to be implemented. The positive change in organisational culture would affect the organisational structure, making it more conducive to share knowledge. The challenge therefore is to make the organisational structure become

more flat which will allow communication to flow horizontally and vertically easily to speed up decision making process.

Creating clear lines of communication was ranked as the ninth, eighth and fifth most challenging aspect by small, medium and large organisations respectively. This means that larger organisations face a greater challenge compared to smaller organisations in creating a clear line of communication. This could be because, for large organisations with entities in distant geographical locations, there are real knowledge-sharing obstacles, because basic communication becomes more difficult and the creation of trust-based relationships is harder without face-to-face contact. The challenge is intensified further if cross-functional teams need to be formed and functional areas are located in different regions. IT systems such as groupware applications can enhance the convenience and effectiveness of sharing between spaces.

All the study participants (both SMEs and large organisations) agree that a providing a favourable physical layout of the workspace to stimulate informal knowledge-sharing among employees is the least challenge aspect (tenth) faced by construction organisations in setting up knowledge-sharing approaches. This is possibly because investment to provide this is not identified explicitly as a knowledge management activity.

The relationship between size of organisation and challenges in setting up knowledge-sharing approaches

The mean values of the challenges in setting up knowledge-sharing approaches are further compared according to the size of organisation (Table 6.6). This is to verify whether larger organisations perceive the challenges in setting up knowledge-sharing approaches is greater than smaller organisations. This was examined using the Spearman correlation coefficient test.

In this study, the hypothesis documented is:

 H1: There is a relationship between the challenges in setting up knowledge-sharing approaches and size of organisation.

Table 6.6 : Correlations between the challenges in setting up knowledge-sharing approaches and size of organisation

			Challenges in setting up	Size of organisation
Spearman's rho	Challenges in setting up	Correlation Coefficient	1.000	.045
		Sig. (2-tailed)	.	.380
		N	384	384
	Size of organisation	Correlation Coefficient	.045	1.000
		Sig. (2-tailed)	.380	.
		N	384	384

Table 6.6 shows that there is no significant positive correlation between the two variables (rho = 0.045, n = 384, p ≥ 0.05). This means that there is insufficient evidence to suggest that the larger the size of the organisation, the greater challenges they face in setting up knowledge-sharing approaches. The results of this study basically indicate that there is no major difference in the challenges in setting up knowledge-sharing approaches between SMEs and large construction organisations. This clearly indicates that the size of the organisation does not have an impact on the level of challenges faced in setting up knowledge-sharing approaches. The null hypothesis is not rejected. This result is in line with the study of small businesses in Australia and Singapore done by Lim and Klobas (2000), who found that the knowledge-sharing needs and challenges are surprisingly similar to those of bigger companies.

Having discussed the extent of the challenges faced by construction organisations in setting up knowledge-sharing approaches, the next section focuses on the extent of the challenges in implementing knowledge-sharing approaches.

6.4. Challenges associated with implementing knowledge-sharing approaches.

6.4.1. The extent of the challenges in implementing knowledge-sharing approaches: aggregate level

Table 6.7 presents the overall mean scores and the ranking of the survey respondents at the aggregate level for the extent of the challenges associated with implementing knowledge-sharing approaches. As mean score increases, the challenge in implementing knowledge-sharing approaches decreases. By taking the rankings and converting them to a score, statistical analysis enabled the creation of the tables below.

Table 6.7 : Mean score of challenges associated with implementing knowledge-sharing approaches: aggregate level.

Challenges in implementing knowledge-sharing approaches (Organisation level)	Overall (N=384)	
	Mean	Rank
Choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance.	2.50	1
Reviewing strategy and achievements periodically for possible revision of knowledge-sharing initiatives.	2.51	2
Maintaining senior management support for knowledge sharing.	2.63	3
Identifying and involving knowledge-sharing champions to promote knowledge-sharing practices.	2.67	4
Running adequate training to build awareness and understanding of knowledge-sharing programmes.	2.68	5
Establishing a community of practice and promoting its existence throughout the organisation as a means of facilitating knowledge sharing.	2.71	6
Determining time and conversation format for employees to talk with one another and share knowledge.	2.72	7
Getting employees to fully exploit the intranet for knowledge sharing.	2.89	8
Getting employees to use the intranet for knowledge sharing.	2.94	9
Getting employees to fully exploit the internet for knowledge sharing.	2.98	10
Getting employees to use the internet for knowledge sharing.	2.99	11

Meaning of scale (the extent of the challenge)

1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all)

Table 6.7 shows that the overall mean scores range from 2.50 to 2.99. This means that all ten factors are significant and fall into the category of 'Challenging'. From the data it is evident that the most challenging factor associated with implementing knowledge-sharing approaches is choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance. This is closely followed by reviewing strategy and achievements periodically for possible revision of knowledge-sharing initiatives. The least challenging in setting up knowledge-sharing approaches is getting employees to use the internet for knowledge sharing.

The difficulty of choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance was ranked the most challenging (mean value =2.50) by the respondents involved in this study. Possible explanations is that the respondents, might lack the necessary knowledge, skills and expertise to performed this activity and were thus inclined to rate it as most challenges. Lack of appropriate methods and tools for measuring and assessing the impact of knowledge-sharing initiatives on business performance also was found as a challenge by Egbu (2004). This could be because choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance is not easy (APQC, 2002), and the effectiveness of sharing initiatives is difficult to measure (Riege, 2005). Although the effectiveness of sharing initiatives, goals and strategies is difficult to measure and differs between companies, many authors have concluded that sharing existing knowledge contributes to the performance of organisations (e.g. Argote and Ingram, 2000; Epple et al., 1996; Argote and Epple, 1990), at the same time knowledge sharing is a key area for the success of an organisation (Shepard, 2000). It is important that construction organisations measure how knowledge-sharing initiatives contribute to business performance. Appropriate measures will help construction organisations to get some idea of the current situation to see where they should adapt, improve, or change in their implementation of knowledge-sharing approaches. To meet the challenge of sharing knowledge, it is recommended that organisations should be able to assess the preconditions for successful knowledge sharing and its impact on organisation performance. The performance measurement may include reviewing the knowledge repository and giving a visible reward to those who show commitment to the knowledge-sharing initiatives.

Reviewing strategy and achievements periodically for the possible revision of knowledge-sharing initiatives was ranked the second most challenging aspect faced by construction organisations in the implementation of knowledge-sharing approaches, with a mean value of 2.51.The interviewees claimed that appropriate knowledge-sharing approaches are vitally important to share knowledge successfully. Hence, they indicated that the success of knowledge sharing needs be reviewed and empowered according to the needs. In particular, the related knowledge and skills need to be improved. However, for knowledge-sharing initiatives to be useful, they have to be reviewed periodically, and this naturally requires manpower and man-hours.

The next challenge is to maintain senior management support for knowledge sharing, and this was ranked as the third most challenging aspect faced by the respondents involved in this study (mean value =2.63). Top management needs to make continuous contributions and commitments in order to make knowledge sharing a success. However, according to Chong and Choi (2000), top management support alone is inadequate for knowledge-sharing initiatives to be successful; sustained support and commitment by top management is required to forge employee empowerment, leading to more knowledge sharing. Top management support and commitment help to create a favourable climate for knowledge sharing. Hence, employees feel more secure about sharing and solving their problems when management shows a more relaxed approach to the free flow of knowledge.

Identifying and involving knowledge-sharing champions to promote knowledge-sharing practices was ranked as the fourth most challenging aspect, with a mean value of 2.67. This could be because most of the construction organisations involved in this study cannot afford to hire a knowledge-sharing champion due to their financial standing. In many interviews, managers claimed that people might be reluctant to participate, as they are busy with their "day's job", and may not be happy to take on the additional work and effort that being part of a cross-functional team often requires.

As one of the respondents stated:

"Currently, I am the one who initiate the knowledge-sharing initiatives through intranet. In future, company need to have a specific staff to look in to this because I am busy with my work as senior QS".

Chong (2005) suggest that construction organisations should first train a few of their employees from different departments in knowledge sharing, and assign them to their respective departments to sell the idea while a senior manager is seconded to perform the knowledge-sharing champion's job. This will guarantee that the programmes follow a systematic, coherent and well-established structure. In addition, everyone should be encouraged to believe that their knowledge, ideas and opinions are respected. This will then help people to feel more valued and, in turn, more empowered.

Running adequate training to build awareness and understanding of knowledge-sharing programmes were ranked as the fifth most challenging aspect faced by construction organisations, with a mean of 2.68. Training seems to be the common approach to knowledge sharing in construction organisations (Subsection 5.3.1 in Chapter 5). This was also indicated in the interviews; most of the respondents commented that the high cost of formal training programmes, a lack of time where other priorities take precedence, and high staff turnover are deterrent factors. As the benefits of knowledge-sharing initiatives are still not clear to these organisations, it is believed that they would be reluctant to invest in running adequate training to build awareness and understanding of knowledge-sharing programmes. As one of the respondents stated:

"There is no specific training and development used as a means of encouraging knowledge management/knowledge sharing. Training is to meet the needs of CIDB. It is compulsory and also to meet ISO requirements. Training is usually ad hoc. Training is also very rare because management did not see benefits/advantages of training."

People need to be educated and trained properly to engage in overall knowledge-sharing initiatives. Accordingly, people should be made aware of any potential knowledge-sharing initiatives and their collective responsibility to prevent or minimise the challenges or difficulties in implementing them. This will help to make preparedness part of their organisation lives, or enhance their culture of preparedness. Some interviewees also suggested that sharing knowledge is restricted by insufficient in-house seminars where expertise and experience can be shared. According to them, the success of training depends on several factors, including the knowledge of the person who delivers the training, the environment in which the training is delivered, the level of resources needed to support the training and the absorptive capacity of the people who receive the training. Hence, it is suggest that construction organisations should have

adequate training to build awareness and understanding of knowledge-sharing approaches. With proper guidelines and more awareness training given to managers and employees, both parties should be able to gain better understanding regarding the positive outcomes that knowledge-sharing approaches can offer.

Establishing a community of practice and promoting its existence throughout the organisation as a means of facilitating knowledge sharing was ranked as the sixth most challenging aspect, with a mean value of 2.71. A challenge for managers is to provide financial and technical support, and to encourage a supportive culture as well as an organisational structure which promotes an open and trust-based communication between all organisational members, irrespective of their status. In addition, support in the form of resources, time and effort is needed to ensure the long-term survival of communities of practice (Ahmed et al., 2002).

Determining the time and conversation format for employees to talk with one another and share knowledge was ranked as the seventh most challenging aspect, with a mean value of 2.72. Construction projects are the endeavors to produce different, unique products and need a great deal of efforts. Furthermore, they have their own time limits as one of their objectives, which make people involved in projects to feel like being busy all the time. It prevents construction experts from having their time to share their own knowledge. The workload on construction sites together with the office is considered to be quite heavy, and most managers involved in this study argue that pressure to achieve deadlines, completing the job (project) with client satisfaction, is their first priority, and other people have other priorities. Anything that detracts from the main business is seen as of diminished importance (Carrillo et al., 2000).

As one of the respondents stated:

"We are small. The same QS will have to prepare v.o. claim, site evaluation, tendering, material purchasing etc.... Most staff is busy especially with checking and data keying works for each division. There are a lot of works to do especially in upgrading our filing system, documentation, key in information to system. So it is really 'steal' our time".

A lack of time to share knowledge, whether it is to enter knowledge into a repository, or for informal interactions, and a lack of conversation format for employees to talk with one another and share knowledge was found to be an obstacle to knowledge sharing.

O'Dell and Grayson (1998) highlight the lack of time as being a common barrier to sharing, concluding that even though managers are aware of the benefits of knowledge sharing, they often struggle to implement it due to time constraints.

One of the main factors contributing to the problem is a lack of structured time for knowledge sharing. When there is no structured time schedule, the sharing of knowledge remains ad-hoc or accidental. This lack of structured time may be detrimental, as new knowledge becomes lost and mistakes are perpetuated. Thus, it is important for construction organisations to create time and opportunities for people to learn and share knowledge. If the organisation does not make knowledge sharing a priority, and the time to share knowledge is not built into the employees' daily work life, most likely they will not share their knowledge (Miller, 2002; Soo et al., 2002; Martensson, 2000; Galagan, 1997). Another approach suggested by Galagan (1997) is to create formal learning networks so that the identification and sharing of effective practices becomes part of the job. Skyrme (2003), Collison and Parcell (2002) and Davenport and Prusak (2000) suggest that it is important to embed knowledge goals into the company strategy and project planning so that it becomes acceptable for people to have time and space to reflect and seek out knowledge. Organisations need to make it quick and easy to share knowledge (Miller, 2002). Management should identify knowledge sharing as a priority, and allow employees sufficient time for learning and sharing knowledge.

Getting employees to fully exploit the intranet for knowledge sharing was ranked as the eighth most challenging aspect, with a mean value of 2.89. This could be due to users' lack of awareness of the intranet contents. This lack of awareness might happen because of poor socialisation and marketing efforts for an intranet culture (Chaudhry et al., 2008). This finding implies that it is indispensable for organisations to promote the benefits of the intranet and cultivate the interest of employees in using the intranet for day-to-day office duties. The semi-structured interviews revealed that staff members have little exposure to the intranet, the intranet is not being exploited to its fullest potential, knowledge is not well organised and the contents were not sufficiently managed to facilitate knowledge sharing and discovery (Subsection 5.3.1 in Chapter 5). Moreover, improvements are required to the updating of information and the ease with which information can be found. This suggests that while the information on the intranet is generally seen to be reliable, the regular updating of the content and the ease

with which the information can be found need to be improved. This might impede the effective use of the intranet as a knowledge-sharing tool. Tiwana and Ramesh (2001) suggest that the intranet should be seen as integral to an organisation's knowledge management strategy and should therefore be designed and tailored to enhance an organisation's knowledge-sharing activities.

Getting employees to use the intranet for knowledge sharing was ranked as the ninth most challenging aspect, with a mean value of 2.94. The interviews revealed that some staff members have little exposure to the intranet or other information tools because they do not use or have experience with them (Subsection 5.3.1 in Chapter 5). Due to a lack of familiarity, employees found the intranet is not user-friendly, therefore there is likely to be resistance to sharing knowledge through this system, or for some it may simply be that it is too much of a hassle to try finding what is being sought. Moreover, there is a lack of time and no transparent rewards for sharing knowledge using intranet. These challenges show that the management are not promoting or supporting fully the use of the intranet for knowledge sharing across the whole organisation. If they supported intranet use they would provide all the resources to make the whole organisation efficient. Orientation and on-job training is an effective way to make sure that employees make use of the intranet. Van der Walt et al. (2004: p. 17) suggest that employees should be "motivated in various ways, so that they can see and experience the value they could add and receive by using the intranet for knowledge sharing activities".

Getting employees to fully exploit the internet for knowledge sharing was ranked as the tenth most challenging aspect, with a mean value of 2.98. The results show that companies are not exploiting the full potential of the technology they have. Organisations do not feel a real need to create space on their own website or elsewhere to create knowledge-sharing instruments to the benefit of their target groups. This finding is in line with the study done by Egbu and Botterill (2001), who found that construction organisations limit internet usage to efficient information storage rather than as a tool for communication.

Difficulties in getting employees to use the internet for knowledge sharing was ranked as the least challenging aspect (eleventh) faced by construction organisations in implementing knowledge-sharing approaches, with a mean value of 2.99. The

interviews with managers revealed that speed and cost-effectiveness are the main reasons for difficulties in getting employees to use the internet. Another possible explanation is that, very often, organisations themselves do not have good ideas about how the internet can be used as a knowledge-sharing tool (Van Doodewaard, 2006).

Having considered the extent of the challenges in implementing knowledge-sharing approaches at the aggregate level, the next section focuses on the extent of the challenges in implementing knowledge-sharing approaches at the dis-aggregate level, namely at SMEs and large organisation levels.

6.4.2. The extent of the challenges in implementing knowledge-sharing approaches: dis-aggregate level

The mean values of the challenges in implementing -knowledge-sharing approaches were then compared according to different size of organisation. This is to verify whether the level of challenges differs according to the size of organisation.

Table 6.8 : Mean score of challenges associated with implementing knowledge-sharing approaches: dis-aggregate level.

Challenges in implementing knowledge-sharing approaches (Organisation level)	Small (N=294)		Medium (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance.	2.49	1	2.55	2	2.48	1
Reviewing strategy and achievements periodically for possible revision of knowledge-sharing initiatives.	2.52	2	2.49	1	2.48	2
Maintaining senior management support for knowledge sharing.	2.63	3	2.69	3	2.44	9
Identifying and involving knowledge-sharing champions to promote knowledge-sharing practices.	2.64	5	2.88	7	2.56	10
Running adequate training to build awareness and understanding of knowledge-sharing programmes.	2.63	4	2.92	8	2.68	8
Establishing a community of practice and promoting its existence throughout the organisation as a means of facilitating knowledge sharing.	2.67	6	2.78	4	2.92	11
Determining time and conversation format for employees to talk with one another and share knowledge.	2.68	7	2.82	5	2.88	3
Getting employees to fully exploit the intranet for knowledge sharing.	2.89	8	2.85	6	3.00	5
Getting employees to use the intranet for knowledge sharing.	2.93	9	3.08	11	2.80	4
Getting employees to fully exploit the internet for knowledge sharing.	2.99	10	2.94	9	2.96	7
Getting employees to use the internet for knowledge sharing.	3.00	11	2.98	10	2.84	6

Meaning of scale (the extent of the challenge)

1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all)

From the Table 6.8, it is observed that small, medium and large construction had the same opinion about the variables 'choosing an appropriate method to assess the impact of knowledge sharing initiatives on business performance', and 'reviewing strategy and achievements periodically for the possible revision of knowledge-sharing initiatives' as most challenge in implementing knowledge sharing approaches.

At the dis-aggregate level, the results show that identifying and involving knowledge-sharing champions to promote knowledge-sharing practices was ranked fifth, seventh and tenth by small, medium and large organisations respectively (Table 6.8). This means that SMEs face a greater challenge in this aspect than large organisations. This is not unusual, as most large organisations have the ability to hire external knowledge champion consultants who design and implement knowledge-sharing and monitoring tools. In comparison, SMEs have less effective resources, as they mostly lack the financial resources and have less capable employees. Many of the SMEs cited their financial standing as their main constraint in appointing team members to take the responsibility to facilitate knowledge-sharing initiatives due to the company size. This is understandable, as 93.5% of the respondents in this study come from SMEs (Table 4.14 and 4.15 in Chapter 4). With limited funding, these companies cannot afford to have a knowledge-sharing champion in their organisations. This problem can be solved by seconding a member of the top management to the position (Chong and Choi, 2005).

Issues related to running adequate training to build awareness and understanding of knowledge-sharing programmes was ranked as the fourth most challenging aspect by small organisations and eighth by medium and large organisations. This is not surprising, since most of the larger organisations have the ability to run adequate training, as they have more capable employees. In comparison, smaller organisations have less effective resources, which create an obstacle to adopting much of the knowledge-sharing training. Moreover, SMEs management tends to regard training as an operating expense rather than an investment (Finegold and Soskice, 1988), and managers in smaller firms are more sceptical about the benefits of training (Wood, 1992). The interviews with managers revealed that the most frequently specified challenge to providing training to employees to build awareness and understanding of knowledge-sharing programmes among construction organisations is "employees are temporary". Other important reasons provided include: training and development activities would not produce any benefits; the costs of training; the loss of working

time; and the inability to cover work while workers are being trained. This is roughly the same in all sizes of organisation. It is suggested that knowledge-sharing training opportunities may need to be carefully linked to project assignments along with the career path of employees so that organisational members can develop the required know-how and expertise as they build their career.

Determining the time and conversation format for employees to talk with one another and share knowledge was ranked seventh, fifth and third by small, medium and large organisations respectively. This means that larger organisations face a greater challenge compared to smaller organisations. Implementing knowledge management in any organisation is a challenge because of the time and effort that is required before there is a return on the investment (Alawneh et al., 2009). This result also supports the study done by Carrillo et al. (2004), who surveyed large UK construction organisations. It was found that a lack of time within large organisations is the main barrier to knowledge management (Carrillo et al., 2004). Although SMEs may be aware of the power of knowledge management and the importance of knowledge sharing in their organisation, they often feel that they have other more pressing priorities and needs (Lee et al., 2005).

Getting employees to fully exploit the intranet for knowledge sharing, getting employees to use the intranet for knowledge sharing, getting employees to fully exploit the internet for knowledge sharing, and getting employees to use the internet for knowledge sharing was ranked at least challenges in implementing knowledge-sharing approaches by small, medium and large organisation. However, the mean value shows that large organisation faced more challenge in these aspects.

The relationship between size of organisation and challenges in implementing knowledge-sharing approaches

It is now important to identify whether the size of organisation has an impact on the results discussed above. This is to verify whether larger organisations perceive the challenges in implementing knowledge-sharing approaches is greater than smaller organisations. This was investigated using the Spearman rho. In this study, the hypothesis documented is:

H1: There is a relationship between the challenges in implementing knowledge-sharing approaches and size of organisation.

Table 6.9: Correlations between challenges in implementing knowledge-sharing approaches and size of organisation

			Size of organisation	Challenges in implementing
Spearman's rho	Size of organisation	Correlation Coefficient	1.000	.045
		Sig. (2-tailed)	.	.379
		N	384	384
	Challenges in implementing	Correlation Coefficient	.045	1.000
		Sig. (2-tailed)	.379	.
		N	384	384

Table 6.9 shows that there is no significant positive correlation between the two variables (rho = 0.045, n = 384, p ≥ 0.05). This value is not significant at the 5% level. This means that there is insufficient evidence to suggest that the larger the size of the organisation, the greater the challenges they face in implementing knowledge-sharing approaches. This result indicates that the size of organisation does not impact on the extent of the challenges faced in implementing knowledge-sharing approaches. The null hypothesis is rejected.

Having discussed the extent of the challenges faced by construction organisations in implementation knowledge-sharing approaches, the analysis continued to discover which management levels within SMEs and large construction organisations faced more challenges in setting-up and implementing knowledge-sharing approaches. The next sections focus on the extent of the challenges faced by managers in setting up and implementing knowledge-sharing approaches.

6.5. Challenges faced by managers in setting up knowledge-sharing approaches

6.5.1. The extent of the challenges faced by managers in setting up knowledge-sharing approaches: aggregate level

Table 6.10 : Mean score of challenges associated with implementing knowledge-sharing approaches: aggregate level.

Challenges to setting-up knowledge-sharing approaches (Managerial level)	Overall (N=384)	
	Mean	Rank
Developing a knowledge sharing strategy	2.47	1
Preparing for dealing with something new/different	2.52	2
Providing a clear understanding of what knowledge is vital	2.55	3
Creating a culture of trust and openness	2.57	4
Set-up an appropriate technology infrastructure	2.59	5
Justifying and gaining management support	2.59	6
Developing concise methodologies	2.62	7
Creating flexible organisational structures	2.65	8
Create clear lines of communication	2.69	9
Providing favourable physical layout of work space	2.80	10

Meaning of scale (the extent of the challenge)

1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all).

Table 6.10 presents the overall mean scores and the ranking of the survey respondents at the aggregate level for the extent of the challenges associated with implementing knowledge-sharing approaches at the managerial level. As mean score increases, the challenge in implementing knowledge-sharing approaches decreases. By taking the rankings and converting them to a score, statistical analysis enabled the creation of the tables below.

The overall mean values ranged from 2.47 to 2.80, regarded as 'challenge'. However, where two or more factors had the same mean, priority was given to the lowest standard deviation (SD) figure, since the lower SD indicates that the data is less spread out and therefore the average is more likely to be valid for the majority. By converting each ranking to a score, statistical analysis was possible. According to the mean scores presented in Table 6.10, the three variables that have the highest rank are: Developing a knowledge sharing strategy (mean value = 2.47), preparing for dealing with something new/different (mean value = 2.52), and providing a clear understanding of what

knowledge is vital (mean value = 2.55). Creating a culture of trust and openness (mean value = 2.57) was ranked fourth most challenge in terms of setting up knowledge-sharing approaches. 'Providing favourable physical layout of work space appeared to be the least challenge, with a mean value of 2.80.

A comparison was then made between different managerial levels to identify any variations to the above. Table 6.11 gives a mean value comparison of the level of challenges to setup knowledge-sharing approaches at the dis-aggregate level (senior, middle and junior managers).

6.5.2. The extent of the challenges faced by managers in setting up knowledge-sharing approaches: dis-aggregate level.

Table 6.11 : The extent of the challenges faced by managers in setting up knowledge-sharing approaches: dis-aggregate level

Challenges to setting-up knowledge-sharing approaches (Managerial level)	Senior managers (N=68)		Middle managers (N=202)		Junior managers (N=114)	
	Mean	Rank	Mean	Rank	Mean	Rank
Developing a knowledge-sharing strategy	2.43	1	2.53	1	2.40	1
Preparing to deal with new/different processes	2.47	3	2.53	2	2.52	2
Providing a clear understanding of what knowledge is vital	2.47	4	2.55	3	2.58	5
Creating a culture of trust and openness	2.49	5	2.57	4	2.63	7
Setting up an appropriate technology infrastructure	2.54	7	2.65	6	2.52	3
Justifying and gaining management support	2.54	6	2.61	5	2.60	6
Developing concise methodologies	2.43	2	2.66	7	2.57	4
Creating flexible organisational structures	2.65	9	2.66	8	2.65	8
Creating clear lines of communication	2.65	8	2.70	9	2.70	9
Providing a favourable physical layout of the workspace	2.81	10	2.82	10	2.77	10

Meaning of scale (the extent of the challenge)

1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all)

A questionnaire survey was sent to three levels of managers: senior, middle and junior managers. Table 6.11 shows the overall mean scores for the challenges faced in setting up knowledge-sharing approached based on the different levels of managers. There is general agreement between senior, mid, and junior managers. They all ranked 'developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach', 'preparing to deal with new/different processes as part of knowledge-sharing initiatives within the organisation in terms of business efforts, especially how the business is to be operated', and 'providing a clear understanding of what knowledge is vital to the organisation future prosperity 'as the most challenging aspects in setting up knowledge-sharing approaches. Senior manager feel it is challenge as they should provide direction for where the company should head in term of knowledge sharing. While direction from senior managers is crucial to effective knowledge sharing, well trained middle managers also have critical roles to play in bridging the gaps that exists between top managers and junior managers. Nonaka and Takeuchi (1995) give important insights into the function of this level of management: "middle managers mediate between the 'what ought to be' mindset of the top and 'what is' mindset of the junior manager" (p. 323).

Creating clear lines of communication to raise awareness of knowledge sharing among employees was ranked eighth by senior managers and ninth by mid and junior managers (Table 6.11). This means that senior manager feel more challenge. It is the responsibility of senior management to communicate those goals and strategies to all employees in a transparent fashion to obtain support. However, all too often, this communication and managerial directions are either too vague or detailed with neither providing a clear picture and guideline to employees (Riege, 2005). However, looking at the least challenging aspects in setting up knowledge-sharing approaches, namely 'creating flexible organisational structures', 'creating clear lines of communication' and 'providing a favourable physical layout of the workspace', it can be observed that there is agreement between all levels of management.

It is now important to identify whether the level of managers has an impact on the results discussed above. The next section explores the underlying relationships between the challenges in setting up knowledge-sharing approaches and managerial level by means of the Spearman correlation coefficient.

The relationship between level of management and challenges in setting up knowledge-sharing approaches

As management hierarchy increases from junior to senior, it is expected that the challenges in setting up knowledge-sharing approaches will increase. In other words, to ascertain if senior managers perceive that there are greater challenges in setting up knowledge-sharing approaches than junior managers. It is hypothesised that:

H1: There is a relationship between the challenges in setting up knowledge-sharing approaches and level of management.

Table 6.12 : Correlations between challenges faced in setting up knowledge-sharing approaches and managerial level.

			Position	Challenges in setting up
Spearman's rho	Position	Correlation Coefficient	1.000	.011
		Sig. (2-tailed)		.835
		N	384	384
	Challenges in setting up	Correlation Coefficient	.011	1.000
		Sig. (2-tailed)	.835	
		N	384	384

Table 6.12 shows that there is no significant positive correlation between the challenges in setting up knowledge-sharing approaches and managerial level (r = .011, N = 384, p = ≥ 0.05). The null hypothesis is not rejected. This means that there is insufficient evidence to suggest that the more senior the management level, the greater the challenges they face in implementing knowledge-sharing approaches. The next section examines the extent of the challenges faced by managers in implementing knowledge-sharing approaches.

6.6. Challenges faced by managers in implementing knowledge-sharing approaches

6.6.1. The extent of the challenges faced by managers in implementing knowledge-sharing approaches: aggregate level

Table 6.13 : The extent of the challenges faced by managers in implementing knowledge-sharing approaches: aggregate level

Challenges in implementing knowledge-sharing approaches (Managerial level)	Overall (N=384)	
	Mean	Rank
Choosing an appropriate method to assess the impact of knowledge sharing initiatives on business performance.	2.50	1
Reviewing strategy and achievements periodically for possible revision of knowledge sharing initiatives.	2.51	2
Maintaining senior management support for knowledge sharing.	2.63	3
Identifying and involving knowledge sharing champions to promote knowledge sharing practices.	2.67	4
Running adequate training to build awareness and understanding of knowledge sharing programmes.	2.68	5
Establishing community of practice and promoting its existence throughout the organisation as a means of facilitating knowledge sharing	2.71	6
Determining time and conversation format for employees to talk with one another and share knowledge.	2.72	7
Getting employees to fully exploit the intranet for knowledge sharing.	2.89	8
Getting employees to use intranet for knowledge sharing.	2.94	9
Getting employees to fully exploit the internet for knowledge sharing.	2.98	10
Getting employees to use internet for knowledge sharing.	2.99	11

Meaning of scale (the extent of the challenge)

1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all)

The difficulty of choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance was ranked the most challenging (mean value =2.50) by the respondents involved in this study. Possible explanations is that the respondents, might lack the necessary knowledge, skills and expertise to performed this activity and were thus inclined to rate it as most challenges.

6.6.2. The extent of the challenges faced by managers in implementing knowledge-sharing approaches: dis-aggregate level

Table 6.14 : The extent of the challenges faced by managers in implementing knowledge-sharing approaches: dis-aggregate level

Challenges in implementing knowledge-sharing approaches (Managerial level)	Senior Managers (N=68)		Middle managers (N=202)		Junior managers (N=114)	
	Mean	Rank	Mean	Rank	Mean	Rank
Choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance.	2.43	1	2.50	1	2.54	1
Reviewing strategy and achievements periodically for the possible revision of knowledge-sharing initiatives.	2.50	2	2.56	2	2.43	2
Maintaining senior management support for knowledge sharing.	2.54	5	2.70	6	2.56	3
Identifying and involving knowledge-sharing champions to promote knowledge-sharing practices.	2.57	6	2.88	9	2.75	5
Running adequate training to build awareness and understanding of knowledge-sharing programmes.	2.54	4	2.87	8	2.68	4
Establishing a community of practice and promoting its existence throughout the organisation as a means of facilitating knowledge sharing.	2.53	3	2.94	10	2.83	7
Determining the time and conversation format for employees to talk with one another and share knowledge.	2.60	7	2.97	11	2.82	6
Getting employees to fully exploit the intranet for knowledge sharing.	2.91	8	2.74	7	2.93	8
Getting employees to use the intranet for knowledge sharing.	3.04	10	2.69	4	2.99	10
Getting employees to fully exploit the internet for knowledge sharing.	3.03	9	2.67	3	2.96	9
Getting employees to use the internet for knowledge sharing.	3.12	11	2.69	5	3.01	11

Meaning of scale (the extent of the challenge)

1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all)

Junior, middle and senior managers had the same opinion about the variables 'choosing an appropriate method to assess the impact of knowledge sharing initiatives on business performance', and 'reviewing strategy and achievements periodically for the possible revision of knowledge-sharing initiatives'. This was ranked as the most challenging aspect in implementing knowledge-sharing approaches.

Maintaining senior management support for knowledge sharing was ranked as more challenge by junior managers (third ranked) as compared to senior and mid managers (ranked as fifth and sixth respectively). Estimating the benefits of a knowledge-sharing initiative has proven very difficult (Lahneman, 2004). As a result, convincing senior management that a knowledge-sharing initiative will improve organisation performance is difficult if no one provide information about its likely return on investment (Lahneman, 2004).

However, looking at the four least challenging aspects in implementing knowledge-sharing approaches, namely getting employees to fully exploit the intranet for knowledge sharing, getting employees to use the intranet for knowledge sharing, getting employees to fully exploit the internet for knowledge sharing and getting employees to use the internet for knowledge sharing, it can be observed that there is agreement between all levels of management. However, closer observation shows that the middle managers faced more challenge as compare to junior and senior managers. In the semi - structured interviews with all the managers, most the middle managers pointed out that they had all the requisite skills to use and utilise the intranet and internet effectively because they were all computer literate and knew how to navigate the computer and make demands on the subsystems of the intranet and internet that enable them to get the information they need to execute their duties and share knowledge. However, some senior and junior managers said that they did have all the requisite skills but others said they did not and therefore could not use it effectively.

It is therefore necessary to test if a significant correlation exists between the extent of the challenges faced in implementing knowledge-sharing approaches and managerial level.

The relationship between level of management and challenges in implementing knowledge-sharing approaches

This section examines the relationship between the challenges faced by managers in implementing knowledge-sharing approaches in their organisation and managerial level. In other words, to ascertain if senior managers perceive the challenges to be greater than junior managers. This was investigated using the Spearman rho.

It is hypothesised that:

H1: There is a relationship between level of management and the challenges in implementing knowledge-sharing approaches.

Table 6.15 : Correlations between challenges faced in implementing knowledge-sharing approaches and managerial level.

			Position	Challenges in implementation
Spearman's rho	Position	Correlation Coefficient	1.000	.034
		Sig. (2-tailed)		.508
		N	384	384
	Challenges in implementation	Correlation Coefficient	.034	1.000
		Sig. (2-tailed)	.508	
		N	384	384

Table 6.15 shows that there is no significant positive correlation between the two variables (rho = .034, n = 384, p ≥ 0.05). This is not significant at the 0.05 level. The null hypothesis is not rejected. This means that there is insufficient evidence to suggest that higher level managers perceive the challenges in implementing knowledge-sharing approaches to be greater than managers at lower levels. In other words, managers at higher levels do not necessarily face greater challenges in implementing knowledge-sharing approaches than those at lower levels.

6.7. Conclusions and recommendations

A number of issues have been discussed in this chapter relating to the challenges associated with setting up and implementing knowledge-sharing approaches in construction organisations. These issues have profound implications for the development and implementation of knowledge-sharing strategies in construction organisations. The extensive list of the challenges that can be faced in setting up and implementing knowledge-sharing approaches provides a helpful starting point and guideline for senior managers auditing their existing practices with a view to identifying any bottlenecks and improving the overall effectiveness of knowledge-sharing approaches. Construction organisations should concentrate their limited resources and effort on these challenges associated with setting up and implementing knowledge-sharing approaches and possible responses should be established to each challenge.

A secondary aspect of knowledge sharing, directly arising from this research, also received attention. The issues of the similarities and differences in the perception of the challenges faced in setting up and implementing knowledge-sharing approaches across three sizes of organisation and three management levels received due consideration.

The conclusions that follow this part of the study can be documented as follows:

1. The challenges faced by construction organisations in setting up knowledge-sharing approaches have been established. In all, 11 challenges were identified. The results reveal that there are three main challenges faced by construction organisations in setting up knowledge-sharing approaches. These are:

    *   Developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach.

    *   Preparing to deal with new/different processes as part of knowledge-sharing initiatives within the organisation in terms of business efforts, especially how the business is to be operated.

    *   Providing a clear understanding of what knowledge is vital to the organisation's future prosperity.

2. The least challenging aspects in setting up knowledge-sharing approaches are:

- Creating flexible organisational structures to provide employees with easy access to the knowledge they need.

- Creating clear lines of communication to raise awareness of knowledge sharing among employees.

- Providing a favourable physical layout of the workspace to stimulate informal knowledge sharing among employees (e.g. pantry, open office, meeting room, etc.).

3. There is no significant positive correlation between the challenges in setting up knowledge-sharing approaches and the size of organisation. In other words, large organisations do not necessarily find the challenges greater than small organisations in setting up knowledge-sharing approaches. The extent of the challenges in setting up knowledge-sharing approaches is not significantly impacted by the size of the organisation.

4. Similarly, the findings revealed three most challenging factors in implementing knowledge-sharing approaches. These are:

- Choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance.

- Reviewing strategy and achievements periodically for the possible revision of knowledge-sharing initiatives.

- Maintaining senior management support for knowledge sharing.

5. The least challenging aspects in implementing knowledge-sharing approaches are:

- Getting employees to fully exploit the intranet for knowledge sharing.

- Getting employees to use the intranet for knowledge sharing.

- Getting employees to fully exploit the internet for knowledge sharing.

- Getting employees to use the internet for knowledge sharing.

6. There is no significant positive correlation between the challenges in implementing knowledge-sharing approaches and the size of organisation. The results indicate that large organisations do not necessarily find the challenges greater than small organisations in setting up knowledge-sharing approaches. In other words, the size of the organisation does not impact the extent of the challenges in implementing knowledge-sharing approaches.

7. The three most challenges faced by managers in setting up knowledge-sharing approaches are:

   - Developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach.

   - Preparing to deal with new/different processes as part of knowledge-sharing initiatives within the organisation in terms of business efforts, especially how the business is to be operated.

   - Providing a clear understanding of what knowledge is vital to the organisation's future prosperity.

8. Similarly, the three least challenges faced by managers in setting up knowledge-sharing approaches are:

   - Creating flexible organisational structures to provide employees with easy access to the knowledge they need.

   - Creating clear lines of communication to raise awareness of knowledge sharing among employees.

   - Providing a favourable physical layout of the workspace to stimulate informal knowledge sharing among employees (e.g. pantry, open office, meeting room, etc.).

9. There is no significant positive correlation between the challenges in setting up knowledge-sharing approaches and management level. In other words, managers at higher levels do not necessarily find the challenges greater than managers at lower levels.

10. The three most challenges faced by managers in implementing knowledge-sharing approaches are:

    - Choosing an appropriate method to assess the impact of knowledge sharing initiatives on business performance.

    - Reviewing strategy and achievements periodically for possible revision of knowledge sharing initiatives.

    - Maintaining senior management support for knowledge sharing

11. Similarly, the three least challenges faced by managers in implementing knowledge-sharing approaches are:

    - Getting employees to use intranet for knowledge sharing.

    - Getting employees to fully exploit the internet for knowledge sharing.

    - Getting employees to use internet for knowledge sharing.

12. There is no significant positive correlation between the challenges in implementing knowledge-sharing approaches and management level. In other words, managers at higher levels do not necessarily find the challenges greater than managers at lower levels.

13. With regards to the recommendations for construction organisations, it is clear that the construction organisations involved in the study have good internet and intranet technology facilities for knowledge sharing. However, they need to address some of the potential challenges highlighted, such as a lack of knowledge-sharing strategy, dealing with new/different processes, providing a clear understanding of what knowledge is vital, fostering a culture of trust, having a method to assess the impact of knowledge-sharing initiatives on business performance, maintaining senior management support, allocating time and having transparent rewards.

14. Top management must ensure that all the possible constraints that impede knowledge sharing are removed, in order to ensure that the construction organisation is ready to adopt the philosophy of knowledge management.

In the next chapter, the research continues with discussions about the readiness of organisations to set up and implement knowledge-sharing approaches.

CHAPTER 7. ORGANISATIONAL READINESS FOR KNOWLEDGE-SHARING APPROACHES

7.1. Introduction

This chapter is concerned with the issue of organisational readinesses; in other words, ensuring that the organisation is ready to adopt the philosophy of knowledge management. This chapter also discusses the importance of organisational readiness. The implications of the results and a comparison with the literature are discussed at the end of this chapter. The focus of this chapter is to answer objective number four (see Table 1.1 in Chapter 1): "To specifically explore the readiness of organisations to setup and implement knowledge-sharing approaches".

Accordingly, this chapter consists of four sections:

- Section 7.2 discusses some views gleaned from a thorough review of the literature that can be used to assess the organisational readiness to setup and implement knowledge-sharing approaches.

- Section 7.3 presents the results regarding the readiness of construction organisations to setup knowledge-sharing approaches at the aggregate and dis-aggregate level.

- Section 7.4 presents the results regarding the readiness of construction organisations to implement knowledge-sharing approaches at the aggregate and dis-aggregate level.

- Section 7.5 concludes by summarising the key findings of the study.

7.2. Organisational readiness to setup knowledge-sharing approaches

The importance of identifying organisational readiness to setup and implement knowledge-sharing approaches cannot be over emphasised, since it involves investment in personnel and infrastructure. Hence, supporting knowledge-sharing initiatives can be very costly and often do not yield immediate results (Desouza and Raider, 2006; Davenport et al., 1998). Failure to assess organisational and individual knowledge-sharing readiness might result in wasting resources in developing capital, tools or policies that will not benefit the organisation (Haggie and Kingston, 2003), significant loss of time and energy of managers dealing with resistance to knowledge management (Mohammadi et al., 2009) and failure to achieve its proposed value (Haggie and Kingston, 2003). Therefore, careful consideration has to be made to avoid failures and unnecessary wastage in the implementation of knowledge management initiatives.

Considering the magnitude of the organisational commitment and resources often required to initiate the adoption of knowledge management, more attention should be given to knowledge-sharing readiness studies (Holt et al., 2007). As a result, it is necessary to assess whether the organisation is ready to setup and implement knowledge management initiatives (knowledge-sharing approaches). An assessment of an organisation's readiness could serve as a guide to leaders or managers as they plan and implement knowledge management initiatives (Holt et al., 2004). Thus, the goal of this study is to help owners and managers in construction organisations to understand how important it is to measure the readiness of their organisation to setup and implement knowledge-sharing approaches.

Organisation readiness to setup knowledge-sharing approaches in this study refers to the work that should takes place before any knowledge management initiatives are implemented. Readiness, the initial stage, occurs when the organisational members' attitudes are such that they are receptive to the forthcoming knowledge management effort (Holt et al., 2007). Readiness to setup knowledge-sharing approaches needs to be achieved in the early planning phase of knowledge management initiatives. Thus, for the successful implementation of knowledge-sharing approaches, organisations need to assess whether their organisations are suitably equipped before embarking on knowledge management initiatives.

A list of variables for readiness to setup and implement knowledge-sharing approaches was derived from a thorough review of the literature on knowledge management and knowledge sharing (Subsection 2.3.5 in Chapter 2), and then modified after interviews with 49 managers from 40 construction organisations. Overall, 11 variables of organisation readiness to set up knowledge-sharing approaches were identified from the work of ; Mohammadi et al., 2009; Jalaldeen et al., 2009; Al-Alawi et al., 2007; Robinson et al., 2006; Wei et al., 2006; Wong, 2005; Hung and Chou, 2005; Taylor and Wright, 2004; Holt et al., 2004; Cho et al., 2000; O'Del et al., 1998). Each of these variables will be discussed in turn.

1. Developing trust between employees as a basis for knowledge sharing.

2. Providing a conducive workplace setting approach to promote knowledge sharing.

3. Giving support and commitment to setting up knowledge-sharing initiatives.

4. Developing a clear strategy for knowledge sharing.

5. Providing the appropriate communication channels to facilitate effective communication for knowledge sharing (e.g. reports, bulletin, emails etc.).

6. Set-up team members take responsibility for facilitating knowledge-sharing initiatives.

7. Empowering employees to seek knowledge to make quality decisions.

8. Putting in place an adequate standardised process for knowledge sharing within the organisation.

9. Setting up a community of practices as a starting point for knowledge-sharing initiatives.

10. Changing management style and actively participating in the change process.

11. Providing an annual budget for enhancing knowledge-sharing practices.

There is widespread agreement today that the workspace (workplace setting) does matter, and that one of its most important effects is its influence on social interaction and knowledge sharing (DBA, 2005). In the context of knowledge sharing, many studies have found a conducive workplace setting, such as the design of the physical environment (Becerra-Fernandez et al., 2004; Senge, 1997) and a good office layout

(Allee, 1997), to be a critical driver of knowledge sharing. The design of the physical environment of the workplace in terms of office layout, provision of meeting rooms and spaces for informal knowledge sharing and transfer such as coffee rooms is a vital component which can facilitate human interaction and thus enable knowledge sharing and creation (Becerra-Fernandez et al., 2004). Too often, office design groups teams together and segregates them from other units of the organisation. A culture of knowledge sharing does not happen by accident (Allee, 1997). One element of promoting such a culture is good office layout, which can remove physical and psychological barriers to encourage open communication. Thus, it appears that providing a conducive workplace setting approach is a condition for readiness to setup knowledge-sharing approaches.

As repeatedly discussed in the previous chapters, organisational culture is recognised as a critical factor for knowledge sharing. Before an organisation can begin to implement knowledge-sharing initiatives, its culture must actively support the collection and dissemination of information and the use of knowledge and must foster trust. A culture of trust is critical and must be nurtured in an organisation that plans to initiate knowledge sharing (Yang, 2004; Dyer and Singh, 1998). Whenever there is trust between individuals in an organisation there is a tendency for higher cooperation (Molm, 2003). Trust is the foundation of every relationship within the organisation (Fox, 1974). Nahapiet and Goshal (1998) posit that trust increases the level of cooperation in every relationship. For knowledge sharing to occur, trust among team members is essential (Abrams et al., 2003; Zarraga and Bonache, 2003). Gold et al. (2001) suggest that trust is one of the important facets of a culture that is knowledge-sharing ready. Thus, it appears that aspects of the organisational culture (developing trust between employees as a basis for knowledge sharing) are very appropriate indicators of knowledge-sharing readiness.

Without the commitment and support of top management in an organisation, not only knowledge sharing initiatives but any other course of action cannot be followed or implemented. Hence, top management plays a major role in the implementation of knowledge sharing. This factor is considered to be a critical success factor by different authors: management leadership and support (Wong, 2005), knowledge leadership (Skyrme and Amidon, 1997), senior management support (Davenport et al., 1998), leadership (Holsapple and Joshi, 2000; Hasanali, 2002) and senior leadership support

(Liebowitz, 1999). Therefore, aspects of management support and commitment is essential to encourage employees to share and utilise knowledge, and is a condition for readiness to setup knowledge-sharing approaches.

As repeatedly discussed in the previous chapters, developing a clear strategy for knowledge sharing is a means to drive the success of knowledge management (Liebowitz, 1999; Zack, 1999). Without a proper strategy, any plan will fail (Rehman et al., 2010). This factor is suggested by many authors, who refer to it with different names: strategy and purpose (Wong, 2005), strong link to business imperative, vision and architecture (Skryme and Amidon, 1997), clear purpose and language (Davenport et al., 1998), knowledge management strategy (Liebowitz, 1999) and strategy (APQC, 1999). Developing a clear strategy for knowledge sharing helps to guide an organisation towards becoming knowledge-based and provides the necessary focus to its employees. In addition, the purpose or objective of pursuing knowledge sharing needs to be set and understood by everyone involved. Having a clear strategy for knowledge sharing will not only provide direction to organisations, it will also increase employees' passion to accomplish knowledge management initiatives (Wong, 2008). An organisation wishing to become ready to setup knowledge-sharing approaches should consider developing a clear strategy for knowledge sharing.

It is well understood that having the appropriate communication channels to facilitate effective communication for knowledge sharing is essential to support knowledge sharing in an organisation. This implies that establishing reports, bulletins, emails etc. greatly facilitates the setting up of knowledge-sharing approaches. Communication should not only be restricted to among peers (colleagues); all levels of management (top, middle and lower) should communicate with each other. Communication can be considered to be an emerging critical success factor for knowledge-sharing implementation, because communication helps to spread the importance of knowledge sharing through word of mouth. Therefore, knowledge-sharing related seminars and informal talks should be allowed at regular intervals. This will help to build a knowledge-sharing supportive culture. Therefore, communication is a condition for readiness to setup knowledge-sharing approaches. With this in mind, Yang (2004) suggests that providing the appropriate communication channels to facilitate effective communication for knowledge sharing is important.

The need for set-up team members to take responsibility for facilitating knowledge-sharing approaches is another key criterion for readiness to set up knowledge-sharing approaches. This implies establishing a set of roles or teams to perform knowledge-related tasks (Davenport et al., 1998). The idea that an organisation should consider the attributes of the organisation's employees is increasingly justified, as these team members attempt to diffuse knowledge sharing through their organisations. The person or group leading the knowledge management strategy needs to be identified. In the words of Davenport and Grover (2001), "to fully institutionalise knowledge management, the focus must shift to amateurs – those whose roles in organisations are not primarily knowledge management, but accomplishing their real organisation missions" (p.4). Thus, set-up team members taking responsibility for facilitating knowledge-sharing approaches give a signal that the organisation is very serious and ready to set up knowledge-sharing approaches.

Undeniably, empowering the employees to seek knowledge to make quality decisions is one of the key enablers to setting up knowledge sharing. Employee empowerment means giving employees responsibility and authority to make decisions regarding all aspects of product development or customer service (Atchison, 2001). However, according to Riggs (1995), empowerment is not just delegating decision-making authority; it is also setting goals and allowing employees to participate. Generally, the increase in autonomy by empowering workers results in increased motivation, job satisfaction and enhanced job performance. Not only do employees have the power to make decisions, they also have useful knowledge and the internal motivation to make certain that the company goals are achieved. A study done by Ozbebek and Toplu (2011) in the fast-moving consumer goods sectors in Turkey found that empowerment is positively associated with knowledge-sharing behaviour. Empowered employees are more willing to share their knowledge. Therefore, to completely benefit from employees' knowledge, organisations need to be ready to change the management style to focus on developing and empowering employees.

Another key criterion for readiness to set up knowledge-sharing approaches is putting in place adequate standardised processes and activities for knowledge sharing within the organisation. Different parts of the organisation might use terms and concepts in different ways. This lack of standard can inhibit sharing knowledge between them. Many construction organisations now suffer from having too many different processes

and ways of performing similar activities (Robinson et al., 2001). Gann (2001) argues that construction organisations may have strong capabilities in project management but are often much weaker in organising their internal business processes. All processes and activities should be systematic. Processes and activities should be coupled with knowledge sharing. Without proper linkage between 'processes and activities' and knowledge sharing, there is no point implementing knowledge sharing (Rehman et al., 2010). It is argued that a rationalisation or synchronisation of some processes and activities to improve the possibility of re-using knowledge about best practice and sharing experience is needed. This provides the basic framework of the company's operations, through which it is managed and resourced. It helps to avoid confusion and misunderstanding (Siemieniuch and Sinclair, 2005).

Setting up a community of practices is another important consideration when implementing knowledge-sharing approaches. Through a community of practices, the diverse knowledge and expertise of individuals at various locations in an organisation can be assembled, integrated and applied to the task in hand (Alavi and Tiwana, 2002). Thus, setting up a community of practices gives a signal that the organisation is very serious and ready for knowledge-sharing initiatives.

Changing management style and actively participating in the change process is another important consideration when setting up knowledge-sharing approaches. As stated by Shirazi et al. (2011), knowledge-sharing readiness is largely dependent on readiness for change. The adoption of knowledge-sharing approaches requires changes in the organisational set-up and members' behaviour. Siemieniuch and Sinclair (2004) point out that organisations and individuals need to exhibit certain characteristics in order to set up knowledge management initiatives. It is understood that introducing any change in any organisation is difficult and, therefore, leaders or managers are encouraged to assess the readiness of their organisation to adopt those changes in advance (Jalaldeen et al., 2009). Top management can stimulate change by communicating and reinforcing values through an articulated vision for the organisation (Thong, 1999). Construction organisations may need a change in management style to do jobs differently. The change in management style specifies how to gain acceptance of knowledge-sharing approaches. As part of the overall change management style, job descriptions need to be updated and feedback sessions and performance reviews are needed to reflect the new

workflow. Neglecting to make these changes is likely to create friction (Nagarajan et al., 2009).

Arguably, providing an annual budget for enhancing knowledge sharing also plays an influential role and is considered to be a crucial element in setting up knowledge-sharing approaches (Goodluck, 2011; Robinson et al., 2001). A study done by Robinson et al. (2001) found that most of the respondents identified a budget as the key element of their strategy. A budget charts the course of future action for knowledge management in an organisation (Ozigi, 1977). The challenge is to make sure that organisations have the right resources allocated to the right purposes in support of readiness. Even with a solid foundation of readiness funds in the budget, the costs of unbudgeted contingency operations can reduce the resources available to carry out training, maintenance and other readiness-related activities. Hence, appreciating how this budget can be better acquired, allocated and managed is suggested to be a critical success factor by Wong (2005) and Holsapple and Joshi (2000), and suggested as a feature of knowledge-sharing readiness in an organisation.

Based on the above discussion of the organisational readiness variables, this study explores the level of organisational readiness to setup knowledge-sharing approaches in Malaysian construction organisations. These 11 variables represent critical areas or activities that should be addressed in order to ensure the organisation is ready to setup knowledge-sharing approaches. Ignorance and oversight of these will likely hinder an organisation's efforts to realise its full benefits. However, this study does not provide a specific checklist, because each organisation must carefully tailor the design and application to its own needs.

To commence the analysis, the level of organisational readiness to setup and implement knowledge-sharing approaches will be presented at the aggregate level. This will be followed by analysis the level of organisational readiness to setup and implement knowledge-sharing approaches at the dis-aggregate level. In order to discover the level of readiness, the respondents were asked to indicate the level of readiness of their organisation to setup and implement knowledge-sharing approaches using the 5-point Likert rating scale: 1 (Very ready), 2 (Ready), 3 (Fairly ready), 4 (Less ready), and 5 (Not ready at all). The categories of 'very ready' and 'ready' were combined to form the structural variables for the 'most ready to setup knowledge-sharing approaches'.

Another dimension will be taken into account in order to explore in more detail the readiness associated with setting up and implementing knowledge sharing. The perceptions of Malaysian construction organisations regarding the readiness to setup and implement knowledge-sharing approaches were sought through semi-structured interviews.

Overall, the analyses were carried out based on two major parts. Part 1 consists of 2 sub stages:

- The first stage presents the results for the level of readiness of the organisation to setup knowledge-sharing approaches by construction organisations at the aggregate level, which deals with the overall mean values of the responses.

- The second stage deals with means, which are ranked based on the level of readiness of the organisation to setup knowledge-sharing approaches; at the dis-aggregate level (small, medium and large contractors).

Part 2 of the analysis presents the underlying relationships between the level of readiness of the organisation to setup knowledge-sharing approaches and different sizes of organisation by means of the Spearman Correlation Coefficient.

Data regarding the level of readiness of the organisation with the implementation of knowledge-sharing approaches is also presented.

The following section reports the analysis of the data and findings related to the readiness of organisations to setup knowledge-sharing approaches.

7.2.1. Organisational readiness to setup knowledge-sharing approaches: aggregate level

Table 7.1 : Mean score of the readiness to setup knowledge-sharing approaches: aggregate level.

Readiness to setup	Overall (N=384)	
	Mean	Rank
Providing a conducive workplace setting approach to promote knowledge sharing.	2.69	1
Developing trust between employees as a basis for knowledge sharing.	2.69	2
Giving support and commitment to setting up knowledge-sharing initiatives.	2.69	3
Developing a clear strategy for knowledge sharing.	2.72	4
Providing the appropriate communication channels to facilitate effective communication for knowledge sharing (e.g. reports, bulletins, emails etc.).	2.73	5
Set-up team members take responsibility for facilitating knowledge-sharing initiatives.	2.78	6
Empowering employees to seek knowledge to make quality decisions.	2.80	7
Putting in place an adequate standardised process for knowledge sharing within the organisation.	2.83	8
Setting up a community of practices as a starting point for knowledge-sharing initiatives.	2.85	9
Changing management style and actively participating in the change process.	2.90	10
Providing an annual budget for enhancing knowledge-sharing practices.	2.97	11

Meaning of scale (the extent of readiness)

1 (Very ready), 2 (Ready), 3 (Fairly ready), 4 (Less ready), and 5 (Not ready at all).

Table 7.1 presents the overall mean scores and the ranking of the survey respondents at the aggregate level for the level of readiness of their organisation to setup knowledge-sharing approaches. As mean score increases, the less likely it is that the organisation is ready to setup knowledge-sharing approaches, indicating that several aspects (within a category) need urgent attention to achieve readiness. The overall mean values ranged from 2.69 to 2.97, regarded as 'ready'. However, where two or more factors had the

same mean, priority was given to the lowest standard deviation (SD) figure, since the lower SD indicates that the data is less spread out and therefore the average is more likely to be valid for the majority. By converting each ranking to a score, statistical analysis was possible.

Three variables that have the highest rank, with a mean value of 2.69, are providing a conducive workplace setting approach to promote knowledge sharing, developing trust between employees as a basis for knowledge sharing, and giving support and commitment to setting up knowledge-sharing initiatives. Developing a clear strategy for knowledge sharing was ranked fourth most ready in terms of setting up knowledge-sharing approaches. Providing an annual budget for enhancing knowledge-sharing practices appeared to be the least ready, with a mean value of 2.97. A comparison was then made between different sizes of organisation to identify any variations to the above.

7.2.2. Organisational readiness to setup knowledge-sharing approaches: dis-aggregate level

The approaches adopted in analysing data at the aggregate level were also employed at the dis-aggregate level of small, medium and large construction organisations. As mean score increases, the level of readiness characteristics decreases. It is argued that different sizes of organisations may have different levels of readiness to setup knowledge-sharing approaches. Hence, this study explored the level of readiness to setup knowledge-sharing approaches in SMEs and large Malaysian construction organisations. Table 7.2 illustrates the eleven variables considered by the survey respondents for the mean comparison of the level of readiness to setup knowledge-sharing approaches according to size of organisation. The variables are ranked based on their mean score values to determine their level of readiness.

Table 7.2 : Mean score of readiness to setup knowledge-sharing approaches: dis-aggregate level.

Readiness to setup	Small (N=294)		Med (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Developing trust between employees as a basis for knowledge sharing.	2.67	1	2.72	5	2.76	5
Providing a conducive workplace setting approach to promote knowledge sharing.	2.70	2	2.60	3	2.76	7
Giving support and commitment to setting up knowledge-sharing initiatives.	2.72	3	2.58	1	2.64	2
Developing a clear strategy for knowledge sharing.	2.73	4	2.71	4	2.52	1
Providing the appropriate communication channels to facilitate effective communication for knowledge sharing (e.g. reports, bulletins, emails etc.).	2.77	5	2.58	2	2.68	3
Set-up team members take responsibility for facilitating knowledge-sharing initiatives.	2.79	6	2.75	7	2.80	8
Empowering employees to seek knowledge to make quality decisions.	2.80	7	2.82	9	2.88	9
Putting in place an adequate standardised process for knowledge sharing within the organisation.	2.86	8	2.74	6	2.72	4
Setting up a community of practices as a starting point for knowledge-sharing initiatives.	2.89	9	2.77	8	2.76	6
Changing management style and actively participating in the change process.	2.91	10	2.86	10	2.96	10
Providing an annual budget for enhancing knowledge-sharing practices.	2.99	11	2.91	11	2.84	11

Meaning of scale (the extent of readiness)

1 (Very ready), 2 (Ready), 3 (Fairly ready), 4 (Less ready), and 5 (Not ready at all).

Table 7.2 shows a substantial variation in the results of different sizes of organisation. Small organisations identified developing trust between employees as a basis for knowledge sharing as the most ready to setup knowledge-sharing approaches compared to medium and large organisation, in which this was ranked it as fifth. The probable reason for this is that small organisations tend to provide an environment that is conducive to sharing knowledge, mainly due to their size, because they often have a single site and the employees have closer social relationships, resulting in good communication flow and knowledge sharing. This level of trust in small organisations seems to have a direct influence on communication flow and thus the amount of knowledge sharing (DeLong and Fahey, 2000; McAllister, 1995) compared to larger organisations.

Developing a clear strategy for knowledge sharing was ranked first by large organisations and fourth by SMEs. This result indicates that large organisations are more ready to develop a clear strategy for knowledge sharing. This might be because many SMEs appear to lack strategic focus due to their being preoccupied with day-to-day viability. In particular, SMEs seem to lack absorptive capacity, as they tend to be less effective in recognising the value of their explicit knowledge and are short of adequate resources, infrastructure and technology to disseminate and apply existing and new knowledge (Levy et al., 2003). A strategy for setting up knowledge sharing within an organisation should set out clear goals and how these are to be achieved within a specified timeframe.

Putting in place an adequate standardised process for knowledge sharing within the organisation was ranked eighth, sixth and fourth ready by small, medium and large organisations respectively. This result indicates that the larger the organisation, the more ready it is in terms of putting in place standardised processes for knowledge sharing. Beijerse (2000) concludes that SMEs are knowledge generators but often do not have a systematic strategic approach or standardised process to develop, capture, disseminate, share, or apply knowledge. On the other hand, according to Carrillo et al. (2004), a lack of standard work processes is also a problem with large organisations where, in some cases, they have grown rapidly and there are no longer standard procedures, leading to different approaches being adopted.

Empowering employees to seek knowledge to make quality decisions was ranked seventh by small and ninth by medium and large organisations. This means that small organisations are more ready to empower the employees to seek knowledge to make quality decisions. This may be because, usually, small organisations give their employees the ability to solve problems and make decisions. Koch and Godden (1997) argue that empowerment should only be tried in small companies where the risk of failure is less as compared to large organisations. According to Argyris (1998), it is unrealistic to think that management would allow thousands of employees to have decision-making authority without some limits. It is suggested that construction organisations give employees the necessary latitude for making a variety of decisions.

Setting up a community of practices as a starting point for knowledge-sharing initiatives was ranked ninth, eighth and sixth by SMEs and large organisations respectively. This means that large organisations are more ready to set up a community of practices. This is not surprising, as a community of practices is most valuable in large, physically dispersed organisations, and where, as in construction organisations, there are several specialist, professional and relatively well-defined skills. A critical mass of members is needed to keep a community alive, and that is impossible in a small organisation. Therefore, it is recommended that the introduction of group-based incentives to promote knowledge sharing would help create a community of practices for sustained knowledge sharing.

Changing management style and actively participating in the change process, and providing an annual budget for enhancing knowledge-sharing practices were the bottom two least ready for SMEs and large construction organisations. There is a general agreement that providing an annual budget for enhancing knowledge-sharing practices is least ready, rated 11 out of 11, in terms of readiness to set up knowledge-sharing approaches, by the 314 managers who responded to the questionnaire survey of the study. This finding supports the statement by Desouza and Raider (2006) and Davenport et al. (1997), who argue that knowledge management initiatives (knowledge sharing) is expensive and is likely to get support only in an organisation where it is linked to economic benefit or competitive advantage. Moreover, the low profit margins of construction organisations and their conservative nature have also led to reluctance to invest in knowledge management initiatives and the infrastructure support required (Carrillo et al., 2004). Hence, construction organisations planning to adopt knowledge-

sharing approaches need to analyse their businesses to ensure the productive and beneficial implementation of knowledge management. The budget must be made available on a long-term and ongoing basis to support and enhance knowledge-sharing practices. Generally, it can be deduced that construction organisations should ensure there are adequate available sources of finance before starting work on knowledge sharing.

The relationship between the readiness to setup knowledge-sharing approaches and size of organisation.

An attempt was made to establish if there is a significant correlation between the level of readiness to setup knowledge-sharing approaches and size of organisation. In other words, to ascertain if larger organisations perceive that they are more ready than smaller organisations. This was examined using the Spearman correlation coefficient test. In this study, the hypothesis documented is:

H1: There is a relationship between the level of readiness to setup knowledge-sharing approaches and different size of organisation.

Table 7.3 : Correlations between level of readiness to setup knowledge-sharing approaches and size of organisation.

			Size of organisation	**Readiness to set up**
Spearman's rho	Size of organisation	Correlation Coefficient	1.000	-.040
		Sig. (2-tailed)	.	.434
		N	384	384
	Readiness to set up	Correlation Coefficient	-.040	1.000
		Sig. (2-tailed)	.434	.
		N	384	384

Table 7.3 shows that there is no significant relationship between the level of readiness to setup knowledge-sharing approaches and size of organisation (r = -.040, N= 384, p= $\geq$ 0.05). This is not significant at the 0.05 level. The null hypothesis is not rejected. This denotes that the results do not differ according to the size of organisation. This means that there is no sufficient evidence to suggest that larger organisations perceive that they are more ready to setup knowledge-sharing approaches than smaller organisations.

Having considered the readiness to set-up knowledge-sharing approaches at the aggregate and dis-aggregate level, the finding on the organisational readiness to implement knowledge-sharing approaches at the aggregate and dis-aggregate level will now be discussed.

7.3. Organisational readiness to implement knowledge-sharing approaches

Organisations readiness to implement knowledge-sharing approaches in the present study is defined as 'putting the knowledge-sharing approaches design into practice'. The approaches need to be different for different people or organisation but concurrent with the different kinds of tasks they undertake (Mathew et al., 2003). In most situations, organisation readiness to implement knowledge-sharing approaches entails all the activities that need to be performed or implemented by the organisation for their knowledge-sharing strategy to prove successful. Implementation occurs when knowledge management (knowledge sharing) becomes a stable part of employees' behaviour and fabric of the organisation (Holt et al., 2007). At this level, the organisation needs to carry out the following activities (Mohammadi et al., 2009; Jalaldeen et al., 2009; Al- Alawi et al., 2007; Robinson et al., 2006; Wei et al., 2006; Wong, 2005; Hung and Chou, 2005; Taylor and Wright, 2004; Holt et al., 2004; Cho et al., 2000; O'Dell et al., 1998):

1. Provide training for education, personal and team development for effective sharing of knowledge.

2. Implement the optimisation of internet technology to promote knowledge sharing across the organisation

3. Implement the optimisation of intranet technology to promote a knowledge-sharing environment.

4. Implement an approach for flexibility in providing easy user access to the knowledge needed.

5. Implement an approach that provides time to encourage employees to interact and collaborate.

6. Implement a process which involves top management in knowledge-sharing initiatives.

7. Implement a process of recognition of and rewarding employees for their contribution to knowledge sharing.

8. Implement a performance measurement system approach to evaluate the knowledge-sharing initiatives.

9. Implement a process of hiring people who possess knowledge and skills to promote knowledge sharing among employees.

10. Implement a process whereby 'individual' knowledge is converted into organisational knowledge before the individual retires or leaves the organisation.

All of these variables are argued to be fundamental conditions for organisational readiness to implement knowledge-sharing approaches. These variables discussed in the following paragraphs.

As repeatedly discussed in the previous chapters, providing training for education, personal and team development for effective knowledge sharing is an important consideration when implementing knowledge-sharing approaches. Through training, employees gain a better understanding of the fundamentals of knowledge sharing as well as the approaches to achieve it (Rajagopalan et al., 2007; Siemieniuch and Sinclair, 2004). Training and educating employees about knowledge sharing, the future of knowledge sharing and the benefits of knowledge-sharing implementation should be provided. This will help employees to direct their career more towards knowledge-sharing related activities. Training and education is not only important to low-level employees but is required for top management as well. As a result, training and education is treated as a critical success factor for the implementation of knowledge sharing by Wong (2005) and is suggested as a feature of knowledge-sharing readiness in an organisation.

There is evidence that internet and intranet technology can improve knowledge sharing in organisations (Alavi and Leidner, 2001; Bock and Kim, 2001). For example, use of the internet and intranet has greatly facilitated the implementation of knowledge-sharing approaches (see Subsection 5.3.1 in Chapter 5). In short, internet and intranet technology certainly play a variety of roles to support an organisation's knowledge management processes (Nilsson, 2007; Lee and Hong, 2002; Alavi and Leidner, 2001). Thus, it appears that implementing the optimisation of internet and intranet technology to promote a knowledge-sharing environment is an appropriate indicator of knowledge-sharing readiness.

Top management support is considered one of the most important potential influences on the implementation of knowledge-sharing approaches in organisations (Connelly and Kelloway, 2003). His/her encouragement will create and maintain a positive knowledge-sharing culture in an organisation. Numerous studies have found that top management support is essential to create supportive climate and provide sufficient resources (Lin, 2008). MacNeil (2004) emphasises the importance of visible top management support to organisational knowledge sharing. Hence, implementing a process which involves top management in knowledge-sharing initiatives plays a major role in creating and maintaining a positive knowledge-sharing culture in an organisation. This factor is considered to be a critical success factor by several authors: management leadership and support (Wong, 2005), knowledge leadership (Skryme and Amidon, 1997), senior management support (Davenport et al., 1998), leadership (Holsapple and Joshi, 2000; Hasanali, 2002; APQC, 1999) and senior leadership support (Liebowitz, 1999). Therefore, implementing a process which involves top management in knowledge-sharing initiatives is suggested as a feature of knowledge-sharing readiness in an organisation.

A significant body of research has shown that rewards and recognition play a crucial role in encouraging people to share their ideas (e.g. Andriessen, 2006; Chaudhry, 2005; Zarraga and Bonache, 2003). The availability of such a reward or recognition structure will definitely encourage a culture of knowledge sharing, as discussed in Subsection 9.5.2.2 in Chapter 9. Therefore, organisations need to be ready to establish the right motivational aids, recognition or rewards to encourage people to share and apply knowledge (Hauschild et al., 2001).

Another key criterion for organisational readiness in implementing knowledge-sharing approaches is a performance measurement system approach to evaluate the knowledge-sharing initiatives. According to Arora (2002) and Ahmed et al. (1999), measuring such an initiative is necessary to ensure that its envisioned objectives are being attained. Measurement enables organisations to track the progress of knowledge sharing and to determine its benefits and effectiveness. Essentially, it provides a basis for organisations to evaluate, compare, control and improve upon the performance of knowledge sharing (Ahmed et al., 1999). Regular evaluation and also feedback to the staff on the state of knowledge sharing within the organisation and between groups communicates the management's meaning and priorities effectively. Empirically, Hsu (2006) found that higher performing firms in Taiwan provide feedback on knowledge sharing much more actively and formally than did those with lower performance (p.330). Hence, it is argued that an appropriate performance measurement system approach is necessary to encourage people to work towards the goals of the company in a trustworthy manner (Siemieniuch and Sinclair, 2004). Thus, it appears that a performance measurement system approach to evaluate knowledge-sharing approaches is an appropriate indicator of knowledge-sharing readiness.

Another important issue related to organisation readiness to implement knowledge-sharing approaches is to hire people who possess the knowledge and skills to promote knowledge sharing among employees. As Storey and Quintas (2001) suggest, the success of knowledge management initiatives needs employees who are "willing to share their knowledge and expertise" (p. 359). Thus, the emphasis is on hiring candidates who are a good match with the skills and abilities to succeed in the position and well suited to the company's culture. This also has an impact on the culture of an organisation. As culture is dependent on people, knowledgeable individuals who like to share their knowledge should be hired. This will help in the promotion of a knowledge-sharing culture.

There is a need to preserve organisational knowledge by converting individual knowledge into organisational knowledge so that when experts leave the organisation, other employees may benefit from the captured knowledge or experience to solve problems that may closely or exactly match similar or different contexts. Through this knowledge management, many organisations can avoid the phenomenon of corporate amnesia (Sharif et al., 2005).The interaction between individual knowledge and the

various forms of organisational knowledge, and the conversion from one form to the other, creates value in an organisation (Sharif et al., 2005). Therefore, it is suggested that managers need to assess their organisations' readiness to convert individual knowledge into organisational knowledge prior to taking any definite decision regarding knowledge-sharing implementation (Holt et al., 2007). The following section reports the analysis of the data and findings related to the readiness of organisations to implement knowledge-sharing approaches.

7.3.1. Organisational readiness to implement knowledge-sharing approaches: aggregate level

Table 7.4 : Mean score of readiness to implement knowledge-sharing approaches: aggregate level.

Readiness to implement knowledge-sharing approaches	Overall (N=384)	
	Mean	Rank
Provide training for education, personal and team development for effective knowledge sharing.	2.67	1
Implement the optimisation of internet technology to promote knowledge sharing across the organisation.	2.68	2
Implement an approach for flexibility in providing easy user access to the knowledge needed.	2.73	3
Implement an approach that provides time to encourage employees to interact and collaborate.	2.77	4
Implement the optimisation of intranet technology to promote a knowledge-sharing environment.	2.79	5
Implement a process which involves top management in knowledge-sharing initiatives.	2.80	6
Implement a performance measurement system approach to evaluate knowledge-sharing initiatives.	2.84	7
Implement a process of recognition of and rewarding employees for their contribution to knowledge sharing.	2.87	8
Implement a process whereby 'individual' knowledge is converted into organisational knowledge before the individual retires or leaves the organisation.	2.89	9
Implement a process of hiring people who possess the knowledge and skills to promote knowledge sharing among employees.	2.91	10

Meaning of scale (the extent of readiness)

1 (Very ready), 2 (Ready), 3 (Fairly ready), 4 (Less ready), and 5 (Not ready at all).

Table 7.4 reports the level of readiness to implement knowledge-sharing approaches at the aggregate level. The variables ranked at or near the top of the table are most ready. Conversely, those ranked at the bottom are relatively least ready. According to the mean values presented in Table 7.4, providing training for education, personal and team development for effective knowledge sharing has the highest rank, with a mean value of 2.67. Of the findings, implementing the optimisation of internet technology to promote knowledge sharing across the organisation is ranked the second most ready in terms of implementing knowledge-sharing approaches, with mean value of 2.68. Implementing a process of hiring people who possess knowledge and skills to promote knowledge sharing among employees is the least ready, with a mean value of 2.91.

Having considered the level of readiness to implement knowledge-sharing approaches at the aggregate level, the next section focuses on the level of readiness to implement knowledge-sharing approaches at the dis-aggregate level, namely in SMEs and large organisations. A comparison was made between different sizes of organisation in order to identify any variations to the above.

7.3.2. Organisational readiness to implement knowledge-sharing approaches: dis-aggregate level

Table 7.5 : Mean score of readiness to implement knowledge-sharing approaches: dis-aggregate level.

Readiness to implement knowledge-sharing approaches	Small (N=294)		Med (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Provide training for education, personal and team development for effective knowledge sharing.	2.70	1	2.51	3	2.76	4
Implement the optimisation of internet technology to promote knowledge sharing across the organisation.	2.72	2	2.45	1	2.84	7
Implement an approach for flexibility in providing easy user access to the knowledge needed.	2.78	4	2.49	2	2.72	3
Implement an approach that provides time to encourage employees to interact and collaborate.	2.77	3	2.77	6	2.76	5
Implement the optimisation of intranet technology to promote a knowledge-sharing environment.	2.82	5	2.65	4	2.84	8
Implement a process which involves top management in knowledge-sharing initiatives.	2.85	7	2.68	5	2.60	1
Implement a performance measurement system approach to evaluate knowledge-sharing initiatives.	2.84	6	2.85	9	2.88	9
Implement a process of recognition of and rewarding employees for their contribution to knowledge sharing.	2.90	8	2.78	7	2.68	2
Implement a process whereby 'individual' knowledge is converted into organisational knowledge before the individual retires or leaves the organisation.	2.91	9	2.82	8	2.92	10
Implement a process of hiring people who possess the knowledge and skills to promote knowledge sharing among employees.	2.92	10	2.88	10	2.80	6

<u>Meaning of scale (the extent of readiness)</u>

1 (Very ready), 2 (Ready), 3 (Fairly ready), 4 (Less ready)

Providing training for education, personal and team development for effective knowledge sharing was ranked first, third and fourth most ready by SMEs and large organisations respectively. There is disagreement over the level of training provided by small organisations. Kitson and Wilkinson (2003: p.36) found that small organisations provide less training than larger organisations when formal on and off-job training methods were combined. However, some claim that informal training is more appropriate than formal training in small organisations and that the difficulties of measuring informal training provision lead to underreporting, so that the true level of training provision may be similar between organisations of different sizes (Patton et al., 2000: p.84). So it is unsurprising that small organisations were found to be more ready to provide training for education, personal and team development for effective knowledge sharing than medium or large organisations.

Implementing a process which involves top management in knowledge-sharing initiatives was ranked seventh, fifth and first ready by small, medium and large organisations respectively. This means that large organisations are more ready to implement a process that involves top management in knowledge-sharing initiatives. This may be because, usually, the managers of SMEs have to look after every aspect of the business, which gives them limited time to focus on the strategic issues relating to knowledge management (Wong and Aspinwall, 2004). Another distinction to be made is that SMEs do not like to share knowledge even within the company, the managers are afraid of losing control of knowledge (Alawneh et al., 2009). Top management should devote them to promoting a corporate mind-set that emphasises co-operation and knowledge sharing across the organisation.

Implementing a process of recognition of and rewarding employees for their contribution to knowledge sharing was ranked eighth, seventh and second ready by small, medium and large organisations respectively. This result indicates that SMEs are less ready compared to large organisations to implement a process of recognition of and rewarding employees for their contribution to knowledge sharing. A possible reason for this is that SMEs lack a knowledge infrastructure. In the interviews, all the respondent claimed that their organisation supports knowledge sharing in performing their tasks, especially when handling matters related to projects. However, the result shows that there are apparent differences in the ways these organisations encourage their employees to share knowledge. Large organisations provide the best environment to

nurture knowledge sharing. They establish a suitable infrastructure for the employees through an open structure and reward system. The informal ambience in the operating environment of large organisations encourages the employees to voice their opinions, share their experiences and get recognition and reward for their ideas. On the other hand, the rigid and structured environment in SMEs impedes knowledge sharing, creativity and innovative ideas. In fact, the employees are less motivated to be creative due to the lack of an effective reward plan offered by these organisations. To encourage knowledge-sharing behaviour, it is suggested that organisations should motivate their employees to share knowledge by introducing recognition and reward, and this should be consistent (but not necessarily the same for everybody) within the organisation. Furthermore, the rewards do not necessarily have to be financial (Siemieniuch and Sinclair, 2004).

There is a general agreement that implement a process whereby 'individual' knowledge is converted into organisational knowledge before the individual retires or leaves the organisation was ranked as second least ready by SMEs and large organisations. An often-noted barrier for any knowledge-seeking and learning organisation is the retention of high quality staff. Given that when an employee is absent for longer periods of time or leaves an organisation, the individual and organisational knowledge they contain and impart leaves the organisation with them. Indeed, ''given that knowledge people use their minds, which means they own their means of production, when they leave, they take this means of production with them'' (Stauffer, 1999, p. 20). Also, in today's global and dynamic business world, more and more skilled workers are highly mobile and aware of their value in the marketplace. Hence, for organisations to improve their knowledge-sharing approach, knowledge retention readiness strategies need to be higher on the priority list of knowledge or human resource professionals.

Implementing a process of hiring people who possess the knowledge and skills to promote knowledge sharing among employees was ranked as least ready by SMEs (ninth) and sixth by large organisations. This is not surprising, since most of the larger organisations have the ability to hire people who possess knowledge and skills. In comparison, smaller organisations simply do not have the resources, systems and processes that exist within large corporations. SMEs are struggling to fill talent gap, find knowledgeable employees, identifying right candidate for a right job with right skill, and aligning their business for getting the quality cost, and lack of competitive

salary stands are a huge challenge to any SME's (Kishore et al., 2012). Human resource policies and practices need to play a central role in facilitating effective knowledge-sharing programmes.

The relationship between the readiness to implement knowledge-sharing approaches and size of organisation.

An attempt was made to establish if there is a significant correlation between the level of readiness to implement knowledge-sharing approaches and size of organisation. In other words, to ascertain if smaller organisations perceive that they are more ready than larger organisations. This was examined using the Spearman correlation coefficient test. In this study, the hypothesis documented is:

H1: There is a relationship between the level of readiness to implement knowledge-sharing approaches and different sizes of organisation.

Table 7.6 : Correlations between the level of readiness to implement knowledge-sharing approaches and size of organisation

			Size of organisation	Readiness to implement
Spearman's rho	Size of organisation	Correlation Coefficient	1.000	-.048
		Sig. (2-tailed)	.	.350
		N	384	384
	Readiness to implement	Correlation Coefficient	-.048	1.000
		Sig. (2-tailed)	.350	.
		N	384	384

The two variables, the readiness to implement knowledge-sharing approaches and size of organisation, were shown to have no significant correlation (rho = -.048, n= 384, $p \geq 0.005$). This value is not significant at the 5% level. The null hypothesis is not rejected. In other words, this suggests that smaller organisations are not necessarily more ready to implement knowledge-sharing approaches than smaller organisations.

7.4. Conclusions and recommendations

This chapter presents the results related to readiness to setup and implement knowledge-sharing approaches in Malaysian construction organisations. The analyses were conducted using mean values and ranking statistical methods followed by inferential statistics (e.g. Spearman test). The results show that there are many factors to be considered by construction organisations before they are really ready to setup and implement knowledge-sharing approaches.

The conclusions that follow this part of the study can be documented as follows:

1. The study found three variables that are most ready to setup knowledge-sharing approaches:

   • Providing a conducive workplace setting approach to promote knowledge sharing.

   • Developing trust between employees as a basis for knowledge sharing.

   • Giving support and commitment to setting up knowledge-sharing initiatives.

2. The study found three variables that are least ready to setup knowledge-sharing approaches:

   • Setting up a community of practices as a starting point for knowledge-sharing initiatives.

   • Changing management style and actively participating in the change process.

   • Providing an annual budget for enhancing knowledge-sharing practices.

3. There is no significant relationship between the readiness to setup knowledge sharing approaches and size of organisation. In other words, large organisations are not necessarily more ready than small organisations to setup knowledge-sharing approaches.

4. Similarly, the findings revealed three variables that are most ready to implement knowledge-sharing approaches:

   • Providing training for education, personal and team development for effective knowledge sharing.

- Implementing the optimisation of internet technology to promote knowledge sharing across the organisation.

- Implementing an approach for flexibility in providing easy user access to the knowledge needed.

5. The three variables least ready to implement knowledge-sharing approaches are:

- Implementing a process of recognition of and rewarding employees for their contribution to knowledge sharing.

- Implementing a process whereby 'individual' knowledge is converted into organisational knowledge before the individual retires or leaves the organisation.

- Implementing a process of hiring people who possess the knowledge and skills to promote knowledge sharing among employees.

6. There is no significant relationship between readiness to implement knowledge-sharing approaches and size of organisation. This suggests that larger organisations are not necessarily more ready to implement knowledge-sharing approaches than smaller organisations.

7. Based on this study of the level of organisational readiness to set up and implement knowledge-sharing approaches, the following points should be carefully considered in order to avoid the potential pitfalls of knowledge management initiatives:

- Effective knowledge-sharing approaches in construction organisations depend on many factors, including culture, role of technology, top management support, role of human resources, organisational structure and leadership. These items can provide a basis for organisations to evaluate their readiness to implement knowledge-sharing approaches.

- On the other hand, it is also crucial not to overlook those factors which were ranked as least ready, such as providing an annual budget and implementing a process of hiring people who possess the knowledge and skills to promote knowledge sharing among employees, because it enables construction organisations to be more ready to set up and implement knowledge-sharing approaches. As such, the significance of knowledge sharing should be promoted

to managers so that they will be more aware of it and be able to implement knowledge management confidently.

The next section discusses the significance (importance and benefits) of knowledge-sharing approaches, and the extent to which knowledge sharing contributes to organisation performance.

CHAPTER 8. THE SIGNIFICANCE AND CONTRIBUTION OF KNOWLEDGE SHARING TO ORGANISATION PERFORMANCE.

8.1. Introduction

This chapter presents the results of the study regarding the significance of knowledge sharing in organisations. It also considers the reasons for its importance to organisations. In addition, the contribution of knowledge sharing to organisational performance is also duly considered. This chapter addresses the fifth objective: "To investigate the significance (importance and benefits) of knowledge sharing, and the extent to which knowledge sharing contributes to organisational performance."

Accordingly, the chapter is structured in three main sections.

- Section 8.2 briefly discusses the relevant literature on the importance of knowledge sharing in organisations.

- Section 8.3 presents the analysis of the empirical data in relation to the degree of importance of the knowledge-sharing approaches to organisations at the aggregate and disaggregate levels.

- Section 8.4 demonstrates the results of the three most important knowledge-sharing approaches in organisations and reasons for their importance.

- Section 8.5 briefly discusses the contribution of knowledge sharing to organisation performance.

- Section 8.6 presents the findings regarding the extent to which knowledge sharing contributes to organisational performance at the aggregate and disaggregate levels.

- Section 8.7 concludes by summarising the key findings of the study.

8.2. The importance of knowledge sharing in organisation.

The significance of knowledge sharing in any organisation is being increasingly realised. According to Ndlela and Du Toit (2001), through the capturing and sharing of experiences and information, better utilisation and collection of knowledge by individuals, organisations and professional bodies can be achieved. Giannetto and Wheeler (2000) also mention that the competitive edge of a company is gained with knowledge management, where new knowledge is quickly disseminated and shared across the business. Any new projects or endeavours should be reviewed and learning points shared with others. As a result, new employees quickly become effective and the organisation becomes flexible and fluid, reacting quickly to change. Riesenberger (1998) cites five reasons for practising knowledge sharing: (1) to learn about customers; (2) to reveal best practices; (3) to discover internal competencies and products; (4) to discover emerging market trends; and (5) to acquire competitive intelligence.

With knowledge-sharing initiatives, employees are expected to be more proactive than before in generating ideas and solving problems, and they have far more responsibility far sooner. Knowledge sharing will result in an increased understanding of the value of learning across organisations: employees share their best practice, which will bring continuous improvement in products, services, performance and to the company as a whole (Giannetto and Wheeler, 2000). Knowledge sharing is important for creating new knowledge in order to achieve competitive advantage and counteracting the increasing turnover of staff. People no longer keep the same job for life. When someone leaves an organisation their knowledge walks out of the door with them. In addition, knowledge retained from a mobilised workforce can stabilise daily and project operations for organisations. Some higher-level managers believe that businesses will change incrementally in an inherently stable market, and that executives can foresee change by examining the past through knowledge management (Hildebrand, 2003). As a result, a faster response or a plan to cope with future changes might mean profit maximisation for the company.

Cohen and Levinthal (1990) suggest that knowledge sharing is a critical factor in an organisation's ability to respond quickly to change, innovate and achieve competitive success. A growing body of empirical evidence indicates that organisations that are able to share knowledge effectively from one unit to another are more productive and more likely to survive than organisations that are less adept at sharing knowledge (Argote and Ingram, 2000; Argote et al., 2000). The significance of knowledge sharing is viewed by the Department of Trade and Industry (DTI) in its Competitiveness White Paper as: "Our success depends on how well we exploit our most valuable assets: our knowledge, skills, and creativity. These are the key to designing high-value goods and services and advanced business practices. They are the heart of a modern, knowledge-driven economy" (DTI, 1998).

Given its importance, the notion of knowledge sharing has been extensively discussed in a broad range of literature, and it has shown that if an organisation implement knowledge sharing strategies effectively, it is certain to enhance organisation performance (Ngah and Jusoff, 2009; Hsu, 2008; Giannetto and Wheeler, 2000) in both a direct and indirect manner.

8.3. The degree of importance of the knowledge-sharing approaches to organisations

A list of the importance of knowledge-sharing approaches in organisations and its contribution to organisation performance was derived from a thorough review of the literature on knowledge sharing, and then modified after interviews with 49 managers from 40 construction organisations. Eleven important knowledge-sharing approaches that could be acquired through knowledge sharing in organisations were found. The respondents were requested to indicate the degree of importance of ten knowledge-sharing approaches to their organisations, and to categorise them as: 1 (Very important), 2 (Important), 3 (Fairly important), 4 (Less important), or 5 (Not important at all), and to rate the contribution of the approaches as 1 (A very high level of contribution), 2 (Some contribution), 3 (Little contribution), 4 (Low level of contribution), 5 (No contribution at all) to measure the extent to which knowledge sharing contributes to organisation performance.

Although the degree of importance of the knowledge-sharing approaches and their contribution to organisation performance varied between organisations, the questionnaire was expected to elicit a general assessment of the importance and contribution of knowledge sharing to organisation performance.

The statistical analyses are undertaken using the Statistical Package for Social Science (SPSS 16) software and are discussed in two major parts. Part 1 consists of two substages:

1. The aggregate level deals with the overall mean values of the responses.

2. The dis-aggregate level deals with the means ranked based on the degree of importance. Detailed comparisons of the ranking order are undertaken based on the different sizes of organisation (small, medium and large).

Part 2 of the analysis explores the underlying relationships between the importances of the knowledge-sharing approaches according to the size of the organisation by means of the Spearman correlation coefficient. Data for the extent to which knowledge sharing contributes to organisation performance is also presented. The following sections present the results.

8.3.1. The degree of importance of the knowledge-sharing approaches to organisations: aggregate level

Table 8.1 : The degree of importance of the knowledge-sharing approaches to organisations: aggregate level.

The importance of knowledge-sharing approaches in organisations	Overall (N=384)	
	Mean	Rank
Training employees in knowledge sharing to improve the identification and sharing of best practices among employees across the organisation.	1.98	1
Use of the internet for knowledge sharing to increase the network connectivity between internal and external individuals, thus improving customer service.	1.99	2
Clear lines of communication to quickly and effectively respond to key business issues.	1.99	3
A knowledge-sharing culture to improve ways of working and minimise unnecessary duplication.	2.00	4
Empowering knowledgeable and skilled employees to improve decision-making.	2.05	5
A conducive environment for sharing knowledge to encourage the free flow of ideas, thus increasing innovation and creativity.	2.07	6
Use of the intranet for knowledge sharing to increase the network connectivity between internal and external organisational members, thus improving customer service.	2.11	7
Rewarding and recognising the value of employees' knowledge to enhance employee retention rates.	2.12	8
Performance measurement for knowledge sharing to increase the efficiency of operations and reduce costs by eliminating redundant or unnecessary processes.	2.12	9
A clear knowledge-sharing policy to enhance business development and the creation of new business opportunities.	2.15	10
Use of communities of practice to improve productivity and deliver products and services to the market faster.	2.20	11

In order to determine the importance and ranking of the eleven knowledge-sharing approaches in organisations from the respondents' point of view, the mean score of the perceived importance of each factor was calculated. Table 8.1 shows the results of the aggregate mean scores and the importance of the knowledge sharing approaches in organisations. Table 8.1 shows that the mean score for the degree of importance assigned by the respondents for all the knowledge-sharing approaches ranges from 1.98 to 2.20. This means that all eleven variables were ranked by construction organisations as 'very

important/important'. Three of the eleven variables were ranked as 'very important' by the respondents: training employees in knowledge sharing to improve the identification and sharing of best practices among employees across the organisation (mean value 1.98); the use of the internet for knowledge sharing to increase the network connectivity between internal and external individuals, thus improving customer service (mean value 1.99); and clear lines of communication to quickly and effectively respond to key business issues (mean value 1.99).

The remaining eight variables were rated as 'important' by the respondents, with the overall mean scores ranging from 2.00 to 2.20. Table 8.1 shows that the respondents ranked knowledge-sharing culture to improve ways of working and minimise unnecessary duplication as important (mean value 2.00). Knowledge sharing occurs if the culture of the organisation allows it, and culture was ranked as the fourth most important criterion for the implementation of knowledge sharing in organisations. Empowering knowledgeable and skilled employees to improve decision-making was ranked fifth (mean value 2.05) and a conducive environment for sharing knowledge to encourage the free flow of ideas to increase innovation and creativity was ranked sixth (mean value 2.07). The companies surveyed also regard the use of the intranet for knowledge sharing to increase network connectivity between internal and external individuals , thus improving customer service as very important/important (mean value 2.11), and rewarding and recognising the value of employees' knowledge to enhance employee retention rates as important (mean value 2.12). While performance measurement for knowledge sharing to increase the efficiency of operations and reduce costs by eliminating redundant or unnecessary processes (mean value 2.12); a clear knowledge-sharing policy to enhance business development and the creation of new business opportunities (mean value 2.15); and use of communities of practice to improve productivity and deliver products and services to the market faster (mean value 2.20) were the three least important. Although these three aspects are at the bottom of the table, they are also considered to be important.

Having considered the importance of knowledge-sharing approaches at the aggregate level, the next section focuses on the importance of knowledge-sharing approaches at the disaggregate level, namely in small, medium and large organisations.

8.3.2. The degree of the importance of the knowledge-sharing approaches to organisations: dis-aggregate level

The approach adopted to analyse the data at the aggregate level is also employed at the disaggregate level for small, medium and large organisations. As mean score increases, the importance of the knowledge-sharing approaches decreases.

Table 8.2 : The degree of the importance of the knowledge-sharing approaches to organisations: dis-aggregate level.

The importance of knowledge-sharing approaches in organisations	Small (N=294)		Med (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Training employees in knowledge sharing to improve the identification and sharing of best practices among employees across the organisation.	1.97	1	2.00	2	2.08	4
Use of the internet for knowledge sharing to increase the network connectivity between internal and external individuals, thus improving customer service.	2.02	4	1.82	1	2.08	3
Clear lines of communication to quickly and effectively respond to key business issues.	2.00	3	2.00	3	1.92	1
A knowledge-sharing culture to improve ways of working and minimise unnecessary duplication.	1.99	2	2.00	4	2.16	6
Empowering knowledgeable and skilled employees to improve decision-making.	2.04	6	2.03	5	2.16	7
A conducive environment for sharing knowledge to encourage the free flow of ideas, thus increasing innovation and creativity.	2.03	5	2.22	9	2.16	8
Use of the intranet for knowledge sharing to increase the network connectivity between internal and external organisational members, thus improving customer service.	2.13	10	2.08	7	2.04	2
Rewarding and recognising the value of employees' knowledge to enhance employee retention rates.	2.11	7	2.08	8	2.28	10
Performance measurement for knowledge sharing to increase the efficiency of operations and reduce costs by eliminating redundant or unnecessary processes.	2.12	9	2.03	6	2.32	11
A clear knowledge-sharing policy to enhance business development and the creation of new business opportunities.	2.12	8	2.26	10	2.20	9
Use of communities of practice to improve productivity and deliver products and services to the market faster.	2.18	11	2.29	11	2.12	5

Meaning of scale (the extent of importance)

1 (Very important), 2 (Important), 3 (Fairly important), 4 (Less important), 5 (Not important at all).

Table 8.2 gives the results of the overall mean scores and relative importance of the knowledge-sharing approaches to organisations. It can be seen that the values for small organisations range from 1.97 to 2.18, while those for medium organisations are between 1.82 and 2.29. The means for large organisations, however, range from 1.92 to 2.32. Since all the values fall within the range of 'very important' and 'important', it can be said that all the variables were perceived by the respondents as playing a vital role in the adoption of knowledge sharing approaches.

According to the survey results, SMEs and large organisations perceive the importance of each factor differently. In the context of importance, small organisations rank training employees in knowledge sharing to improve the identification and sharing of best practices among employees across the organisation (mean value 1.97) and a knowledge-sharing culture to improve ways of working and minimise unnecessary duplication (mean value 1.99) as very important, and clear lines of communication to quickly and effectively respond to key business issues (mean value 2.00) was ranked as important. Medium organisations perceive the use of the internet for knowledge sharing to increase network connectivity between internal and external individuals, thus improving customer service (mean value 1.82), training employees in knowledge sharing to improving the identification and sharing of best practices among employees across the organisation (mean value 2.00) and clear lines of communication to quickly and effectively respond to key business issues (mean value 2.00) as important.

Large organisations, on the other hand, believe that clear lines of communication to quickly and effectively respond to key business issues (mean value 1.92), the use of the intranet for knowledge sharing to increase the network connectivity between internal and external individuals , thus improving customer service (mean value 2.04) and the use of the internet for knowledge sharing to increase the network connectivity between internal and external individuals, thus improving customer service (mean value 2.08) are the most important.

When comparing SMEs and large organisations (Table 8.2), it was found that both sets of respondents conclude that training, the use of the internet and clear lines of communication are the most important knowledge-sharing approaches in their organisations. However, there are some key differences between the companies' rankings that probably arise from

their difference in size. Training employees in knowledge sharing to improve the identification and sharing of best practices among employees across the organisation was ranked first, second and fourth by small, medium and large organisations respectively. Training is enormously important for practising knowledge sharing (Mondy, 2010; Hung et al., 2005; Moffett et al., 2003; Salleh and Goh, 2002), making it one of the most important critical success factors. Through training, employees will gain a better understanding of the fundamentals of knowledge sharing as well as the approaches to achieve it.

The use of the internet for knowledge sharing to increase the network connectivity between internal and external individuals, thus improving customer service was ranked fourth, first and third most important by small, medium and large organisations respectively. This means that with more employees the more important network connectivity is, especially for medium and large organisations. A similar picture also emerges regarding the use of the intranet for knowledge sharing to increase the network connectivity between internal and external individuals, thus improving customer service. The use of the intranet was ranked tenth, seventh and second most important to small, medium and large organisations respectively. Both the internet and intranet were ranked as important because construction projects are normally located at different sites, thus the role of the internet and intranet is important in sharing knowledge.

The survey results also raise some concerns regarding the low importance of certain knowledge-sharing approaches, i.e. a clear knowledge-sharing policy to enhance business development and the creation of new business opportunities and the use of communities of practice to improve productivity and deliver products and services to the market faster.

It is quite surprising to find that a knowledge-sharing policy is not rated as very important by the respondents (ranked tenth, mean value 2.15), especially as it helps to enhance business development and the creation of new business opportunities, clarifies the business case for pursuing knowledge management and steers the company towards becoming knowledge-based. In addition, it provides the essential focus as well as values for everyone in the organisation. This could be because the top management are not very committed to knowledge management initiatives (Sunassee, 2001). It may also be due to a misunderstanding about the benefits of knowledge sharing and its implementation. A

strategy or policy should be developed for the implementation of knowledge management. Without a proper strategy any plan will fail. This factor has been suggested by many authors and referred to by different names, such as strategy and purpose (Wong, 2005), strong link to business imperative, vision and architecture (Skryme and Amidon, 1997), clear purpose and language (Davenport et al., 1998), knowledge management strategy (Liebowitz, 1999) and strategy (APQC, 1999).

The use of communities of practice to improve productivity and deliver products and services to the market faster was ranked as the least important factor by both small and medium organisations (ranked eleventh). This is no surprise, as the concept of knowledge management, and hence the communities of practice issue, has only just recently been highlighted in Malaysia, and most SMEs do not see it as important (Wong, 2008).

Another area worth exploring is whether there is any significant correlation between small, medium and large organisations with regard to their perceived importance of the factors. In other words, to ascertain if larger organisations perceive knowledge-sharing approaches to be more important than small organisations. The Spearman rho was utilised for this purpose. It is hypothesis that:

H1: There is a relationship between the importance of knowledge-sharing approaches in organisations and the size of the organisation.

Table 8.3 : Correlations between the importance of knowledge-sharing approaches in organisations and the size of organisation.

			Size of organisation	Important of knowledge sharing
Spearman 's rho	Size of organisation	Correlation Coefficient	1.000	.031
		Sig. (2-tailed)	.	.544
		N	384	384
	Important of knowledge sharing	Correlation Coefficient	.031	1.000
		Sig. (2-tailed)	.544	.
		N	384	384

As shown in Table 8.3, the Spearman's correlation coefficient reveals that there is no significant positive correlation between the importance of knowledge-sharing approaches in organisations and the size of the organisation (r = .031, N = 384, p = ≥ 0.05). This value is not significant at the 5% level. The null hypothesis is not rejected. This means that there is no substantial evidence to suggest that larger organisations perceive knowledge-sharing approaches as more important than smaller organisations. This means that the importance of the factors as perceived by large organisations was commonly shared by the SMEs.

This result is in line with the study done by Quaddus and Xu (2008) on five large organisations and ten SMEs in Australia. They found that there are no major differences in the significant factors of knowledge sharing between large businesses and SMEs across different industries in Australia. Perhaps larger companies practise knowledge management more consciously and systematically than their smaller counterparts and the former might have more resources and deploy more advanced methods to manage knowledge. Knowledge management is not only essential for large organisations but has almost the same significance for SMEs (Megdadi et al., 2012).

The next section presents the data on the respondents' opinion of the three most important knowledge-sharing approaches and indicates the reasons for their importance in the organisation. This will be followed by an evaluation of the extent to which knowledge sharing contributes to organisation performance.

8.4. The three most important knowledge-sharing approaches

The analyses so far have focused on the importance of knowledge sharing to organisations in general. The next section takes the analyses one step further. Based on the questionnaire in Appendix A, the respondents were required to rank the three most important knowledge-sharing approaches in their organisation and indicate the reasons for their importance. The analysis of the three most important approaches to knowledge sharing in organisations and the reason for their importance are presented using frequency distribution.

Table 8.4 presents a prioritised list of these important approaches based on the number of construction organisations that selected that option (frequency).

Table 8.4 : The importance of knowledge-sharing approaches in organisations.

Frequency	The importance of knowledge-sharing approaches in organisations
92	Training
70	Rewarding and recognising
68	Internet
54	Knowledge-sharing culture
50	Empowering knowledgeable and skilled employees
41	Conducive environment
38	Clear lines of communication
37	Performance measurement
33	Intranet
24	Knowledge-sharing policy
9	Communities of practices

Table 8.5 : The three most important approaches to knowledge sharing and reasons for their importance.

Rank	Approaches to knowledge sharing	Responses	Main reasons
1	Training	92	• Chances to gain knowledge • Improve skills and knowledge • Improve work efficiency • Improve quality of work • Continuous learning for improvement • Assisting in decision-making • Sharing best practice • Produce competent workers • Expose staff to a new product, new technologies and new knowledge • Performed right skill in doing job • As a platform for experienced employees to share knowledge with others • Get information from experts
2	Rewarding and recognising	70	• Encourage employees to improve knowledge • Appreciate employees • Motivation for employees to share knowledge • Attract and retain knowledgeable employees • Participating in decision-making • Reinforces positive behaviours
3	Internet	68	• Improve skills and knowledge • Improve work efficiency • Improve quality of work • Communication made easy • Searching for information • Increasing network and improving customer service • Knowledge can be shared easily and quickly • For connectivity inside and outside organisation • Assisting in decision-making

8.5. Organisational performance

The purpose of this section is to investigate the extent to which knowledge sharing contributes to organisation performance. This section gives an overview of organisational performance, including the definition of organisational performance (Subsection 8.5.1), measuring performance (Subsection 8.5.2), and briefly reviews the literature on the contribution of knowledge sharing to organisational performance (Subsection 8.5.3). The analysis of the contribution of knowledge sharing to organisational performance at the aggregate and disaggregates levels is discussed in Section 8.6.

8.5.1. Definition of organisational performance

Researchers have different opinions of performance. Performance, in fact, continues to be a contentious issue among organisational researchers (Barney, 1997). The struggle to establish a meaning of performance has been ongoing for many years, and is not limited to the field of knowledge management. Over thirty years ago, Katz and Kahn dryly commented: "The existence of the problem of developing satisfactory criteria of organisational performance is clear enough; its solution is much less obvious" (1966: p. 150).

Performance is defined in many ways depending on the context. For example, some contextual meanings can be seen in Javier (2002), who shows that performance is equivalent to the famous 3Es (economy, efficiency and effectiveness) of a certain programme or activity. Wilderom et al. (2000) give ten uses of the term 'performance', which variously refer to measurable financial income or profits, growth and the operation of health, safety or personnel standards. However, according to Pitt and Tucker (2008: p. 243), organisational performance is defined as "a vital sign of the organisation, showing how well activities within a process or the outputs of a process achieve a specific goal". Also, it is defined as "a process of assessing progress towards achieving pre-determined goals, including information on the efficiency by which resources are transformed into goods and services, the quality of these outputs and outcomes, and the effectiveness of organisational objectives" (Amartunga and Baldry, 2003: p. 172). Similar to Amartunga

and Baldry (2003), Daft (2000) defines organisational performance as the ability of the organisation to attain its goals by using resources in an efficient and effective manner.

The term 'performance' is sometimes confused with productivity. According to Ricardo and Wade (2001), there is a difference between performance and productivity. Productivity is a ratio depicting the volume of work completed in a given amount of time. Performance is a broader indicator that could include productivity as well as quality, consistency and other factors. In result-oriented evaluation, productivity measures are typically considered. Richard et al. (2008) make the distinction between organisational performance and organisational effectiveness. Organisational performance encompasses three specific areas of firm outcomes: (1) financial performance (profit, return on assets, return on investment, etc.); (2) market performance (sales, market share, etc.); and (3) shareholder return, economic value added, etc. Organisational effectiveness is broader and captures organisational performance plus the plethora of internal performance outcomes normally associated with more efficient or effective operations and other external measures that relate to considerations that are broader than those simply associated with economic valuation (either by shareholders, managers, or customers), such as corporate social responsibility.

8.5.2. Measuring performance

The organisation performance measurement has become an important standard in evaluating organisational success (Moullin, 2007; Darroch and McNaughton, 2003). It is defined as "comparing the expected results with the actual ones, investigating deviations from plans, assessing individual performance and examining progress made towards meeting the targeted objectives" (Ngah and Ibrahim, 2010). Based on this definition, the organisation performance measurement can provide more assistance for managers to evaluate the organisational activities and maintain the competitive or superiority over competitors (Liao and Wu, 2009; Visser and Sluiter, 2007).

Many authors have assessed the influence of knowledge-sharing elements on organisation performance, and some say that the impact is hard to measure (Rasula et al., 2012; Shannak, 2009). It is extremely difficult to create any measure of knowledge sharing that will show an absolute one-to-one correlation between a knowledge-sharing action and a

business result (Rasula et al., 2012). Studies of this subject have been both qualitative and quantitative. The qualitative studies have explored and described numerous factors affecting knowledge sharing (e.g. improvements by measuring attitudes, beliefs and culture), but have not quantified the variables or the effect they have on knowledge sharing. Quantitative studies, on the other hand, attempt to measure both the level of the factor studied and the level of its effect, but often involve a small number of factors (e.g. indicate participation, for instance the number of communities or the number of people using a database). There is neither in the organisations nor in the literature an established method or tool which handles both the quantitative and the qualitative results (Shannak, 2009). As the process of knowledge sharing is complex and involves many variables, it is difficult to estimate the contribution of a quantitative study in this field. In this study, organisation performance is measured from several standpoints: increasing efficient operations and reducing costs, improving decision-making to improve project and services delivery to the market, improving ways of working and minimising unnecessary duplication, improving client/customer service, improving the identification and dissemination of best practices, enhancing business development and the creation of new business opportunities, inspiring creativity and innovation, enhancing employee retention rates. The potential variables are described in Section 8.6.

8.6. The contribution of knowledge sharing to organisational performance

Previous research suggests that the ability to share internal best practices is important to overall organisational performance (Wijk et al., 2007; Sher and Lee, 2004; Szulanski, 1996) and exploiting external knowledge is crucial in the creation of new knowledge and driving new product innovation (Al-Hawamdeh, 2003; Hippel, 1994). Organisational knowledge sharing, therefore, can bring enormous benefits to an organisation (Liebowitz and Chen, 2001; Argote, 1999; Garvin, 1993) and can be the backbone of organisational performance (Md Noor and Salim, 2012). Prior research has gone further to determine if there is a significant relationship between knowledge sharing and organisation performance (Hsu, 2008; Law and Ngai, 2008; Du et al., 2007). Similarly, while Hsu (2008) suggests that knowledge-sharing approaches are considered the facilitating factors for improving organisation performance through human capital, Law and Ngai (2008) acknowledge that

even though knowledge sharing may affect organisation performance, it is also important to examine the relationship between knowledge sharing and business process improvement to fully understand the factors that affect organisation performance. The results show that business process improvement is associated with organisation performance. Hence, knowledge sharing and organisational performance are essential to success in business. These benefits are important for construction organisations to consider if they want to fully exploit their organisational knowledge.

In order to identify a comprehensive list of the contributions of knowledge sharing to organisational performance, an extensive review of the literature was conducted. A list of the contributions of knowledge sharing to organisation performance was derived through a thorough review of the literature on knowledge management and knowledge sharing, especially that of Waruszynski (2008), Singh et al. (2006), Kelley (2003), Longbottom and Chourides (2001), Van Buren (1999), KPMG (1999), Ruggles (1998), Skyrme (1997), Chase (1997), Allee (1997) and Wiig (1993). The list was then modified after interviews with 49 managers from 40 construction organisations. An extensive search of the literature revealed that there are ten related works on the contributions of knowledge sharing to organisational performance. These works provided a list of impressive and convincing contribution outcomes based on theoretical or empirical support, and hence they are included in this study (Table 8.6). All of them have direct references to contributions but under different terms such as "outcomes", "benefit", "impact", "focus", "performance factors", "metrics", "results", "strategies" and "value" (Anantatmula and Kanungo, 2005) (Table 8.6). The following sections present the results.

Table 8.6 shows that the list of the contributions of knowledge sharing to organisational performance written about in the literature varies from five (the least, e.g. Ruggles, 1998) to fourteen (the most, e.g. KPMG, 1999). The top eleven contributions of knowledge sharing to organisation performance were taken as the construct to measure the performance of organisations in this study.

Table 8.6 : Summary of knowledge-sharing contributions

	Contributions of knowledge sharing	KPMG (1999)	Skryme (1997)	Singh et al. (2006)	Wiig (2001)	Chase (1997)	Kelly (2003)	Salleh & Ahmad (2006)	Waruszynski (2008)	Ruggles (1998)	Longbottom &Chourides (2003)	Allee (1997)	Total
1	Better client/ customer handling	1	1		1	1	1	1	1		1		8
2	Better decision-making	1		1	1	1		1	1	1			7
3	Reduced costs	1	1	1	1	1		1			1		7
4	Inspired creativity & innovation		1	1		1		1	1		1	1	7
5	Improved learning/adapting capability		1	1			1	1	1	1		1	7
6	Sharing best practices	1		1				1		1	1	1	6
7	Enhance product or service quality		1	1	1	1	1				1		6
8	Faster response to key business issues	1		1		1		1			1		5
9	New or better ways of working	1								1	1	1	4
10	Better staff attraction/retention	1	1	1			1						4
11	Creation of new business opportunities	1			1						1		3
12	Increased market share	1			1		1						3
13	Improved productivity	1					1		1				3
14	Increased profits	1			1	1							3
15	Improved new product development	1			1						1		3

Table 8.6: Summary of knowledge-sharing contributions (continue)

	Contributions of knowledge sharing	KPMG (1999)	Skryme (1997)	Singh et al. (2006)	Wiig (2001)	Chase (1997)	Kelly (2003)	Salleh & Ahmad (2006)	Waruszynski (2008)	Ruggles (1998)	Longbottom &Chourides (2003)	Allee (1997)	Total
16	Increased empowerment of employees		1		1				1				3
17	Improved employee skills	1	1										2
18	Increased share price	1		1									2
19	Increased market size				1		1						2
20	Enhanced intellectual capital											1	1
21	Improved communication											1	1
22	Improved business process					1							1
23	Entry to different market types									1			1

8.7. The extent to which knowledge sharing contributes to organisational performance

8.7.1. The extent to which knowledge sharing contributes to organisational performance: aggregate level

Table 8.7 : The extent to which knowledge sharing contributes to organisational performance: aggregate level.

The contribution of knowledge sharing to organisation performance	Overall (N=384)	
	Mean	Rank
Knowledge sharing increases efficient operations and reduces costs by eliminating redundant or unnecessary processes.	1.97	1
Knowledge sharing improves decision-making through opportunities for learning and skills development and consequent advancements in job responsibilities.	2.01	2
Knowledge sharing improves project and services delivery and to the market, as lessons learned from one project can be carried on to future projects, resulting in continuous improvement.	2.02	3
Knowledge sharing improves ways of working and minimises unnecessary duplication, as employees will be both more effective (adopting the most appropriate solutions) and more efficient (using less time and other resources).	2.05	4
Knowledge sharing increases network connectivity between internal and external individuals and so improves client/customer service.	2.07	5
Knowledge sharing helps with the integration of knowledge into work practices, and in so doing improves the speed and effectiveness at which key business issues are addressed.	2.14	6
Knowledge sharing improves the identification and dissemination of best practices among employees across the organisation.	2.14	7
Knowledge sharing enhances business development and the creation of new business opportunities, as organisations can be more agile and better able to respond to organisational changes.	2.15	8
A knowledge sharing environment gives employees the opportunity to communicate effectively and comfortably, which inspires creativity and innovation.	2.21	9
Knowledge sharing enhances employee retention rates, as they are able to use their full potential and, in so doing, recognised in terms of their value in skills and knowledge.	2.22	10

Meaning of scale (the level of contribution)

1 (A very high level of contribution), 2 (Some contribution), 3 (Little contribution), 4 (Low level of contribution), 5 (No contribution at all)

Table 8.7 represents the overall mean scores and the ranking of the survey respondents at the aggregate level for the extent to which knowledge sharing contributes to organisation performance. As mean score increases, the contribution of knowledge sharing to organisation performance decreases.

According to the mean values given in Table 8.7, the top contribution of knowledge sharing to organisation performance is that it increases efficient operations and reduces costs by eliminating redundant or unnecessary processes, with a mean value of 1.97. This is closely followed by 'improves decision-making through opportunities for learning and skills development and consequent advancements in job responsibilities' (mean value 2.01) and 'improves project and services delivery to the market' (mean value 2.02). These are followed by 'improves ways of working and minimises unnecessary duplication' (mean value 2.05), 'improves client/customer service' (mean value 2.07), 'the speed and effectiveness at which key business issues are addressed' (mean value 2.14), 'improves the identification and dissemination of best practices' (mean value 2.14) and 'enhances business development and the creation of new business opportunities' (mean value 2.15).

The three contributions ranked the lowest are: 'more agile and better able to respond to organisational changes' (mean value 2.15), 'inspires creativity and innovation' (mean value 2.21) and 'enhances employee retention rates' (mean value 2.22). It is evident that the mean value of the employees' responses in this study is between 1 and 2, which indicates that, on average, employees' responses are on the "very high level of contribution/some contribution" side. This can be interpreted that knowledge sharing is absolutely essential for Malaysian construction organisations to improve their organisation performance.

Having considered the extent to which knowledge sharing contributes to organisational performance at the aggregate level, the next section focuses on the extent to which knowledge sharing contributes to organisational performance at the disaggregate level, namely in small, medium and large organisations.

8.7.2. The extent to which knowledge sharing contributes to organisational performance: disaggregate level

Table 8.8 : the extent to which knowledge sharing contributes to organisational performance: disaggregate level.

The contribution of knowledge sharing to organisational performance	Small (N=294)		Med (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
increases efficient operations and reduces costs by eliminating redundant or unnecessary processes.	2.03	2	1.68	1	2.04	2
improves decision-making through opportunities for learning and skills development and consequent advancements in job responsibilities.	2.02	1	1.91	4	2.16	5
improves project and services delivery to the market, as lessons learned from one project can be carried on to future projects, resulting in continuous improvement.	2.04	3	1.94	5	2.08	3
improves ways of working and minimises unnecessary duplication, as employees will be both more effective (adopting the most appropriate solutions) and more efficient (using less time and other resources).	2.07	4	1.83	2	2.36	10
increases network connectivity between internal and external individuals and so improves client/customer service.	2.13	5	1.83	3	1.92	1
helps with the integration of knowledge into work practices, and in so doing improves the speed and effectiveness at which key business issues are addressed.	2.13	6	2.11	8	2.32	9
improves the identification and dissemination of best practices among employees across the organisation.	2.14	7	2.15	10	2.16	6
enhances business development and the creation of new business opportunities, as organisations can be more agile and better able to respond to organisational changes.	2.18	8	2.06	7	2.08	4
environment gives employees the opportunity to communicate effectively and comfortably, which inspires creativity and innovation.	2.22	9	2.12	9	2.28	8
enhances employee retention rates, as they are able to use their full potential and, in so doing, recognised in terms of their value in skills and knowledge.	2.26	10	2.05	6	2.16	7

Meaning of scale (the level of contribution)

1 (A very high level of contribution), 2 (Some contribution), 3 (Little contribution), 4 (Low level of contribution), 5 (No contribution at all)

The mean scores indicate that there is a realisation among the three different sizes of construction organisation of the level of contribution that knowledge-sharing approaches have to organisational performance. When comparisons were made between the survey respondent groups, the top five contributions or benefits that have been generated by knowledge sharing in small organisations are: improves decision-making (mean value 2.02), increases efficient operations and reduces costs (mean value 2.03), improves project and service delivery to the market (mean value 2.04), improves ways of working and minimises unnecessary duplication (mean value 2.07) and improves client/customer service (mean value 2.13).

Medium organisations ranked five variables as having 'a very high level of contribution'. These are: increases efficient operations and reduces costs (mean value 1.68), improves ways of working and minimises unnecessary duplication (mean value 1.83), improves client/customer service (mean value 1.83), improves decision-making (mean value 1.91) and improves project and service delivery to the market (mean value 1.94).

Large organisations, on the other hand, ranked 'improves client/customer service' (mean value 1.92) as having 'a very high level of contribution', followed by 'some contribution' for increases efficient operations and reduces costs (mean value 2.04), improves project and services delivery to the market (mean value 2.08), enhances business development and the creation of new business opportunities (mean value 2.08) and improves decision-making (mean value 2.16).

Overall, both SMEs and large organisations perceive increases efficient operations and reduces costs, improves decision-making, improves project and service delivery to the market and improves ways of working as the four main contributions of knowledge sharing to organisation performance. While most of the SMEs perceive improves decision making, improves ways of working and minimises unnecessary duplication as being the greatest contributions, only around half of the large organisations surveyed agreed. Even though there are some slight differences, the four variables that have the highest contribution to organisation performance, irrespective of their order of ranking, remain unchanged. This suggests that the responses do not differ according to the size of organisation.

All three organisation sizes agree that the contribution of knowledge sharing to enhancing employee retention rates, as they are able to use their full potential and, in so doing, are recognised in terms of their value in skills and knowledge, is the least.

The differences in the contributions of knowledge-sharing approaches to organisation performance are due to differences in nature, organisation and practitioners in the departments. In general, all the defined contributions have resulted from knowledge sharing in construction organisations. The contributions or benefits derived from knowledge sharing have been documented by many authors (e.g. Stewart, 2001), but the effectiveness varies considerably among organisations (Argote and Ingram, 2000).

The relationship between the contribution of knowledge sharing to organisation performance and the size of organisation.

It is now important to recognise whether the size of organisation has an impact on the results discussed above. This is to verify whether larger organisations perceive that knowledge sharing contributes more to organisation performance. This was examined using the Spearman correlation coefficient test. In this study, the hypothesis documented is:

H1: There is a relationship between the contribution of knowledge sharing to organisation performance and the size of organisation.

Table 8.9 : Correlations between the contribution of knowledge sharing to organisation performance and the size of organisation.

			Size of organisation	Contribution of knowledge sharing
Spearman's rho	Size of organisation	Correlation Coefficient	1.000	-.062
		Sig. (2-tailed)	.	.222
		N	384	384
	Contribution of knowledge sharing	Correlation Coefficient	-.062	1.000
		Sig. (2-tailed)	.222	.
		N	384	384

Table 8.9 shows that there is no significant negative correlation between the two variables (rho = -0.062, n = 384, p ≥ 0.05). The result basically indicates there is no relationship between the contribution of knowledge sharing to organisation performance and the size of the organisation. The null hypothesis is not rejected. This means that there is no statistical evidence to suggest that one size of organisation enjoys a greater contribution of knowledge sharing than any other size of organisation. Knowledge sharing does not contribute more to small organisations than it contributes to large organisations. Every organisation, no matter what size, can benefit from knowledge sharing approaches.

8.8. Conclusions and recommendations

This chapter has considered the importance of knowledge sharing to organisations and the contribution of knowledge-sharing approaches to organisation performance. From the discussions throughout the chapter the following conclusions can be made:

1. The study analysed statistically the significance of 11 factors which are involved in implementing knowledge sharing by small, medium and large construction organisations. As evident from the analysis conducted above, the importance of knowledge-sharing approaches in organisations, in order of importance (ranked from the highest to the lowest), are as follows:

    - Training employees in knowledge sharing to improve the identification and sharing of best practices among employees across the organisation.

    - Use of the internet for knowledge sharing to increase the network connectivity between internal and external individuals, thus improving customer service.

    - Clear lines of communication to quickly and effectively respond to key business issues.

    - A knowledge-sharing culture to improve ways of working and minimising unnecessary duplication.

    - Empowering knowledgeable and skilled employees to improve decision-making.

    - A conducive environment for sharing knowledge to encourage the free flow of ideas to increase innovation and creativity.

- Use of the intranet for knowledge sharing to increase the network connectivity between internal and external individuals, thus improving customer service.

- Rewarding and recognising the value of employees' knowledge to enhance employee retention rates.

- Performance measurement for knowledge sharing to increase efficient operations and reduce costs by eliminating redundant or unnecessary processes.

- A clear knowledge-sharing policy to enhance business development and the creation of new business opportunities.

- Use of communities of practice to improve productivity and delivery of products and services to the market.

2. There is no significant positive correlation between the size of organisations and the importance of knowledge sharing in organisations. This means that there is no substantial evidence to suggest that larger organisations perceive knowledge sharing as more important than smaller organisations. All organisations, irrespective of size, can benefit from the exploitation of knowledge sharing. Large organisations and SMEs can benefit from knowledge sharing in different ways according to the different size of the organisation. This means that the organisation will need to look at how they can benefit more from knowledge sharing and exploit the benefit.

3. The respondents were required to rank the three most important knowledge sharing approaches and indicate the reasons for their importance in the organisation. Both SMEs and large organisations agreed that training, reward and recognition, and the use of the internet are the three most important knowledge-sharing approaches in organisations. All organisations also showed many similarities in their reasoning behind their choice, such as to encourage employees to share their knowledge, improve skills and knowledge, improve work efficiency, improve quality of work and assist in decision-making.

4. The three top contributions of knowledge sharing to organisation performance are: increases efficient operations and reduces costs, improves decision-making, improves project and services delivery to the market. Enhances employee retention rates makes the least contribution.

5. There is no significant negative correlation between the contribution of knowledge sharing to organisation performance for large organisations and SMEs. This basically indicates that there is no relationship between the contribution of knowledge sharing to organisation performance and size of construction organisation. This means that there is no evidence to suggest that organisations of a particular size derive a greater level of contribution to knowledge sharing than any other.

6. This offers training providers an opportunity to offer appropriate training to organisations of different sizes on the potential benefits that can accrue for them through knowledge sharing and how they can exploit this. It is true that they may benefit from a particular approach today but when something changes they may benefit from other approaches, but at least they understand the fuller spectrum of the benefits. They may then decide which benefit would be greatest for them at different periods and in different contexts. It is expected that the performance of construction organisations may be improved if knowledge sharing is well understood and appropriately managed. Understanding the benefits of knowledge sharing may assist construction organisations to take full advantage of the improvements in organisational performance.

In the next chapter, the research continues with discussions about the influence of organisational structure, culture, and human resource practices in the implementation of knowledge sharing in organisations.

CHAPTER 9. THE INFLUENCE OF ORGANISATIONAL STRUCTURE, CULTURE AND HUMAN RESOURCE PRACTICES

9.1. Introduction

This chapter investigates the influence of organisational structure, culture and human resource practices as independent variables on knowledge sharing among contractors in the Malaysian context. The current trends of organisational structure, culture and human resource practices are thoroughly investigated to explore whether these variables have an influence in the implementation of organisational knowledge sharing. The aim of this chapter is to answer research objective six (see Table 1.1 in Chapter 1): "To specifically investigate the degree of influence that organisational structure, culture and human resource practices play in the implementation of knowledge sharing in organisations".

Accordingly, the chapter is divided into six main sections.

- Section 9.2 reviews the literature on the organisational factors that influence the implementation of organisational knowledge sharing.

- Section 9.3 presents the influence of organisational structure on the implementation of organisational knowledge sharing.

- Section 9.4 presents the influence of organisational culture on the implementation of organisational knowledge sharing.

- Section 9.5 explains the influence of human resource practices on the implementation of organisational knowledge sharing.

- Section 9.6 summarises the key findings of the study.

9.2. Organisational factors influencing the implementation of knowledge sharing in organisations

Previous studies in the area of management, knowledge management and knowledge sharing led to the identification of a broad range of organisational factors that affect the sharing of knowledge in organisations. The literature suggests that organisations must develop a certain organisational arrangements to enhance knowledge sharing. These arrangements broadly include organisational structure, culture and human resource practices that have been identified as important factors in contributing to the successful implementation of knowledge sharing in organisations (Martin and Martin, 2011; Hassan and Al Hakim, 2011; Matin et al., 2010; Al-Alawi et al., 2007; Kim and Lee, 2004; Becker, 2001; Myer, 1996). However, most of the literature on knowledge sharing is based on research in developed countries. There is a substantial pool of knowledge from American and European countries, but the understanding of knowledge sharing in developing cultures and countries is limited. The focus of this study is on the contextual factors that affect knowledge sharing in contractor organisations in Malaysia. It is argued that every attempt should be made to look into the organisational factors in such a way that they allow knowledge sharing to become embedded in the organisation. Thus, Almahamid et al. (2010) suggest that a deep understanding of organisational factors and their impact on knowledge sharing in organisations is still needed and much more research should be done. This study investigates the influence of organisational structure, culture and human resource practices on the implementation of knowledge sharing in organisations so that:

- The presented organisational structure, culture and human resource practices provide a better understanding of why it is imperative for organisations to exploit these aspects to achieve effective knowledge sharing.

- The impact of organisational structure, culture and human resource practices on knowledge sharing can be determined. This is crucial to ensure that successful knowledge sharing takes place amongst employees in organisations. Such research will assist organisations to align their decisions with employees' values and perceptions, which are shaped by particular structures, cultures and human resource practices.

- The study of the organisational structure, culture and human resource practices can help managers understand the complexity within organisations, identify problems, determine the best ways to correct them and establish whether the changes would make a significant difference. It is hoped that managers will be encouraged to reflect more critically upon knowledge sharing and its implication for their practices.

- This research is particularly important, as past research of organisational structure, culture and human resource practices in construction organisations did not identify the precise relationship between the different types of organisational structure, culture and human resource practices and its effect on the implementation of knowledge sharing. Hence, this research also provides an important contributions in better understanding the nature and types of organisational structure, culture and human resource practices and knowledge sharing in the context of Malaysian construction organisations, which may be different from those in the more established western context.

Figure 9.1 shows the variables involved in this study: organisational structure (centralisation, complexity, formalisation, stratification); culture (power distance, uncertainty avoidance, masculinity, collectivism, long-term orientation); and human resource practices (recruitment, reward, training, performance appraisal).
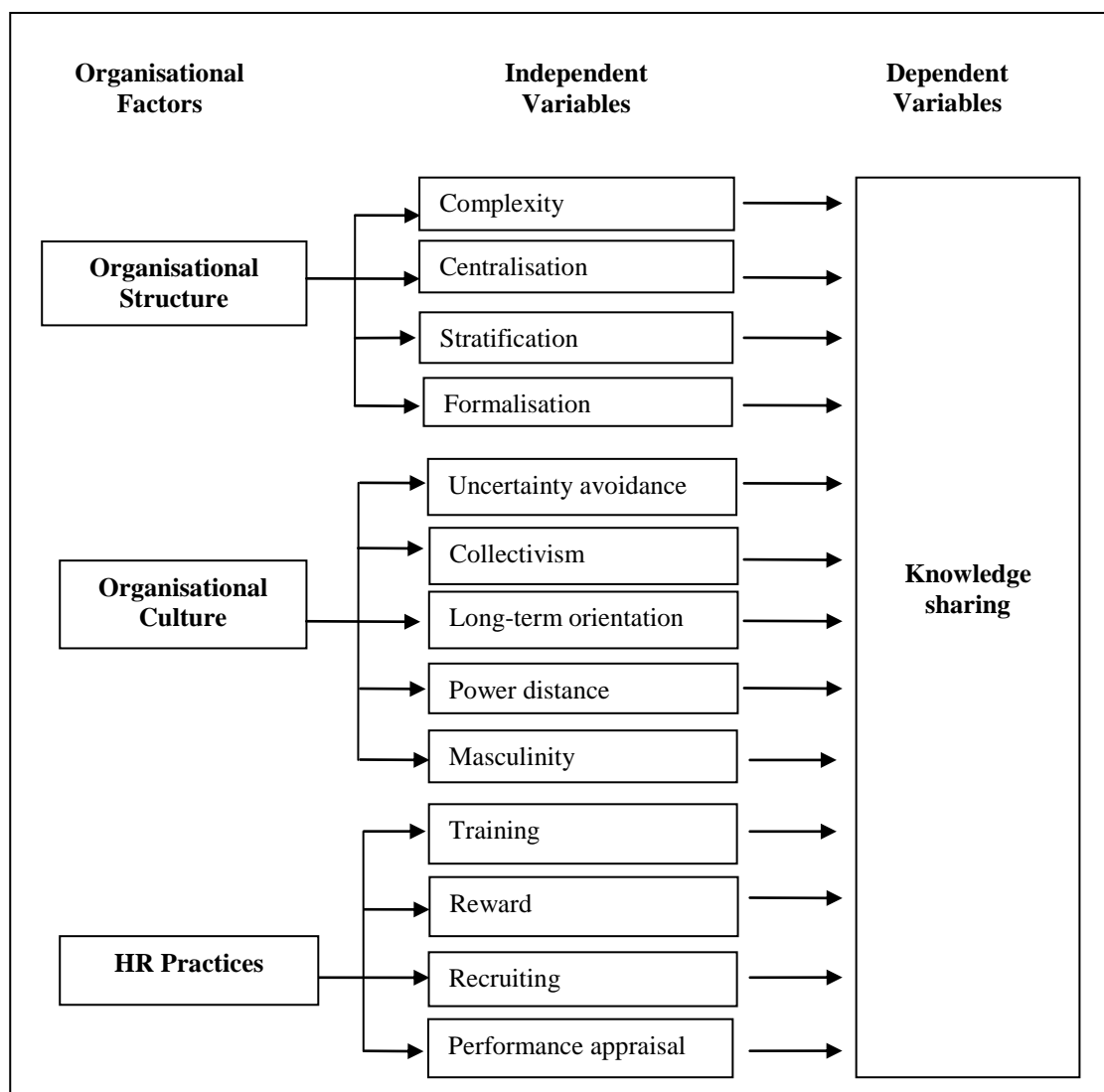
Figure 9.1: The influence of organisational structure, culture and human resource practices on the implementation of knowledge sharing.

The model suggested that each dimension of organisational structure, culture and human resource practices could be related to influence knowledge sharing in organisation. To enhance our understanding of the influence of organisational structure, culture and human resource practices in the implementation of knowledge sharing in organisations, survey questionnaires were sent and semi-structured interviews were conducted. The respondents included managers of contractor organisations in Malaysia. They were asked to indicate the extent to which they perceived the influence of each organisational structure, culture and human resource practices constructs on the implementation of knowledge sharing. A 5-point Likert scale was used: 1 (Very influential), 2 (Influential), 3 (Fairly influential), 4 (Less influential) and 5 (Not

influential at all). A high score indicates a positive correlation. The categories of 'Very influential' and 'Influential' were combined to form the organisational structure, culture and human resource practices constructs that have the 'most influence on the implementation of knowledge sharing in organisations'. Semi-structured interviews were also conducted to elicit managers' opinions on how organisational structure, culture and human resource practices influence the implementation of knowledge sharing in organisations. Content analysis was carried out to analyse the semi-structured interview data. The results are discussed in Sections 9.3, 9.4 and 9.5.

Overall, the analyses were carried out based on two major parts. Part 1 consists of two sub-stages:

- The first stage presents the result of the influence of organisational structure, culture and human resource practices on the implementation of knowledge sharing in organisations at the aggregate level, which deals with the overall mean values of the responses.

- The second stage deals with means, which are ranked based on the degree of influence of organisational structure, culture and human resource practices at the dis-aggregate level (small, medium and large contractors).

Part 2 of the analysis presents the underlying relationships between organisational structure, culture and human resource practices and different sizes of organisation in the implementation of organisational knowledge sharing by means of the Spearman Correlation Coefficient. The next section discusses the influence of each of these variables on the implementation of organisational knowledge sharing.

9.3. The influence of organisational structure on the implementation of knowledge sharing in organisations

9.3.1. Introduction

There are many different definitions of organisational structure. Structure is the arrangement of duties used for the work to be done, and this is best represented by the organisation chart (Jackson and Morgan, 1982). Mintzberg (1993) defines organisational structure as "the sum total of the ways in which it divides its labour into distinct tasks and then achieves coordination among them" (p. 2). Burns and Stalker (1996) said "one has to determine the nature of each individual task; whether the task was abstract or realistic, in order for organisations to determine the right structure" (p. 121). However, according to Pugh (1988), there is no ideal structure, just various options from which to choose the most appropriate. Different types of organisation will need different structures. An organisation that has a number of different core functions may find it advantageous to separate these functions to enable the different cultures and approaches needed to operate.

A number of scholars have highlighted the importance of an organisation's structure and its relationship with knowledge sharing (Hendrix, 2008; Lin, 2008; Al-Alawi et al., 2007; Willem, 2003; Meijaard et al., 2002; Byrne, 2001). For example, Hendrix (2008) discusses the fundamental importance of organisation structure from a knowledge perspective. Hendrix makes suggestions for the design of knowledge intensive firms: 1) reduce hierarchy; 2) only provide the basic outline of production structure; and 3) transfer decisions to connect knowledge worker tasks from the formal to the informal organisation structure. The multiple case study approach of Willem (2006), using a questionnaire in the Belgian divisions of two European companies active in the energy and finance sector, indicates that the organisational structure dimensions affect knowledge sharing. Byrne (2001) argues that organisational structure should play a part in encouraging knowledge sharing. Lin (2008) explores the effects of organisational structure characteristics, interactive relationships between organisation units and the methods to encourage knowledge sharing activities. Lin's (2008) study found that the lower the formalisation of organisational structure, the greater the knowledge sharing among units of an organisation, while the greater the complexity of organisational

structure, the lower the knowledge sharing among units of an organisation. A survey done by Al-Alawi et al. (2007) on various organisations in Bahrain in the public and private sectors revealed that organisational structure is positively related to knowledge sharing. Al-Alawi et al. (2007) conclude that a relationship must exist between structure and knowledge sharing. Meijaard et al. (2002) examined the relationship between organisational structure and performance in SMEs and highlight the importance of understanding organisation structure, both as a dependent and independent variable, in the study of small firms. Based on the above discussion, organisational structure has a key role in the implementation of knowledge sharing in organisations.

Organisational structure has been discussed from many different perspectives. Past studies of organisational structure built on the theoretical framework of Weber (1947). Although numerous scholars have different views and use different evaluation variables in evaluating the perspectives of organisational structure, it is apparent from Table 9.1 that they discuss several common characteristics. Interestingly, when looking at the literature from 1963 to 2011, almost half a century (48 years), there seems to be no real change in the variables that impact organisational structure. Moreover, these authors discuss the variables of organisational structure in different countries; for example, Egbu (2000), Child (1982), and Pugh et al. (1968) from the UK; Samuel and Mannhein (1970) from Israel; Reimann (1973) and Tse (1991) from the USA and Lin (2008) from Taiwan. Once again, there seems to be no differences in the variables these authors use, irrespective of national boundaries. This implies that the variables used for this study are reliable. Some of these studies look at different sized organisations from different sectors. For example, while Miller's work focuses on SMEs, Egbu's (2000) research concentrates on large construction organisations. Similarly, Lin's (2008) research looks into large companies in the hi-tech industry and Ghorbani et al. (2011) studied the Ministry of Education in Iran. Although the terms used by the researchers vary, the differences in their findings demonstrate that the existence of underlying and perhaps universal dimensions of structure is very much open to question. One strong possibility is that the dimensionality of the organisation structure space, rather than being universal, may be contingent on the types of organisations studied and the kinds of situations or environments in which they exist.

Table 9.1 : Summary of perspectives of organisational structure adopted in past studies

Authors	Year	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Hall	1963	✓	✓	✓	✓	✓										
Blau	1967	✓	✓	✓		✓										
Lawerence & Lorsch	1967	✓		✓								✓		✓		
Hage & Aiken	1967	✓	✓	✓		✓										
Puge et al.	1968	✓	✓	✓												
Harvey	1968	✓		✓			✓		✓							
Hickson	1969	✓	✓	✓												
Samuel & Mannhein	1970	✓	✓	✓	✓											
Duncan	1971	✓	✓	✓	✓											
Child	1972	✓	✓													
Hall	1972	✓		✓		✓		✓								
Negandhi & Reiman	1972	✓		✓	✓							✓				
Pennings	1973	✓	✓	✓												
Reimann	1973	✓	✓	✓												
Child	1975	✓		✓												
Pennings	1975	✓		✓												
Eversetal	1976			✓			✓		✓	✓	✓					
Pierce & Delbeco	1977		✓	✓							✓	✓	✓			
Ford & Slocum	1977	✓		✓			✓	✓								
Ford	1979	✓		✓			✓									
Tung	1979	✓		✓												
Schoonhoven	1981	✓	✓													
Blackburn	1982		✓	✓									✓			
Fredrickson	1986		✓	✓									✓			
Miller	1987			✓			✓						✓			
Tse	1991	✓	✓	✓												
Egbu	2000	✓		✓			✓				✓					
Daft	2001				✓	✓									✓	✓
Robbins & Coulter	2003	✓	✓	✓												
Lin	2008	✓		✓			✓									
Ghorbani et al.	2011	✓		✓			✓									

Source: adapted from: Lin (2008), Walton (1981), Sathe (1978)

Legend:

A: Centralisation   I: Diversity
B: Specialisation   J: Stratification
C: Formalisation   K: Differentiation
D: Impersonality   L: Decentralisation
E: Technical qualification M: Span of control
F: Complexity   N: Coordination
G: Administration   O: Departmentation
H: Management and documentation ratio

9.3.2. Variables associated with organisational structure

This study examines four dimensions of organisational structure drawn from the work of Egbu (2000). Egbu's structure dimensions are selected because of the industrial setting (construction industry). Specifically, this study explores the extent to which organisational structure variables (complexity, centralisation, formalisation and stratification) affect the implementation of organisational knowledge sharing. Discussions of the related variables associated with organisational structure, using the work of Egbu (2000), are presented in the following subsections. The characteristics and terms used for variables associated with organisational structure are listed in Table 9.2.

Table 9.2 : Characteristics of organisational structure

Organisational structure characteristics (Egbu, 2000)	Variables
Different types of professionals and task differentiation impact on how knowledge is shared in the organisation.	Complexity
Flexible and decentralised organisational structure impact on knowledge sharing in the organisation.	Centralisation
Formal rules, regulations and controls impact on how knowledge is shared in the organisation.	Formalisation
Different levels of managers impact on how quickly, easily and effectively knowledge could be shared between and among employees in the organisation.	Stratification

9.3.2.1. Complexity and organisational knowledge sharing

The variable 'complexity' of organisational structure refers to the amount of occupational specialisation and task differentiation in the organisation (Egbu, 2003). In theory, occupational specialisation and task differentiation brings together a host of diverse sources of information and knowledge that can be exploited for organisation performance (Egbu, 2003). However, occupational specialisation sometimes leads to a specialist culture, where there is a separation of concerns and reduced knowledge sharing (Becher, 1990). Lin (2008) claims that the higher the complexity of organisational structure, the lower the knowledge sharing among the units of an organisation. Olomolaiye (2007) shows that high levels of task differentiation and occupational specialisation can impact negatively on knowledge sharing. Therefore, a less complex organisational structure is preferred to improve knowledge sharing in organisations.

9.3.2.2. Centralisation and organisational knowledge sharing

The variable 'centralisation' in terms of organisational structure deals with the amount of power distributed among employees in various positions. This variable is measured in terms of hierarchy of authority and participation in decision making (Hage and Aiken, 1967). This means that the decision-making power of a highly centralised organisation is concentrated at the senior executive or top management level. Therefore, centralisation can reduce the communication, commitment and sharing of ideas among employees due to time-consuming communication channels that cause distortion and discontinuousness of ideas (Gold et al., 2001), reduces the opportunity for individual growth and advancement (Kennedy, 1983), and prevents imaginative solutions to problems (Deal and Kennedy, 1982). A high degree of centralisation also infers a less flexible structure.

In a decentralised structure, decision making or authority is distributed among many managers (Mintzberg, 1979) and involves all levels of employee participation in the decision-making processes. Decentralisation enables members to establish lateral ties on their own initiative, without first seeking approval from headquarters (Ryan et al., 2010). A decentralised structure encourages communication (Bennett and Gabriel, 1999; Burns and Stalker, 1961), allowing easier knowledge sharing and retention (Arif et al., 2010; Al-Alawi et al., 2007), the adoption of innovation (Miller, 1971) and higher levels of creativity (Khandwalla, 1977), providing a channel for open and frequent communication as well as the tendency to focus on results rather than turf (McGinnis and Ackelsberg, 1983). This helps to enhance knowledge sharing in organisations, particularly of knowledge that is more tacit in nature (Sharratt and Usoro, 2003). Researchers have shown that knowledge sharing may be facilitated by having a flexible and less centralised organisational structure (Al-Alawi et al., 2007; Riege, 2005; Kim and Lee, 2006). Flexible structures help decision-making processes to be decentralised by facilitating the communication process at all organisational levels (Claver et al., 2007; Chen and Huang, 2007). Therefore, flexibility and decentralisation is more favourable and results in an increase in knowledge sharing.

9.3.2.3. Formalisation and organisational knowledge sharing

The degree of formalisation refers to the extent to which employees' behaviour or activities are bound by the company's formal rules, regulations and procedures (Egbu, 2000; Banner, 1995). Lin's (2008) empirical research on five hi-tech industries in Taiwan found that the lower the formalisation of an organisational structure, the greater the knowledge sharing among units of an organisation. According to Islam et al. (2008), organisations that have a less formal structure tend to provide better communication with employees and business partners. This creates greater flexibility and creativity, which is conducive to knowledge sharing. Conversely, employees operating within formal structures tend to be cautious and conservative. This is referred to as 'vertical' or top-down communication. Such 'vertical' structures raise barriers to knowledge sharing between different divisions because each division operates largely as if it is an independent firm (Lord and Ranft, 2000).

In addition, formalisation tends to reduce employees' discretion in their work activities while increasing the sense of control over employees (Graham and Pizzo, 1996). This condition finally provokes a feeling of impersonality within companies and inhibits spontaneity, experimentation and the freedom of expression necessary for innovative responses to environmental change. Employees' needs are met too slowly, it takes too much time for information to filter down to every level of the organisation (Kluge et al., 2001) and an environment of control is created, which reduces flexibility in knowledge sharing. Hence, formalisation is again ineffective in reaching integration from a knowledge-sharing point of view (Van den Bosch et al., 1999). Therefore, rigid formal rules and documented regulations are disadvantageous to transferring and sharing knowledge amongst departments or individuals. Hence, less formalisation is preferred to improve knowledge sharing.

9.3.2.4. Stratification and organisational knowledge sharing

Another important variable related to organisational structure is 'stratification'. Stratification refers to the span of control of the number of status layers/ levels (subordinate) within an organisation (Egbu, 2000). Spans of control can be either wide, when the work of many subordinates is under the control of one person or a single manager, or narrow, when the work of only a few is supervised, resulting in a hierarchal organisation. Hodge et al. (1996) suggest that there is no 'rule-of-thumb' ratio of

subordinates to managers; rather such decisions are made depending on the ability of managers, the expertise of subordinates, the nature of the work, the degree of vertical and spatial differentiation and the organisational approach to delegation and empowerment. The same authors explain that organisations with broad spans of control tend to have few levels of hierarchy (less vertically complex) and are regarded as flat. Organisations with narrow spans of control tend to have more levels of hierarchy (more vertically complex) and are taller (Hodge et al., 1996). Explaining the impact of the variable 'stratification' in terms of organisational structure on knowledge sharing, Aziz and Sparrow (2011) argues that a deep hierarchy or narrow span of control affects the vertical sharing of knowledge, and the very strict boundaries around each team does not facilitate teams in any informal knowledge-creation and sharing process. Olomolaiye (2007) also suggests that a flatter structure helps to reduce the barriers between managers and staff and allows clear and rapid decision-making. Thus, organisations with a flatter, less hierarchical structure may benefit from increased levels of knowledge sharing.

Based on the above discussion of organisational structure dimensions, this study explores the influence of organisational structure (complexity, centralisation, formalisation and stratification) on the implementation of knowledge sharing in organisations. To commence the analysis, the extent to which organisational structure influences the implementation of knowledge sharing in organisations will be presented at the aggregate level (Subsection 9.3.3). This will be followed by the analysis of the influence of organisational structure on the implementation of knowledge sharing in organisations at the dis-aggregate level (small, medium and large contractors) (see Subsection 9.3.4). Tables 9.3, 9.4 and 9.5 summarise the results of the study.

9.3.3. The extent to which organisational structure influence the implementation of knowledge sharing in organisations: aggregate level

Table 9.3 : The extent to which variables associated with organisational structure influence the implementation of knowledge sharing in organisations.

Organisational structure	Very influential	Influential	Fairly influential	Less influential	Not influential at all
	%				
Complexity	9.60	49.20	32.60	7.60	1.00
Centralisation	9.60	47.10	35.20	6.50	1.60
Formalisation	11.70	42.70	37.80	6.30	1.60
Stratification	10.90	42.20	41.10	4.40	1.30

Table 9.4 : Mean score of organisational structure variables in the implementation of knowledge sharing in organisation: Aggregate level.

Organisation structure	Overall (N=384)	
	Mean	Rank
Complexity	2.41	1
Centralisation	2.43	2
Formalisation	2.43	3
Stratification	2.43	4

Meaning of scale (the extent of influence)

1 (Very influential), 2 (Influential), 3 (Fairly Influential), 4 (Less Influential) and 5 (Not Influential at all)

Table 9.4 presents descriptive statistics gleaned from the questionnaire survey on Egbu's structural dimensions scale. It represents the overall mean scores and the ranking of the survey respondent groups' opinion on the extent to which variables associated with organisational structure influence the implementation of knowledge sharing in organisations. As the mean score increases, the degree of influence of organisational structure decreases.

The result shows that the mean scores range from 2.41 to 2.43. However, where two or more variables had the same mean, priority was given to the lowest standard deviation figure, since the lower S.D indicates that the data is less spread out and therefore the average is more likely to be valid for the majority. Nevertheless, the difference between the mean scores (2.41 and 2.43) for all organisational structure dimensions is very small (0.02). This means that Malaysian contractors have a mixture of the variables complexity, flexibility and decentralisation, formalisation and stratification in terms of organisational structure that influence the successful implementation of knowledge sharing in organisations. This means that there is a general agreement among participants that organisational structure influences the successful implementation of knowledge sharing in organisations (all factors scored above the average mean score of 3.00).

Complexity and organisational knowledge sharing

Table 9.3 shows that almost 60% of respondents regard 'complexity' as having the greatest influence on the implementation of knowledge sharing in organisations and was ranked 1st with a mean of 2.41 (Table 9.4). A possible explanation is that within project-based industries it is common for organisations to split departmentally or functionally according to occupational specialisation and task differentiation (Egbu, 2003). In specialised structures like construction organisations, employees tend to seek only knowledge relevant to their work (Egbu, 2003). This, in turn, tends to reduce opportunities to share and learn across units (Lichtenstein et al., 2004). While this research highlights the negative effects of 'complexity' in terms of organisational structure on the implementation of knowledge sharing in organisation (Subsection 9.3.2.1), managers should note that, according to some experts, 'complexity' can be better managed to reduce such concerns. Garcia et al. (2003) for example, suggest the need for teams to experience the work of other teams to create a common framework of working routines and habits in order for people to work together and at the same time to capitalise on and encourage difference and variety, e.g. specific expertise that would allow for both innovation and creativity within the team and the wider organisation to achieve better knowledge sharing. It has been suggested that reducing hierarchical constraints and increasing inter-unit social interaction are the directions that managers may pursue to encourage internal knowledge flow and enhance the capabilities of their organisation (Tsai, 2002). Regular informal interactions and a range

of formal knowledge sharing approaches, such as update meetings, newsletters and recognition sessions, could facilitate knowledge sharing (Willem and Buelens, 2006). Hales' (2003) study of middle managers suggests that managers find it difficult to lead and coordinate empowered employees and that a focus on middle managers and their skill development could prove valuable.

Centralisation and organisational knowledge sharing

The variable 'centralisation' in terms of organisational structure is one that contractors find very influential on the implementation of knowledge sharing in organisations. This variable is ranked 2nd for degree of influence by 57% of the survey respondents (see Table 9.3) with a mean of 2.43 (Table 9.4). Structure is more centralised in construction organisations (Carilo et al., 2000). For example, the organisational levels that can be found in this study are: managers, heads of projects, heads of units and heads of departments. However, there are many more internal and administrative levels in terms of pay. This increasingly centralised structure inhibits an individual's capacity to generate ideas and share knowledge with others, therefore stifling an organisation's capacity to learn, innovate and exploit knowledge for team working (Egbu, 2003; Sharratt and Usoro, 2003).

Centralisation can influence knowledge sharing in organisations in a variety of ways (Subsection 9.3.2.2). In order for knowledge sharing to occur within organisations, construction organisations need to focus on describing the degree of employees' involvement in decision making, which is the level of democracy in an organisation. Employees should be given adequate freedom and autonomy in the decision-making process, especially for decisions that are related to or affect their work (Johari and Yahya, 2009). In the same vein, Al-Alawi et al. (2007) emphasises that an organisational structure characterised by an increased level of participation in decision making, ease of information flow and cross-functional teams contributes positively to support knowledge sharing.

Formalisation and organisational knowledge sharing

Another organisational structure variable that contractors find very influential on the implementation of knowledge sharing in organisations is 'formalisation'. This variables is ranked 3rd in degree of influence by 54% of the survey respondents (Table 9.3), with a mean of 2.43(Table 9.4). The existence of certain rules, regulations and written

documents in construction organisations becomes necessary in order to keep control over the whole organisation. However, in construction organisations, strong formalisation leads to levels of bureaucracy with the usual inefficiencies (Willem, 2006). Even horizontal coordination is still rather formal. Numerous studies have demonstrated the effects of formalisation on the successful implementation of knowledge sharing in organisations (see Subsection 9.3.2.3). Therefore, it is suggested that construction organisations should create a flexible and non-hierarchical organisational structure. As suggested by O'Dell and Grayson (1998), organisational structure should be designed for flexibility as opposed to rigidity to encourage sharing and collaboration across boundaries within the organisation and across the supply chain. However, this effect can also be achieved by maintaining the formal hierarchal structure while adding the dimension of flexibility (Nonaka and Takeuchi, 1995). In addition, Nonaka and Takeuchi (1995) indicate that a combination of a formal organisational structure and a non-hierarchical self-organising organisational structure can improve knowledge creation and sharing capabilities.

Stratification and organisational knowledge sharing

Of the respondents, 53% regard 'stratification' in terms of organisational structure as the least influential, and was ranked 4th by the survey respondents. For effective knowledge sharing it is suggested that construction organisations should create opportunities for employee interactions to occur, and employees' rank, position in the organisational hierarchy and seniority should be de-emphasised to facilitate knowledge sharing. As suggested by Gold (2001), breaking down hierarchies in the organisation will encourage knowledge sharing and create an open, non-hierarchical office culture, which allows everybody to contribute to practices, because in knowledge-sharing organisations there are always shared ideas and information.

Having considered the influence of organisational structure on the implementation of knowledge sharing in organisations at the aggregate level, the next section focuses on the influence of organisational structure on the implementation of knowledge sharing in organisations at the dis-aggregate level, namely small, medium and large contractors.

9.3.4. The extent to which organisational structure influence the implementation of knowledge sharing in organisations: dis-aggregate level

Table 9.5 : Mean score of the influence of organisational structure variables on the implementation of knowledge sharing in organisations: dis-aggregate level

Organisation structure	Small (N=294)		Med (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Complexity	2.40	1	2.40	3	2.56	3
Centralisation	2.45	4	2.35	1	2.48	1
Formalisation	2.44	3	2.37	2	2.48	2
Stratification	2.41	2	2.45	4	2.64	4

Meaning of scale (the extent of influence)

1 (Very influential), 2 (Influential), 3 (Fairly Influential), 4 (Less Influential), and 5 (Not Influential at all)

The approach adopted in analysing data at the aggregate level is also employed at the dis-aggregate level for SMEs and large construction organisations. As mean score increases, the degree of influence of organisational structure on the implementation of knowledge sharing decreases.

Table 9.5 reports the extent to which organisational structure influences the implementation of knowledge sharing in organisations as perceived by managers in small, medium and large construction organisations. Table 9.5 shows a substantial variation in the results for different size of organisation. For medium and large contractors, the mean values appear to be very similar. As a result, the ranking order of the factors is also similar. However, a closer look at the mean values for small contractors reveals that the ranking order appears to have only few deviations to the ranking of the overall mean values (Table 9.5 at the aggregate level). 'Centralisation' and 'formalisation' appear to be two key organisational structure variables that influence the implementation of knowledge sharing.

Complexity and organisational knowledge sharing

At the dis-aggregate level, the result shows that 'complexity' of organisational structure is ranked 1st by small contractors and 3rd by both medium and large contractors. This means that 'complexity' of organisational structure impacts knowledge sharing in small construction organisations more than in medium and large construction organisations.

This is possibly because small construction organisations have a low degree of employee specialisation and task differentiation (i.e. engineers, architects and designers), hence the impact that task differentiation has is minimal. Small organisations also seem to be more generalist in that they perform a variety of tasks and often have simple organisational structures without high levels of departmentalisation. A low degree of specialisation may lead to inadequate expertise in implementing knowledge management in an organisation (Wong and Aspinwall, 2004). One advantage that larger organisations have over smaller organisations is the level in specialisation in their roles, which gives them better expertise in implementing knowledge sharing. This finding supports the study done by Pugh et al. (1969), which concluded that "an increased scale of operation increases the frequency of recurrent events and the repetition of decisions," which makes standardisation preferable.

This finding is supported by the comments of managers in the interviews:

Small contractor:

We do have a different professional background such as engineer, QS, QA & QC officers, safety officers and also operators. By having this it will help [the] company to solve a problem, especially in the meeting when everybody gets together and doing brainstorming. I can get different views from different people. In this case knowledge sharing is really needed.

Medium contractor:

Our company is not that big. Normally we share our knowledge through discussion, face-to-face conversation. We do have a systematic manual of works on how works [are] to be done. However, in this company, we are very multi-tasking oriented. So everybody does not have clear jobs. Even though we do have a clear scope of works in our offer letter, with this multi-tasking environment I can say that indirectly our staffs have to take note of their surroundings. Means that they have to have some ideas regarding a particular project, what happens to the project and the company as well. We will discuss, sharing our opinion and sit together to solve the problems. That knowledge sharing can be done through this informal multi-tasking approach.

Large contractor:

In this company, every staff has a clear line of responsibility and authority. So, all staff will focus on their work. The weakness is that staff will not [be] aware of the other staff works. They will only share knowledge if necessary. All staff need to finish up their task based on the given deadline.

Centralisation and organisational knowledge sharing

The impact of centralisation in terms of organisational structure on knowledge sharing in the organisation was ranked 1st by medium and large construction organisations and 4th by small construction organisations. This may be because small organisations are perceived to be more flexible and decentralised with a flatter hierarchy and a limited number of superior personnel, who are expected to be accessible to their subordinates. In small organisations with few layers of management, everyone has the potential to contribute to the decision-making process; in fact, everyone is assumed to have equal rights. As such, employees consider it their right to participate in decisions that concern them (Sagie and Aycan, 2003). As Child and Mansfield (1972) state, "Larger organisations are more specialised, have more rules, more documentation, more extended hierarchies, and a greater decentralisation of decision-making further down such hierarchies." In other word, the impact of size on this dimension expands at a decreasing rate as size increases.

In addition, larger organisations are more centralised, bureaucratic and less flat. For example, large organisations are focused more on efficiency, which constrains or impedes knowledge-sharing behaviour. However, smaller organisations, with greater flexibility, decentralisation and focus on effectiveness, can facilitate knowledge-sharing behaviour. Hence, small organisations have an advantage over medium and large organisations in respect of their flexible and decentralised structure in implementing knowledge sharing, which is consistent with previous studies. Rasheed (2005) theorises that SMEs have a much simpler, flatter and less intricate structure, which eases change initiatives across the entire organisation, since functional integration, both horizontal and vertical, is easier to attain. He further iterates that fewer complications will be encountered by SMEs in implementing knowledge sharing, as they have an advantage over large organisations in respect of this structure. Therefore, to encourage rapid

knowledge sharing, construction organisations should have a flat and decentralised structure, thus removing and changing some barriers to knowledge sharing

The statements of the manager's attests to the benefit of a more open, flexible, flatter and decentralised structure:

Small contractor:

"Decision-making here is done by the top management level, which is by the owner (managing director) and also appointed managers. All staff won't be able to make decisions without manager approval, especially when it is involving decisions on money matters. Normally, top management make a decision based on their knowledge and experience. We try to avoid loss. In this context, knowledge sharing is not happen here. Staff will do accordingly to the decision made because they do not want to take risks."

Medium contractor:

"We do not have a specific power or authority flow. Sometimes even though our managing director does not give any instruction, but if we realise that it is important for company, we have to sit together and discuss. This discussion (share knowledge) will encourage staff to be more creative and responsible for whatever decision they have made. I as QS sometimes will instruct them if I think it is necessary. However, I still need to inform managing director after that. Info not necessarily comes from the top management. It can be from others. However, we are free to do our work and the manager(s) will only interfere whenever necessary."

Large contractor:

"We allow head of departments to make their own decisions as long as it is within their scope of work. Basically, the decisions are based on their cooperation and discussion. I will make decision if it does not contradict with comp's interest. Through informal discussion we can straight away jump into the decisions. Effective yet fast decisions are important, as we don't want any delay, especially work at the site. If you have to go through all level managers, the decision process will become rigid and things are going to be slow. The decisions will be informed to the top management later."

Formalisation and organisational knowledge sharing

'Formalisation' in terms of organisational structure was ranked 3rd by small construction organisations and 2nd by medium and large construction organisations. This finding is supported by Pugh's (1988) study, in which he found that increased size is associated with greater specialisation and formalisation. Larger organisations usually require a more intense framework for their organisational structure. Organisations with more employees usually require more managers to supervising them. Complex business operations can also require a more formal organisational structure. Obviously, size influences formalisation.

Larger contractors have a greater need to formalise their activities than small contractors. This means that formal rules, regulations and controls influence medium and large contractors more than small contractors in implementing knowledge sharing. As an organisation grows, however, it becomes increasingly difficult to manage without more formal work assignment and some delegation of authority. Therefore, larger organisations develop formal structures. Tasks are highly specialised and detailed rules and guidelines dictate work procedures. Inferences may be drawn that this result is related to the attributes of the larger contractor, whose employees have higher levels of autonomy. Therefore, rigid formal rules and documented regulations are more disadvantageous for transferring and sharing knowledge amongst departments or individuals.

This study reveals that written reports and formal communication mechanisms are used much more in medium and large construction organisations than small construction organisations. As supported by Schminke et al., (2000), the degree of formalisation in large and medium organisations is higher because there is a greater use of strategic plans, orientation kits, professional development guidelines, job descriptions, policy manuals and the like, which dictate to employees how they are to go about particular activities. It was found that small construction organisations use informal approaches to knowledge sharing (Subsection 5.4.2 in Chapter 5), for example face-to-face communication. In larger organisations, decisions have to be made about the delegation of various tasks. Thus, procedures are established that assign responsibilities for various functions. The statement of a manager from a small construction organisation attests to this:

Small contractor:

"*In the appointment letter, we will specify their scope of work and they know who to report and to ask if they have a problem. However, it is in general and not detail. Normally, staff will discuss among themselves and they won't ask top level management, maybe because they afraid if the manager know they lack in certain knowledge. However, we do have a document or work procedure on how to do a work and staff can also refer to the document*".

Stratification and organisational knowledge sharing

The impact of different levels of managers on how quickly, easily and effectively knowledge is shared between and among employees in the organisation (stratification) was ranked the second most influential factor affecting knowledge sharing by small organisations. However, medium and large organisations ranked this fourth. This means that large and medium organisations are more stratified with many tiers of hierarchy compared to small organisations. The literature suggests that a hierarchical structure does not foster interaction among employees, and therefore does not foster knowledge sharing (Smith and McKeen, 2003; Hwang, 2003; Soo et al., 2002; Bhatt, 2001). In fact, Smith (2003) states that research have repeatedly shown that organisational demographics, particularly large size and formal status differentials, have a negative influence on knowledge sharing. As such, it is recommended that organisations' structure should match the knowledge-sharing strategy; for example, creating teams that cut across organisational functions in order to share, and perhaps create, new knowledge.

Small contractor: "*This company is a small company. We only have 28 staff. So the level of hierarchy is not complicated. Normally staff will be direct to me as a project manager or director of the company and we will discuss, share our knowledge on any issues raised and solve any problem quickly*".

Having considered the influence of organisational structure on the implementation of knowledge sharing in organisations at the aggregate and dis-aggregate level, the next section examines whether there is any relationship between the degree of influence of organisational structure and size on the implementation of knowledge sharing.

The relationship between organisational structure and different sizes of organisation in the implementation of knowledge sharing in organisations.

This section examines the relationship between the influence of organisational structure and size on the implementation of knowledge sharing. In other words, to ascertain if larger construction organisations perceive organisational structure to be more influential than smaller construction organisations to the implementation of knowledge sharing. This was investigated using Spearman rho. It is hypothesised that:

H1: There is a relationship between organisational structure and different sizes of organisation in the implementation of knowledge sharing in organisations.

Table 9.6 : Correlations between organisational structure and size of organisations

			Size of organisation	Organisational Structure
Spearman's rho	Size of organisation	Correlation Coefficient	1.000	.008
		Sig. (2-tailed)	.	.871
		N	384	384
	Organisational Structure	Correlation Coefficient	.008	1.000
		Sig. (2-tailed)	.871	.
		N	384	384

The result in Table 9.6 shows that there is a relationship between organisational structure and size in the implementation of knowledge sharing (r = .008, N = 384, p ≥ 0.05). This value is not significant at the 5% level. The null hypothesis is not rejected. In other words, larger organisations are not necessarily more influenced by organisational structure than smaller organisations. This means that there is no substantial evidence to suggest that the elements of organisational structure that larger organisations perceive as influent are different from those perceived as influential by smaller organisations in the implementation of knowledge sharing. Irrespective of the size of the organisation, it is advocated that managers should harmonise knowledge sharing with the organisational culture in order for the practices to be supported. Having highlighted the influence of organisational structure on knowledge sharing, the study now examines the influence of organisational culture variables on the implementation of knowledge sharing in organisations.

9.4. The influence of organisational culture on the implementation of knowledge sharing in organisations

9.4.1. Introduction

The term 'culture', and more specifically 'organisational culture', has recently become a buzz word in management studies and have been researched extensively. Both practising managers as well management researchers are fascinated with this subject. One of the most important reasons for their increased interest is the assumption that certain organisation cultures lead to an increased level of organisation outcomes (Schein, 1990). For example, a positive relationship has been found between organisational culture and productivity (Ouchi, 1981), organisational effectiveness (Sinha, 1990; Peters and Waterman, 1982), organisational performance (Wan Yusoff, 2011; Abu-Jarad et al., 2010), competitive advantage (Scholz, 1987; Barney 1986), innovativeness (Egbu and Botterill, 2001; Egbu, 2000) and knowledge sharing (Suppiah and Sandhu, 2011; Al-Adaileh, 2011; Abzari and Teimouri, 2008; Issa and Haddad, 2008; Al-Alawi et al., 2007; McDermott and O'Dell, 2001; DeLong and Fahey, 2000).

There is no commonly agreed definition of organisational culture in the management literature (Alvesson, 2002). For example, at the organisation level, culture is widely defined as a collection of values or beliefs about the organisation shared by the members of the organisation (Schein, 2004), and is manifested through the business practices and conduct (Hartmann, 2006). Another widely cited definition of the term is Hofstede's (2001; p.1), who refers to organisational culture as the 'collective programming of the mind' that differentiates one organisation from another. A range of typologies of culture is available in order to understand culture, as depicted in Table 9.7.

Organisational culture can be observed through norms, actions and rules, which are developed through communications and relationships among the organisation's members (Martins and Terblanche, 2003), and can therefore be influenced and open to changes (Jarratt and O'Neill, 2002). This interaction helps members understand how the organisation operates, which subsequently influences their judgments and behaviours (Hartmann, 2006). This organisational culture classifications prove that there is a possibility of more than one culture in an organisation, and exists at multiple levels and these multiple levels generate the inconsistent ways people behave in communities or organisations. (Jarratt and O'Neill, 2002).

Table 9.7 : Classifications used to describe culture.

Source	Observable
Sathe (1983 in Lewis, 2001)	Culture can be observed in broad categories of behaviour: • Shared sayings • Things • Doings • Feelings
Hofstede (1984)	Culture can be observed in work related value differences • Power distance • Uncertainty avoidance • Individualism/collectivism • Masculinity/femininity • Long-term and short-term orientation
Trompenaars (1993)	Culture can be observed in a range of dimensions: • Individualism versus collectivism (group behaviour) • Universalism versus particularise (rules versus relationship) • Neutral versus emotional relationship • Specific versos diffuse involvements achievement versus • Ascription in power and status
Martin Terblanche (2003)	Culture can be observed in the aspects of an organisation on which culture can have an influence, and vice versa: • Mission and vision • External environment • Means to achieve objectives • Image of the organisation (to the outside world) • Management processes • Employee needs and objectives • Interpersonal relationship leadership
Schein (2004)	Culture can be observed using a complex of specific categories: • Observed behavioural regularities when people interact (language, customs, traditions, rituals) • Group norms • Espoused values • Formal philosophy • Rules of the game • Climate • Embedded-skill • Habits of thinking, mental models and linguistic paradigms • Shared meanings • 'root metaphors' or integrating symbol • Formal rituals and celebrations
Schein (2004)	Level of culture can be observed in: • Tacit assumptions (widely held, ingrained subconscious views of human nature and social relationship) • Espoused values (preferences for alternative outcomes, and means of achieving those outcomes day-to-day behaviour, or artefact (rituals, slogans, traditions and myths reflecting values) • Comparison of these

Adopted from Clayton et al., (2008)

There is general agreement among scholars and practitioners that development of a knowledge-sharing culture in an organisation is an important aspect that needs to be addressed by the management of any knowledge-based organisation. Gold et al. (2001) clearly identified that effective knowledge sharing is best supported by a knowledge-friendly culture. For knowledge sharing to work, organisations first have to have an open culture that accepts sharing. Allday (1997) highlights that "having (an) open and participative culture which values the skills and contributions of employees at all levels are critical". Stoddart (2001) argues that "knowledge sharing can only work if the culture of the organisation promotes it". An appropriate organisational culture can encourage people to create and share knowledge (Holsapple and Joshi, 2001; Leonard-Barton, 1995). Studies by De Long and Liam (2000) show that culture influences knowledge sharing by as much as 80%. Haque and Anwar (2012) investigated the extent of knowledge management practices in banking sector of Pakistan reveal that organisational culture contributes positively and significantly in the enhancement of knowledge sharing practices among employees. Malhotra (2003) advocates strongly the need to develop a culture where learning, sharing and creating knowledge is present at all levels. He predicts that this will be a sign of successful organisations in the future. McDermott and O'Dell (2001) found that organisational culture does affect the level of knowledge sharing. To achieve appropriate results, organisations may have to consider a targeted cultural-change programme. Consequently, to effectively develop a knowledge-sharing culture, there needs to be changes to the culture of the organisation. This approach is based on the fundamental premise that it is management's role to motivate employees to foster a knowledge-sharing culture.

In the context of construction organisations, much research reveals the influence of culture on knowledge sharing. Egbu and Botteril (2001) for example, state that due to the project-oriented nature of construction organisations, cultural considerations are important for successful knowledge sharing. They continue by stating that short-term, task-focussed work can promote a culture which inhibits continuous learning. The importance of people and culture to knowledge sharing is reported by Kamara et al. (2005), who state that the transfer of project knowledge is dependent on the people involved and that the key issue is the relationship between "individual knowledge" and "shared organisational knowledge"; in other words, how much knowledge is retained by the individual and how much is held across the organisation. There is s variety of

culture variables that combine in complex ways to influence the willingness of construction employees to share their knowledge. Egbu and Robinson (2005) provide a list of various aspects of organisational culture that support knowledge management efforts in construction organisations, and also recognise the various aspects of culture that may affect an organisation negatively.

From the above discussion, it appears that organisational culture does play an important role in promoting the implementation of knowledge sharing for organisational success, and this can be only achieved by ensuring that an appropriate culture is adopted to match managerial values, attitudes and behaviours. Despite the recognition given to the importance of organisational culture, its influence on knowledge sharing has attracted little interest among researchers (Islam et al., 2011; Sackmann and Friesl, 2007; Syed Ikhsan and Rowland, 2004), particularly in developing countries. Most studies on organisational culture and knowledge sharing have focused on developed countries such as the USA and European countries (Jones et al., 2011; Issa and Haddad, 2008; Al-Alawi et al., 2007; McDermott and O'Dell, 2001). There is very little literature regarding organisational culture studies in the context of Malaysia, particularly on how organisational culture influences the implementation of knowledge sharing in Malaysian construction organisations. Among the limited studies is the work of Wei and Mohammed (2007), which focuses on the general organisational factors which influence knowledge sharing in construction organisations.

To fill in the gap, therefore, this study reports the result of a survey designed to answer the research question: "What degree of influence does organisational culture have on the implementation of knowledge sharing in organisations?" (Table 1.1 in Chapter 1.) This study also examines three different sizes of construction organisation in Malaysia: small, medium and large. Intuitively, one would assume that the cultural context of these different sized organisations plays an important role in how knowledge is shared. Although scholars do not necessarily agree on how the context in which a group is embedded impacts function, they agree that there is an influence (e.g. Williams, 2001; O'Connor, 1997; Sutton and Hargadon, 1996; Zack and McKenney, 1995). This study further examines the relationship between the dimensions of organisational culture and different sizes of construction organisation in Malaysia through an empirical analysis to provide additional insights into this important relationship. It is argued that in order to

support knowledge sharing, construction organisations in Malaysia must exhibit certain organisational cultures.

For the purpose of this research, the organisational culture theory and dimensions of Hofstede (1984) have been adopted as the theoretical base for the questions. Specifically, this study examines the extent of organisational culture regarding uncertainty avoidance, individualism, power distance, long-term orientedness and the masculinity impact on the implementation of knowledge sharing in organisations. Although Hofstede's work has been criticised on a number of points and by various authors (Gerhart and Fang, 2005; Sondergaard, 1994; Tayeb, 1994), the usefulness and popularity of the categories he developed has meant that this theory remains very popular and is utilised by scholars in a variety of fields and is supported by other authors (e.g. WanYusoff, 2011; Catana and Catana, 2010).

Hofstede's cultural dimensions are selected for several reasons: the first is that they have been cited by researchers in the past few decades. Secondly, Hofstede's work on work-related cultural dimensions is the most widely used national culture framework in psychology, sociology, marketing and management studies (Soares et al., 2007). Thirdly, Hofstede's cultural dimensions have been validated through a worldwide study of IBM employees in 40 countries, adopted widely in various sectors and countries (Cheung et al., 2011) and used in early organisational culture studies in Malaysia (Kamal, 1988; Jaina et al., 1997; Asma, 1992). Fourthly, Hofstede's cultural dimensions were developed based on "rigorous research design, a systematic data collection, and a coherent theory to explain national variations" (Sondergaard et al., 1994). Fifthly, although the dimensions identified by Hofstede refer to national culture, they can all have a direct impact on the management of knowledge (Ikhsan and Rowland, 2004). In fact, recent research on Hofstede's cultural dimensions in organisations may help to increase our understanding of the dynamics of knowledge sharing (Wan Yusoff, 2011; Harorimana, 2010; Lucas, 2006). This body of research can therefore be considered highly relevant. Finally, there is a lack of research into Malaysian cultural values, and research objective number seven aims to redress this. Practically, the result is valuable to construction organisations; it helps them to be knowledgeable by highlighting cultures which are conducive to knowledge sharing, thus helping them to face the many challenges of stricter environment regulations, demanding clients, increasing costs and stiff competition. Although this research adapting the sharing cultural values previously

was applied within the Western environment, given the context that Malaysia is becoming a modern, post-industrial nation with multinational and global interests, it is expected both eastern and western cultures will be affecting Malaysian society today (Merriam and Mohamad, 2000). Discussions of the variables associated with organisational culture using the work of Hofstede (2001; 1984) are presented in the following subsections.

9.4.2. Variables associated with organisational culture

The characteristics of and terms used for variables associated with organisational culture are given in Table 9.8 below.

Table 9.8 : Characteristics of organisational culture

Organisational Culture Characteristics (Hofstede, 2001)	Term used
Members of an organisational society feel threatened by uncertain situations, unknown, ambiguous or unstructured situations, which impacts knowledge sharing in the organisation.	Uncertainty Avoidance
Individuals are integrated into groups, having collective achievements and interpersonal relationships, which impacts knowledge sharing in the organisation.	Collectivism
Long-term as opposed to short-term orientation (or way of thinking) impacts knowledge sharing in the organisation.	Long-term orientation
Less powerful members of the organisation expect and accept that power is distributed unequally, which impacts how knowledge is shared in the organisation.	Power distance
Focus on emotional roles between women and men, which impacts how knowledge is shared.	Masculinity

9.4.2.1. Uncertainty avoidance and organisational knowledge sharing

Uncertainty avoidance reflects the "extent to which members of organisation society feel treated by uncertain or unknown situations" (Hofstede, 2001). High uncertainty avoidance cultures are characterised by formalised management and the constraint of innovation by rules (Hofstede, 2001). Furthermore, employees in this type of culture believe that an organisation's rules should not be broken. People will seek to reduce uncertainty and limit risk by imposing formal rules and regulations in order to reduce the amount of uncertainty, and are less inclined toward change (House et al., 2002). For example, where there is a need for rules and dependence there will be a pyramidal

organisational structure. Employees comply with written and unwritten company rules even in situations where the company would benefit from breaking those rules (Hofstede, 2001). A high level of uncertainty avoidance clearly prevents the knowledge sharing process in terms of creativity, proactivity and attitudes towards innovation (Oltra, 2005). In low uncertainty avoidance organisations there are fewer written rules and rituals. People tolerate ambiguous and unstructured circumstances. Therefore, low uncertainty avoidance is preferred in improving knowledge sharing in organisations.

9.4.2.2. Collectivism and organisational knowledge sharing

'Individual-collectivism' in terms of organisational culture refers to how people value themselves and their groups/organisations. Individualist cultures value personal achievement while collectivist ones emphasize the benefits of working in a social group. People in individualist cultures tend to take care of themselves and their nuclear or immediate families only, while in a collectivistic society, people distinguish between in-groups and out-groups; they expect their in-group (relatives, clan, organisation) to look after them, and in exchange for that they feel they owe absolute loyalty to the society (Hofstede, 2001; 1991). Ford and Chan (2003) mention that in individualistic cultures there is a possibility that it is more difficult to share knowledge, as individuals view knowledge as a source of power and a tool for success for oneself. In addition, they state that knowledge sharing is much easier in collective cultures, especially if the group sees a benefit from it. Therefore, a collectivist organisational culture is preferred in improving knowledge sharing in organisations.

9.4.2.3. Long-term orientation and organisational knowledge sharing

A long-term orientation culture focuses on the future and prescribes to the values of long-term commitments and great respect for tradition. The long-term orientation dimension describes the motivation of members of a culture to work towards long-term goals (Hofstede, 2001). Values associated with long-term orientation are thrift and perseverance. Short-term orientations, on the other hand, do not reinforce the concept of long-term and traditional orientation. Organisations with a short-term orientation focus on the past and on quick results (Hofstede, 2001). Values associated with short-term orientation include "fostering of virtues related to the past and present, in particular, respect for tradition, preservation of 'face' and fulfilling social obligations" and protecting one's 'face'. Reciprocation of gifts and favours are valued more (Ford and

Chan, 2003: p. 14). Since knowledge sharing is a process with a high payoff in the long term, it can be said that a long-term oriented culture is more willing to practise knowledge sharing (Ford and Chan, 2003). Therefore, a long-term organisational culture is preferred in improving knowledge sharing in organisations.

9.4.2.4. Power distance and organisational knowledge sharing

Power distance refers to the degree that subordinates in organisations agree to the imbalance of power dissemination (Hofstede, 2005), such as accepting the decisions made by their superiors and the extent to which subordinates are allowed to participate in decision-making (Cheung et al., 2011). High power distance organisations are characterised by tall hierarchies, in which the relationships between superiors and subordinates are stricter than in low power distance organisations. Subordinates fear to disagree with their superiors. In low power distance organisations, subordinates are more likely to express their opinions and participate in managerial decisions. Subordinates prefer a more democratic style of leadership with more independence in decision-making. Hofstede (2001) points out that in a high power distance culture, information flows are restricted by the hierarchy, which can lead to lower level employees being prohibited from certain types of information. Such hierarchy structures could act as an obstacle to knowledge sharing. It is also plausible that in cultures with a high power distance, hoarding knowledge with the reason that "knowledge is a power" is less attractive, because power is more fixed than in cultures with a low power distance. Therefore, it is argued that a culture that is high in power distance and is distributed unequally may impact on how knowledge is shared among individuals in an organisation.

9.4.2.5. Masculinity and organisational knowledge sharing

Masculinity-femininity does not refer to gender (King, 2007). However, there are some gender implications in organisations. A masculine organisation culture has a different personality, work values and management styles than a feminine one (Signh, 1994). As a result, an organisation led by male managers probably has different characteristics from organisations led by gender-diverse management teams. An organisation reflects masculinity with "merit based opportunities for high earning, recognition, advancement, and rewards" (Newman and Nollen, 1996, p.759). Hofstede's (2001) notion is that a culture ranking high in masculinity emphasises achievement, earnings and

assertiveness, while those that reflect femininity emphasise the quality of interpersonal relationships (Newman and Nollen, 1996), favour personal goals, the quality of life, group decision-making, a friendly environment and nurturance (Hofstede, 2001). In a feminine environment, values such as caring and modesty are more dominant, both for men and women (Hofstede and Bond, 1984). This feminine environment of cooperation makes employees feel secure sharing their knowledge with other colleagues (Rivera-Vazquez et al., 2009). It shows an atmosphere of understanding, not one of aggression and self-accomplishment (Hauke, 2006). Therefore, Ford and Chan (2003) suggest that a culture that is high in masculinity may have less knowledge sharing among individuals in the organisation if competitiveness is individually based.

Having discussed the influence of variables associated with organisational culture on the implementation of knowledge sharing in organisations, the next section presents the results of the study.

9.4.3. The extent to which organisational culture influence the implementation of knowledge sharing in organisations (aggregate level)

The results relating to the degree to which organisational culture influences knowledge sharing in organisations are shown in Table 9.9. An examination of Table 9.9 shows that an uncertainty culture was perceived as very highly influential (55%) in implementing knowledge sharing, followed by both collectivism and long-term as opposed to short-term orientation (53%) and power distance (50%), while masculinity scores much lower. Masculinity is perceived to be less influential with just under half of the respondents (42%) ranking it as least influential. The findings revealed that small, medium and large organisations have a combination of organisational cultural dimensions are best describe the culture of Malaysian contractors.

Table 9.9 : The extent to which variables associated with organisational culture influence the implementation of knowledge sharing in organisations.

Organisational culture	Very influential	Influential	Fairly influential	Less influential	Not influential at all
	%				
Uncertainty Avoidance	11.50	43.50	36.20	6.50	2.30
Collectivism	7.30	45.60	39.60	6.30	1.30
Long term	8.90	44.00	36.50	8.90	1.80
Power distance	8.90	41.10	39.10	8.90	2.10
Masculinity	6.30	35.20	41.40	14.30	2.90

Table 9.10 : Mean score of organisational culture variables' influence on the implementation of knowledge sharing in organisations – aggregate level.

Organisational Culture	Overall (N=384)	
	Mean	Rank
Uncertainty Avoidance	2.45	1
Collectivism	2.49	2
Long term	2.51	3
Power distance	2.54	4
Masculinity	2.72	5

Meaning of scale (the extent of influence)

1 (Very influential), 2 (Influential), 3 (Fairly Influential), 4 (Less Influential), and 5 (Not Influential at all)

The mean scores were calculated to observe to what extent the Malaysian contractors inculcate Hofstede's cultural dimension. Table 9.10 depicts the mean scores of each variable and its corresponding construct. As the mean score increases, the influence of the organisational culture dimension on the implementation of the knowledge sharing decreases.

The Malaysian managers rated 'uncertainty avoidance' (mean value = 2.45) as most influential, followed by 'collectivism' (mean value = 2.49), 'long-term orientation' (mean value = 2.51), 'power distance' (mean value = 2.54), with 'masculinity' (mean value = 2.72) ranked last. Generally, Table 9.10 reveals that organisational culture does indeed influence the implementation of knowledge sharing in organisations. The results show the importance of organisational culture for successful knowledge sharing in the organisational context. Support for this relationship is consistent with previous research that suggests a significant influence of organisational culture on knowledge-sharing outcomes (such as Abzari and Teimouri, 2008; Al-Alawi et al., 2007; Alavi et al., 2005; Lee and Choi, 2003; Cummings and Teng, 2003; House et al., 2002; Ruppel and Harrington, 2001; De Long and Fahey, 2000).

The impact of uncertainty avoidance on organisational knowledge sharing

The result shows that at the aggregate level, the culture of uncertainty avoidance is regarded as having the greatest impact on knowledge sharing in organisations, with a mean value 2.45 (Table 9.10). Fifty five (55%) of the survey respondents in this study are of the view that uncertain situations, unknown, ambiguous or unstructured situations are very influential or influential on the implementation of knowledge sharing in organisations (Table 9.10). This uncertainty avoidance culture result supports Richards' (1991) conclusions that Malaysia is higher in this uncertainty avoidance culture dimension than suggested by Hofstede's (1980) original work. This is because, according to Richards' (1991), Malaysians now appear to have higher uncertainty, which is manifested in changes in organisational practices; for example, there is evidence that Malaysians look for ways to ensure high stability and lower variability in business through the creation of rules. A study at the organisational level done by Mansor and Ali (1998) found that most companies surveyed have a very formal system based on a Weberian-style legal rational model; the line of reporting is clear and the formal relationship at work is very much maintained.

Having understood that uncertainty avoidance has the greatest impact on knowledge sharing, the organisation should find a way of coping with this if progress is desired in knowledge sharing. In order for knowledge sharing to occur within organisations there must be significant input from the top management level. The evidence suggests that to tackle this, organisations need to allow employees to take risks. This point has also been suggested by Hauke (2006), who argues that when employees in an organisation are willing to take risks, they feel more accountable for their decisions, which results in better satisfaction with achieved success and high self-esteem. In consequence, Hauke (2006, p.8) mentions: "they build informal networks, which enable knowledge sharing across people. These informal networks are also being built on the basis of ongoing cooperation between different companies, which is positively correlated with knowledge sharing process among them."

The impact of collectivism on organisational knowledge sharing

A collectivism culture (individuals are integrated into groups, having collective achievement and interpersonal relationships, which impacts knowledge sharing in the organisation) was ranked second by fifty three (53%) of the survey respondents, with a mean value of 2.49. The respondents are of the view that a collectivism culture highly influences or influences knowledge sharing in the organisation (Table 9.9). Since the majority of the respondents (53%) are of the view that working in a group impacts knowledge sharing in the organisation, this indicates that low individualism and high collectivism impact knowledge sharing in the organisation. The semi-structured interviews with managers indicate that knowledge sharing is promoted when work is done in a group; problem solving in groups gave better results than individually, hence promoting knowledge sharing. This finding supports studies done by Abdullah (1996, 1992) and Hosfstede (1991). Hofstede (1991) describes and categorises Malaysia as a collective society. Abdullah (1996, 1992a, 1992b) supports this view, noting that Malaysian workers are group oriented, respect elders and hierarchy, emphasize loyalty and consensus, and are concerned with harmony in relationships. In addition, a study done by Mohd Iskandar and Pourjalali, (2000) revealed that all ethnic groups residing in Malaysia have strong family and community values. Further, Noordin and Jusoff (2010) reveal that Malaysian managers are inclined towards collectivism in situations involving in-groups and tend to be individualistic in situations that involve out-groups. In this sense, Malaysian managers are basically collectivist in nature, but the rapid development of the Malaysian economy has undoubtedly introduced another element into Malaysian culture – competition. However, Wan Yusoff (2011) found that individualism is no longer relevant, because everyone in the company is working as a team to sustain the company.

The impact of long-term orientation on organisational knowledge sharing

Fostering long-term as opposed to short-term orientation (or way of thinking), which impacts knowledge sharing in the organisation, is regarded as the third most influential factor impacting the implementation of knowledge sharing by fifty three (53%) of the survey respondents, with a mean value of 2.51. A possible explanation is that construction is characterised by being temporary; most construction work is project based, short term and task oriented, promoting a culture where continuous learning is

inhibited. Construction projects normally only last from 12 to 24 months (Hai et al., 2012). Thus, employees or participants have less opportunity to develop long-term working relationships (Hai et al., 2012). It is devilishly difficult to build strong communication networks and often there is no room for improvement in their work (Emmit and Gorse, 2007). Therefore, it seems impossible to establish formal knowledge sharing in temporary organisations due to a shortage of time to communicate and integrate the information flow among different agencies. Due to the constant changes, these problems lead to difficulty in sharing knowledge in construction organisations. Moreover, employees are reluctant to share information and technical knowledge because they believe that the temporary time frame of construction projects often impedes the establishment of trust (Cheng et al., 2010). It is suggested that construction organisation should allow their employees (managers) to take their own decisions and participate in strategy making. In such a culture, employees get attached to their management and look forward to a long-term association with the organisation. In addition, the management must respect the employees to avoid a culture where the employees just work for money and nothing else. They treat the organisation as a mere source of money and look for a change in a short time span. In other words, the employees are concerned only with their profits and targets and leave as and when they get a better opportunity. Thus, construction organisations should look at their management and style of handling the employees. Construction organisations need to develop a long-term knowledge sharing strategic plan.

The impact of power distance on organisational knowledge sharing

Fifty (50%) of the survey respondents regarded 'less powerful members of the organisation expect and accept that power is distributed unequally, which impacts how knowledge is shared in the organisation', as the fourth most influential factor in implementing knowledge sharing in organisations (Table 9.9), with a mean value of 2.54 (Table 9.10). This result supports Hofstede's (1983) study of Malaysian society. He ranks Malaysia as one of the highest in power distance. Malaysians believe that individuals occupy their rightful place in society and that authority figures should not be challenged. In addition, Wan Yusoff (2011) examined the relationship between organisational culture and the financial performance of the top 100 Malaysian listed companies. He concludes that the culture of Malaysian companies can be classified as having high power distance, particularly in three industrial sectors: trading and services,

finance, and construction. Their research also shows that organisational culture has an impact on performance.

The impact of femininity-masculinity on organisational knowledge sharing

A culture that focuses on the emotional roles between women and men was regarded as the least influential factor by just less than half (42%) of the survey respondents (Table 9.9) with a mean value of 2.72. A possible explanation for this could be that superiors display this quality, which encourages subordinates to demonstrate the same behaviour. This suggests that the respondents believe that the atmosphere in their organisation is one of cooperativeness, which provides security for them to share their knowledge. It also shows an atmosphere of understanding, not one of aggression and self-accomplishment (Hauke, 2006). Research done by Hofstede (1980) in the Malaysian context revealed that, on average, there is no eminent distinction between how roles are distributed in Malaysia according to gender. Furthermore, Hofstede's (1980) study in Malaysia also shows that the index is moderately low to average in terms of masculinity. According to Hofstede (1980), Malaysians are considered to be close to the feminine side of the masculine-feminine continuum in that they care about establishing friendly relationships. Those in a feminine culture "work to live", whereas in a masculine society the belief is that a person "lives to work" (Hofstede, 2001). This is also supported by the work done by Mohd Iskandar and Pourjalali (2000) in Malaysia, which suggests that the gap between the gender roles is not that great, which may signify equality between the roles. The introduction of equal opportunity for both sexes in education and careers in the 1980s has resulted in an increasing number of successful female students and working women in the labour force. This environment is conducive to reducing the masculinity value among Malaysians. This study supports the above finding. As a conclusion, there is a need to match between the type of organisational culture and its management and business operations. For example, top managers need to emphasise less uncertainty avoidance, develop a long-term orientation, high collectivism, less power distance, and no gender bias in making the company's decisions. Having considered the influence of organisational culture on the implementation of knowledge sharing in organisations at the aggregate level, the next section focuses on the influence of organisational culture on the implementation of knowledge sharing in organisations at the dis-aggregate level, namely small, medium and large organisations.

9.4.4. The extent to which organisational culture influence the implementation of knowledge sharing in organisations (dis-aggregate level)

The approach adopted in analysing data at the aggregate level will also be employed at the dis-aggregate level of small, medium and large organisations. As mean score increases, the degree of influence of organisational culture on the implementation of knowledge sharing decreases.

Table 9.11 : Mean score of organisational culture variables' influence on the implementation of knowledge sharing in organisations: dis-aggregate level.

Organisational Culture	Small (N=285)		Med (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Uncertainty Avoidance	2.45	1	2.31	2	2.80	5
Collectivism	2.53	3	2.29	1	2.44	1
Long term	2.53	2	2.38	3	2.60	2
Power distance	2.56	4	2.45	4	2.60	3
Masculinity	2.71	5	2.80	5	2.68	4

Meaning of scale (the extent of influence)

1 (Very influential), 2 (Influential), 3 (Fairly Influential), 4 (Less Influential), and 5 (Not Influential at all)

The impact of uncertainty avoidance on organisational knowledge sharing

At the dis-aggregate level, the result shows that small organisations regarded uncertainty avoidance as the most influential on organisational knowledge sharing, while medium organisations as second most influential and large organisations the least influential. This means that small and medium organisations have more uncertainty and are more threatened compared to large organisations. This is because in large organisations, people feel less threatened by ambiguous situations and are willing to take risks. An explanation that can be offered for this is that in large organisations the extent to which people are uncertain seems not to have an impact on uncertainty avoidance. There is a perception that large organisations have more stability, more support, sound human resource practices, more resources or perhaps the tendency to make people in the organisation more secure. Large organisations with a weak uncertainty avoidance culture continually look for new ways of doing things because they are governed by a philosophy that there must be a better way (Kostova, 1996; Doz et al., 1981). Adopting new ways of doing things is seen as risky but rewarding because of the potential gains to efficiency. Therefore, in large organisations (weak uncertainty

avoidance), there is a continuous desire to experiment with things that are new and to continue to learn. Large organisations seeking to engage in knowledge sharing may not be so aligned. The challenge then becomes getting those who avoid change to embrace what is being provided. This suggests that small and medium organisations with strong uncertainty avoidance cultures will attempt to avoid making changes and will be less than aggressive in their search for new ways of doing things. Where small and medium organisations have a strong uncertainty avoidance environment, there will be significant resistance to the knowledge-sharing process. In this situation, the top management needs to play a major role in facilitating the knowledge sharing efforts. The top management in small and medium organisations may need to establish incentives and methods of persuasion (Lucas, 2006).

The impact of collectivism on organisational knowledge sharing

The culture of having individuals integrated into groups, with collective achievement and interpersonal relationships, was ranked third by small organisations. However, both medium and large organisations ranked collectivism as the most influential or influential in the successful implementation of knowledge sharing in organisations. This means that medium and large organisations have a more collective culture, whereas small organisations have a less collective culture. Overall, people in small, medium and large organisations show more concern about personal goals (friendly atmosphere, getting along well with their boss and others, etc.). For example, in most cases, SMEs would prefer to employ their own family members rather than foreign workers. In the comparison of countries context, this study also supports research done by Hofstede (1980), who found that in North American and European cultures, individuals scored high on individualism, whereas in Asian (Malaysia) cultures, individuals scored high on collectivism. In addition, Bochner (1994) found that Malaysians have a more interdependent self-concept than Australians or the British.

However, a study done by Tayebm (1994) revealed that collectivism in Malaysia has not translated itself well into effective organisation behaviour. For example, collectivism in Malaysia does not mean the same as in Japan, where workers commit themselves to the company (Thong and Jain, 1987). The Malays are not keen to sacrifice their family or religious obligations for the company (Rashid et al., 1997); the welfare of family members and friends takes precedence over the enterprise's vitality,

as organisations are expended to accommodate the maximum number of friends and relatives (Rodrigues, 1998). Furthermore, the Malaysian style of collectivism is unable to dictate the mode of decision-making. The manner of decision-making in Malaysian firms is usually autocratic. Consultative decision-making is not widely practised, as it remains the prerogative of managers (Thong and Jain, 1987).

For example, managers in small, medium and large organisations stated:

Small organisation (I):

We have maintained close-knit relationships among our circle of family and friends through cooperative activities, committee meetings and discussions. We collectively make decisions for the organisation.

Small organisation (II):

"So far, knowledge sharing happens naturally in this company. If you don't know/understand about something, you need to seek help. We don't have special approaches to encourage and motivate our staff about knowledge management/knowledge sharing in specific. We stress a more team work and helping each other attitude. We are so close with our staff here. We treat them as our own family and not based on their hierarchy. It makes them comfortable and they are willing to share their knowledge, own personal problems and are not afraid to voice their opinion to do something."

Medium organisation:

"I didn't get to implement my ideas straight away. It has to be discussed in groups, debated, presented to higher management by the head of department and agreed upon by all layers of management before it can be channelled out."

Large organisation:

"...Everyone works in teams. Everyone is allowed to experiment with the products and develop new issues. The result is that our company has a continuous stream of patent applications and has been successful in developing new products in areas as diverse as piling, mining, automotive, hotel and plantation."

The research also indicates that a collectivist culture could facilitate knowledge sharing. For example, a manager in a medium organisation stated:

Medium organisation:

" ...with the mixture of specialists with wide range of professional back grounds, would impact positively knowledge sharing because all decisions made will indirectly consider varied angles and issues. Hence, knowledge sharing happens collectively for the benefit of the company."

The impact of long-term orientation on organisational knowledge sharing

At the dis-aggregate level, the impact of a culture that fosters long-term as opposed to short-term orientation (or way of thinking) on knowledge sharing in the organisation was ranked second by small and large organisations, and third by medium organisations. One manager of a small organisation stated in the interview:

Our company is not stable because we still get to compete for projects. However, in terms of the establishment of our company age, it can be considered mature. We try to update the business work, especially in terms of management.

The impact of power distance on organisational knowledge sharing

The impact of a culture where less powerful members of the organisation expect and accept that power is distributed unequally on how knowledge is shared in the organisation was ranked fourth by SMEs and third by large organisations. This means that large organisations perceive the influence of a higher power distance is greater than SMEs. This is not unusual, as in most large organisations values like high formalisation, bureaucracy, authority and hierarchical coordination are emphasised. This creates power distance between the upper and lower level of staff. In large organisations, superiors and subordinates consider each other as unequal, the hierarchical system is felt to be based on some existential inequality and power is a basic fact of society that antedates good or evil and where its legitimacy is irrelevant. There is a formal and distant relationship between subordinates and superiors. Employees are not involved in decision-making. High power distance and formal relationships do not facilitate the open and honest working environment necessary for efficient knowledge sharing.

In contrast, in low power distance cultures (SMEs), subordinates and superiors consider each other as more equal and the hierarchical system is just an inequality of roles established for convenience and which may change depending on the circumstances. SMEs with low power distance tend to have a flat organisational structure with closed and informal relationships. Further, knowledge sharing is dependent on the existence of a caring and nurturing environment to facilitate the free and easy exchange of knowledge. Davenport and Prusak (1998) mention that smaller (lower) power distance brings down the gap between superiors and employees, which has a positive effect on the knowledge-sharing process in the organisation. Managers of large and medium organisations stated in the interview:

Medium organisation:

"I need to double check with my immediate superior first before seeing the head, to ensure that we are all aligned in the same goals and approaches".

Large organisation:

"Staff can give opinion/advice. Management normally will formalise the opinions/ideas and will be submitted for recommendations to the consultant and client. Top management is not willing to make a decision if the subordinates are not able to make that happen. So in this case we have a give and take between the superior and subordinate staff."

The impact of femininity- masculinity on organisational knowledge sharing

In this study, it was found that small, medium and large organisations generally agree that gender is the least influential factor in the implementation of knowledge sharing in organisations. The culture of masculinity or femininity was ranked fifth by SMEs, and fourth by large organisations. This means that the culture differences between masculine and feminine values are not great. For example, there is general agreement between the managers of small, medium and large organisations:

"This company employs staff not based on gender. We employ staffs with different professional backgrounds. Their selection is based on experience and formal education background. Working with different professionals and different gender helps with knowledge sharing. They would contribute in discussions, share ideas and knowledge too".

The relationship between organisational culture and different sizes of organisation in the implementation of knowledge sharing in organisations.

This study also examines the relationship between the degree of influence of organisational culture and size of organisations on the implementation of knowledge sharing. In other words, to ascertain if larger organisations perceive organisational culture to be more influential than smaller organisations in implementing knowledge sharing. This was investigated using Spearman rho.

It is hypothesis that:

H1: There is a relationship between organisational culture and size of organisation in the implementation of knowledge sharing in organisations.

Table 9.12 : Correlations between organisational culture and size of organisation.

			Organisational Culture	Size of Organisation
Spearman's rho	Organisational Culture	Correlation Coefficient	1.000	-.026
		Sig. (2-tailed)	.	.615
		N	384	384
	Size of Organisation	Correlation Coefficient	-.026	1.000
		Sig. (2-tailed)	.615	.
		N	384	384

Table 9.12 presents the correlation results between the size of organisation and organisational culture. It reveals that there is a relationship between the two variables ($r = -.026$, N = 384, $p \geq 0.05$). However, the result is a negative one. This value is not significant at the 5% level. The null hypothesis is not rejected. In other words, larger organisations are not necessarily less influenced by organisational culture than smaller organisations. This means that there is no substantial evidence to suggest that dimensions of organisational culture which larger organisations perceive as influential are different from those perceived as influential by smaller organisations in the implementation of knowledge sharing. It is advocated that regards the size of organisation, managers should harmonise knowledge sharing with organisational culture in order for the practices to be supported.

9.5. The influence of human resource practice on the implementation of knowledge sharing in organisations

9.5.1. Introduction

People are another organisational aspect that needs to be considered in sharing knowledge in an organisation. Researchers have argued that people are important to the creation, capture and sharing of knowledge (Egan, 2003; Civi, 2000; Soliman and Spooner, 2000). Egan (2003) indicates that the effective flow of knowledge is only sustainable through people. Geraint (1998) claims that too much faith has been invested in technology at the expense of people issues, while Carter and Scarborough (2001) state that many knowledge management initiatives fail largely because they ignore the people issues associated with sharing knowledge. Greengard (1998b) indicates that all the technology and tools in the world won't make a knowledge-based organisation. Many organisations have recognised that the success of knowledge sharing efforts comes down to people and their behaviours (Ritchie, 2000). Hence, organisations should make their people understand the importance of knowledge sharing. As asserted by Stewart (1997), to successfully lead an organisation, management must support human resource practices that promote knowledge sharing. Therefore, managing people who can and are willing to create and share knowledge is important (O'Dell and Grayson, 1999).

A growing body of empirical research examines the effect of certain human resource practices on knowledge sharing. For example, Mueller and Dyerson (1999) specifically outline appropriation strategies that could be adopted to complement teamwork with appropriate career and reward practices (Currie and Kerrin, 2003). Hunter et al. (2002) note that whether human resource practitioners can influence the management of knowledge depends upon the status of the human resource function. Cabrera and Cabrera (2005) use the more encompassing term "people management practices". Wright et al. (2001) refer to all the relevant practices that organisations might adopt to facilitate and encourage knowledge sharing, including work design, staffing, training and development, performance appraisal and compensation, culture, and technology. Fong et al. (2011) found that recruitment and selection, teamwork, training and development, and performance appraisal have a positive relationship with knowledge

sharing, as perceived by managers in Malaysian manufacturing and service organisations.

In general, the human resource practices deployed by organisations are: staffing, i.e. human resource planning, recruitment and selection; human resource development, i.e. training, development and career planning and development; compensation, i.e. direct and indirect financial compensation and nonfinancial compensation; safety and health; and employee and labour relations (Mondy, 2010). Although there is a long list of best human resource practices that can affect knowledge sharing either independently or collectively, results are hard to interpret. Recent studies have shown that the most popular practices are not always the most effective and that there are distinct bundles of human resource practices for effectively sharing knowledge (McCann and Buckner, 2004; Horwitz et al., 2006). Inappropriate human resource practices can be harmful to knowledge sharing behaviour (Currie and Kerrin, 2003). Thus, it is important to choose the appropriate human resource practices that facilitate knowledge sharing among employees in a particular organisation (Fong et al., 2011). In the organisational knowledge-sharing literature, there are certain human resource practices that are found to be effective in encouraging knowledge-sharing behaviour. For this study, some of the human resource practices initially proposed by Armstrong (2006) which, according to the literature, can be expected to influence knowledge sharing (Olomolaiye, 2007) are examined: 1) Training and development, 2) Reward and incentives, 3) Recruitment and selection, and 4) Performance appraisal.

Accordingly, this study attempts to investigate the degree of influence that human resource practices play in the implementation of knowledge sharing in organisations. It is hoped that the findings will provide managers or human resource professionals with a clear understanding and awareness of the appropriate human resource practices to enable them to develop and implement relevant and appropriate policies and procedures for the effective sharing of knowledge. Discussions of the related variables associated with human resource practices, using the work of Armstrong (2006), are presented in the following subsections.

9.5.2. Variables associated with human resource practices

The characteristics and terms used for variables associated with human resource practices are given in Table 9.13.

Table 9.13 : Characteristics of human resource practices.

Human Resource Practices Characteristics (Amstrong, 2003)	Term used
Training and development in providing a better understanding of the concept of knowledge sharing initiatives impacts knowledge sharing in the organisation.	Training and development
Motivating employees with reward and incentives to encourage employee attitudes to be more positive towards knowledge sharing impacts knowledge sharing in the organisation.	Reward and incentives
Recruitment and selection processes to select the right staff with the right attitude towards knowledge sharing impact knowledge sharing in the organisation.	Recruitment and selection process
Performance appraisal in promoting knowledge sharing initiatives impacts knowledge sharing in the organisation.	Performance appraisal

9.5.2.1. Training and development and organisational knowledge sharing

Education, training and development have a common concern for building human capital, but there is a difference (Lavender, 1996; p. 138). Training is specific to a given job and is therefore of more direct benefit to the employer. Development combines education and training; it is not so much about a specific job to be done now, but looks to the future needs of the individual and the employer. Education is primarily for the benefit of the recipient and gives a range of broad knowledge and skills which will be of use in life and work generally.

Numerous studies have pointed to the importance of proper education, training and development programmes to knowledge-sharing initiatives (Fong et al., 2011; Horwitz et al., 2006; Bryant, 2005; Salleh and Goh, 2002). Salleh and Goh (2002), for example, insist that if a company wants to become a truly knowledge-based organisation, it must start with quality training. Training provides employees and managers with the skills and information to fulfil their responsibilities. Training facilitates the implementation of a strategy by providing employees with the skills and knowledge needed to perform their jobs (Fernald et al., 2011). Horwitz et al. (2006) suggest that training and development opportunities provide room for collective work. Through job design and

job rotation, organisations become able to arrange collective work to integrate overall knowledge throughout the organisation. Bryant's (2005) study suggests that knowledge sharing can be enhanced by increasing employees' self-efficacy through training. Shipton et al. (2006) posit that failure to train employees can lead to perceptual difficulties, especially in perceiving how they can apply different experiences and perspectives. Therefore, it is important for the organisation to have a proper training and development programme to enable employees to gain knowledge and contribute to the creation and sharing of knowledge in the organisation. From the human resource practice point of view, training and development in organisational knowledge sharing play an important role in facilitating effective knowledge-sharing implementation.

9.5.2.2. Reward and incentives and organisational knowledge sharing

A significant body of research has shown that incentives, rewards and recognition play a very crucial role in encouraging people to share their ideas (Chaudhry, 2005; Cabrera and Cabrera, 2005; Evans and Lindsay, 2003; Jackson, Hitt, and Denisi 2003). For example, Evans and Lindsay (2003) propose that rewards and incentives provide a visible means of promoting quality efforts and telling employees that the organisation values their efforts. Consequently, this encourages employees to demonstrate their willingness to share knowledge for the benefit of all (Koulopoulos and Frappalo, 2002). This can create interest, excitement and motivation among people and ensure that early adopters get high visibility so they serve as role models for others (Wang and Noe, 2010). Chaudhry's (2005) study in the area of knowledge sharing in Singapore highlights that introducing rewards and incentives encourages employees to form a more positive attitude toward knowledge sharing. Jackson et al. (2003) suggest that rewards and incentives play an important role in attracting and retaining individuals with the right knowledge, and motivate them to develop and share knowledge in ways that create competitive advantage. Rewarding and recognising these behaviours sends a strong signal to the employees that the organisation values knowledge sharing (Cabrera and Cabrera, 2005).

9.5.2.3. Recruitment and selection processes and organisational knowledge sharing

Recruitment and selection individuals that fit well with the knowledge sharing culture foster knowledge sharing (Hislop, 2003). Study done by Scarbrough (2003) found that in innovative organisations (for example construction organisations), the selection of individuals with both appropriate skills and an appropriate attitude has been identified as crucial to the project team's ability to integrate knowledge from diverse sources.

9.5.2.4. Performance appraisal and organisational knowledge sharing

Performance appraisal is defined as a formal system of review and evaluation of individual or team performance (Mondy, 2010). Knowledge possessed by employees needs to be regularly evaluated to ensure its relevance to the organisation. It is difficult to measure tacit knowledge and its use. This is due to its nature: tacit knowledge is hidden and its use can only be inferred through observation of behaviour. Consequently, it is important to recognise some observable criteria by which to evaluate an employee's contribution to knowledge creation, sharing and application (Lasky, 2003). In addition, Hsu et al. (2007) suggest that if an organisation sets up an explicit performance evaluation of employees' sharing behaviours, it not only gains a better understanding of employees' contributions to the organisation but also promotes employee willingness to share knowledge. Hence, it is important to study the effect of performance appraisal on knowledge sharing behaviour. Having considered the characteristics and terms used for variables associated with human resource practices, the next section focuses on the analysis of the results of this study.

9.5.3. The extent to which human resource practice influence the implementation of knowledge sharing: aggregate level

To commence the analysis, the extent to which human resource practice dimensions influence the implementation of knowledge sharing in organisations at the aggregate level is presented (Subsection 9.5.3). This is followed by the analysis of the influence of human resource practices on the implementation of knowledge sharing in organisations at the dis-aggregate level (small, medium and large contractors) (Subsection 9.5.4). Tables 9.14, 9.15, and 9.16 summarise the results.

The results relating to the degree to which human resource practices influence knowledge sharing in organisations are shown in Table 9.14. An examination of the table shows that training and development are perceived as highly influential (66%) in implementing knowledge sharing, followed by reward and incentives (66 %), and recruitment and selection processes (64%). Performance appraisal was ranked as least influential by 61% of the respondents.

Table 9.14 : The extent to which variables associated with human resource practices influence the implementation of knowledge sharing in organisations.

HR practices	Very influential	Influential	Fairly influential	Less influential	Not influential at all
	%				
Training and development	20.80	45.10	28.40	4.90	0.80
Reward and incentives	19.50	47.40	24.70	6.80	1.60
Recruitment and selection process	18.50	45.30	30.50	4.90	0.80
Performance appraisal	15.60	45.80	33.10	3.90	1.60

In order to determine the influence of human resource practices on the implementation of knowledge sharing in organisations, four human resource practices were ranked by the respondents and the mean score calculated.

Table 9.15 : Mean score of the influence of human resource practices on the implementation of knowledge sharing in organisations: aggregate level.

Human Resource Practices	**Overall (N=384)**	
	Mean	**Rank**
Training and development	2.20	1
Reward and incentives	2.23	2
Recruitment and selection process	2.24	3
Performance appraisal	2.30	4

Meaning of scale (the extent of influence)

1 (Very influential), 2 (Influential), 3 (Fairly Influential), 4 (Less Influential), and 5 (Not Influential at all)

Table 9.14 shows the mean scores of the perceived influence and rank of each human resource practice on the implementation of knowledge sharing in organisations. As the mean score increases, the influence of the human resource practice on the implementation of knowledge sharing decreases. The results indicate that all four human resource practice variables (training and development, reward and incentives, recruitment and selection, performance appraisal) influence knowledge sharing. The mean scores of between 2.20 to 2.30 suggest broad agreement on the range of human resource practices used in the study. This result supports the seminal work of Paauwe and Boselie (2005), which identified four key human resource practices from a list of 26 as impacting knowledge sharing. In their study, they discovered that the top four human resource practices are training and development, contingent pay and reward schemes, performance management, and careful recruitment and selection.

The impact of training and development on organisational knowledge sharing

At the aggregate level, training and development to provide a better understanding of the concept of knowledge sharing initiatives was ranked as the most influential factor in the implementation of knowledge sharing in organisations by 66% of the respondents (

Table 9.14), with a mean value of 2.20 (Table 9.15). This study found that training and development to provide a better understanding of the concept of knowledge sharing initiatives is not as critical as training in technical skills or management. For example, construction organisations provide broad and various training programmes for many reasons; some wish to orient new employees in the organisation or teach them how to perform in their initial assignment; some also wish to develop new knowledge and grow

the skills and innovative capability necessary to perform the work. This finding supports the study done by Fisher et al. (1999), who discovered that some organisations use training to improve the current performance of employees who may not be working as effectively as desired, or to prepare employees for future promotions, or for upcoming changes in design, processes or technology in their present jobs.

The semi-structured interviews with managers revealed that a substantial investment is made in training and developing all employees. One reason that construction organisations in Malaysia have an allocation for training is because starting from 1st January 2010, contractors are required to participate in contractor continuous development programmes. A point collection system was introduced through participation in seminars, associations, publications and other events scheduled by the CIDB. The purpose is to enhance contractors' knowledge and professionalism through participation in the CCD programme. It is of benefit to the individual (people become well trained) and to the organisation, because knowledge gained by employees enables them to translate their knowledge into the organisations' routine, competencies, job descriptions and business processes, plans, strategies and cultures. Contractors who fail to collect CCD points will not have their registration renewed or it will be downgraded. Investment in training can develop employee expertise at all levels of the organisation, which is likely to provide a potentially inexhaustible source of ideas for further innovation (Torraco and Swanson, 1995).

However, it was found in this study that most external training and development opportunities are afforded to the technical and professional staff as opposed to the production workers. For these operational employees, training consists of mostly on-the-job and work-related training. For the technical and professional staff, however, a wide range of options are made available, including company support of additional study and particular courses for personal or professional development.

It is recommended that organisations should be more proactive in formalised training for the purpose of knowledge sharing and have a specific allocation. Managers and staff also need to attend training so that they will know the importance of having a formal knowledge sharing mechanism. Staff will also have a clear role in knowledge sharing. Providing training and development to employees, such as on-the-job training, job rotation, coaching, mentoring, in-basket training, case studies etc., can help to improve

the knowledge, skills, experience, abilities and motivation of employees (Fong et al., 2011). In general, this study also reinforces the view that training is important in motivating knowledge sharing, as it provides a platform for employees to gather and share new knowledge. Consequently, the leaders of construction organisations should recognise the importance of training and development, which serve as a forum for ideas and knowledge to flow freely from one individual to another.

The impact of rewards and incentives on organisational knowledge sharing

Sixty seven (67%) of the survey respondents ranked motivating employees with rewards and incentives to encourage them to be more positive towards knowledge sharing second and as very influential or influential in the implementation of knowledge sharing in the organisation, with a mean value of 2.23 (Tables 9.14 and 9.15).

Even though some literature states that rewards and incentives are important to promote knowledge sharing (Subsection 9.5.2.2), it is apparent in this study that no single company has any form of formal rewards and incentives specifically for knowledge sharing. As one of the respondents stated:

"We have no specific approaches used to motivate our staffs to share knowledge. It is hoped that the lax and flexibility allowed, as well as trust that we put in our staffs will motivate them to stay longer. They should not hoard their knowledge because sharing will help other staff to become knowledgeable and this in turn will benefit the company performance."

This finding is also supported by the studies of Davenport and De Long (1998) and Skyrme (1998) who found that most reward systems did not recognise knowledge contribution. It is recommended that construction organisations think about their reward and incentive programmes that motivate employees to share their knowledge with the rest of the firm. As suggested by Srivastava et al. (2006), knowledge sharing will increase when team leaders recognise individuals for their contribution of ideas and information. Organisational rewards can range from monetary incentives, such as increased salary and bonuses, to non-monetary awards, such as promotions and job security (Davenport and Prusak, 1998). In addition, the literature suggests that reward and incentive systems must be aimed at different levels in the organisation to win over executives, department heads and individuals and encourage them to share their knowledge with their peers (Stevens, 2000). The availability of such a reward and

incentive programme would definitely encourage a culture of knowledge sharing, as discussed in Subsection 9.5.2.2. Additionally, managers need to provide motivation for knowledge sharing activities. The willingness to share anything usually depends on reciprocity. Therefore, "knowledge management strategies need to be linked to people by building reward and recognition programs to encourage employees to share best practices, strategies, and ideas" (Davenport and Hall, 2002, p. 186).

The impact of recruitment and selection processes on organisational knowledge sharing

Sixty four (64%) of the survey respondents ranked recruitment and selection processes to select the right staff with the right attitude towards knowledge sharing third most influential in the implementation of knowledge sharing in organisations, with a mean value of 2.24 (see Tables 9.14 and 9.15). This result supports the view of Davenport and Prusak (1999), who argue that one of the most important factors in developing a knowledge-oriented culture is the selection of knowledgeable employees, and this helps in the promotion of a knowledge-sharing culture.

Most managers interviewed are of the view that their organisation adopts the strategy of recruiting graduates directly from colleges and universities, and then provides opportunities to enhance their competence and experience according to their role. However, Stevens (2000) suggests that organisations should hire people who will share; that is, hire knowledgeable citizens. Stevens (2000) states: "If you want employees who share their knowledge, it is best to encourage that from the beginning by hiring people with whom your employees feel they want to work and share knowledge". In this regard, construction organisations should carefully design the selection methods, tools and testing methods used during the selection process, e.g. interviews, background checks etc., to ensure validity and reliability in selecting the pro-knowledge-sharing employee.

The impact of performance appraisals to promoting knowledge-sharing initiatives

Performance appraisals to promote knowledge-sharing initiatives was ranked as fourth most influential to knowledge sharing by 61% of the survey respondents, with a mean value of 2.30. A possible explanation is that performance appraisals to promote knowledge-sharing initiatives in organisations are sometimes difficult to assess. The semi-structured interviews with managers revealed that the reason performance

appraisals are regarded as least influential might be because they are conducted annually by management "primarily for developmental purposes" (quote from a manager of a large organisation). Normally, employees complete a self-evaluation form prior to the appraisal, on which they are expected to review their own performance related to any goals set with management or their teams during the previous year and to review their interactions with their teams and managers.

However, given the predicted impact of the perceived benefits of knowledge sharing (Subsection 8.3.1 in Chapter 8), it is recommended that construction organisations design performance appraisals to encourage knowledge-sharing behaviours. Roberts (2000) proposes that incorporating the concept of knowledge sharing into employees' performance appraisals would encourage them to believe that knowledge sharing will benefit them. Therefore, it is clearly necessary for construction organisations to emphasise knowledge sharing in employee performance appraisals in order to improve employees' willingness to share knowledge. The results imply that it is important to include knowledge sharing as one of the criteria or components of the key performance index to measure the individual or team performance of workers in an organisation. Moreover, performance appraisals should always be considered in quality improvement plans, in which knowledge sharing can also be cultivated.

Having considered the influence of human resource practices on the implementation of knowledge sharing in organisations at the aggregate level, the next section focuses on the influence of human resource practices in the implementation of knowledge sharing in organisation at the dis-aggregate level, namely SMEs and large organisations.

9.5.4. The extent to which human resource practice influence the implementation of knowledge sharing: dis-aggregate level

Table 9.16 : Mean score for human resource practice variables in the implementation of knowledge sharing in organisations: dis-aggregate level.

Organisational Culture	Small (N=285)		Med (N=65)		Large (N=25)	
	Mean	Rank	Mean	Rank	Mean	Rank
Training and development	2.21	1	2.14	3	2.24	2
Reward and incentives	2.31	3	1.94	1	2.16	1
Recruitment and selection process	2.27	2	2.09	2	2.32	3
Performance appraisal	2.31	4	2.18	4	2.44	4

Meaning of scale (the extent of influence)

1 (Very influential), 2 (Influential), 3 (Fairly Influential), 4 (Less Influential), and 5 (Not Influential at all)

The approach adopted in analysing data at the aggregate level is also employed at the dis-aggregate level of small, medium and large organisations. As mean score increases, the degree of influence of human resource practices on the implementation of knowledge sharing decreases.

The impact of training and development on organisational knowledge sharing

At the dis-aggregate level, the results show that training and development is ranked first by small organisations, second by large organisations and third by medium organisations. This means that small organisations find training and development to provide a better understanding of the concept of knowledge sharing initiatives more influential to the implementation of knowledge sharing than larger organisations. This is because, in general, small organisations may have less employee training, as they do not usually have a specific fund and budget for such an activity, as opposed to larger organisations that have the resources to develop customised training and educational programmes. In addition, during the interviews, some of the SMEs revealed that busy workloads, lack of clearly defined duties and the difficulty of allowing an employee to be absent, even for a day, for training are amongst the reasons why they do not stress training and development for knowledge sharing.

Even though the findings of this study revealed that training and development to provide a better understanding of the concept of knowledge sharing initiatives does impact knowledge sharing in organisations, in the small organisations most training goes to the owner or top managers, supervisors, white-collar workers, or salaried employees (Wong and Aspinwall, 2004). It can be argued that investment in formal and informal training and development in the acquisition and sharing of requisite knowledge is more challenging for smaller than for larger organisations.

It is recommended that the human resource department of construction organisations should take responsibility for teaching the change in mind set required to implement knowledge sharing and to help their employees gain more knowledge. More training will cultivate interest and responsibility in the employees to keep their education current. Through training, it is believed that employees would gain the latest knowledge available in the market, making the staff more adaptable to the changing environment of the construction industry. The use of a knowledge management strategy combined with training may produce some interesting and satisfying results.

The impact of rewards and incentives on organisational knowledge sharing

At the dis-aggregate level, rewards and incentives were ranked first by both medium and large organisations and third by small organisations. This means that medium and large organisations place greater emphasis on rewards than smaller organisations. This result is consistent with previous research, which established that wage responsiveness to individual-level productivity is greater in large organisations than in small organisations (Brown et al., 1990). Moreover, they also conclude that workers in large organisations enjoy better benefits, have greater security and earn higher wages than their counterparts in small organisations. In order for rewards and incentives to be successful in motivating staff to share their knowledge, they must be properly designed to fit employees' needs and perceptions. As highlighted earlier, this is because ineffective or insufficient rewards fail to reinforce knowledge-sharing behaviours. It is recommended that the best solution is to customize the reward system to fit employees' needs and suit their objectives.

The impact of recruitment and selection processes on organisational knowledge sharing

SMEs ranked recruitment and selection processes to select the right staff with the right attitude towards knowledge sharing as second most influential to knowledge sharing in the organisation and large contractors ranked them third. This means that large organisations find recruitment and selection processes to select the right staff less influential than smaller organisations. SMEs are struggling to fill talent gap, find skilled workers especially at workmen level and middle level positions Kishore et al. (2012). SMEs have a problem in attracting high calibre, experienced employees (Kishore et al., 2012; Rasheed, 2005; Willaimson, 2000). Identifying right candidate for a right job with right skill, and aligning their business for getting the quality cost scale balance right, stands as a huge challenge to any SME's (Kishore et al., 2012). This might be because SMEs often face difficulty in retaining employees, especially specialists, because of limited opportunities for progression and the constant appeal of larger organisations, which can provide better prospects. Moreover, SMEs pay lower salaries compared to large organisations, which recruit experienced workers from the labour market and pay a higher salary. Alternatively, it may because SMEs, on the whole, have difficulty attracting and retaining talented staff. These experienced people tend to go to larger organisations, where they will be paid higher salaries and bonuses. In addition, SMEs are mostly seen by some employees as a stepping-stone to larger organisations. The departure of highly knowledgeable employees is a major threat to SMEs, unless that knowledge is captured, codified, shared and transferred throughout the organisation (Rasheed, 2005). In this regard, it is recommended that recruitment and selection should favour people who are open to learning and trying new things. Organisations need to pay attention to selecting valuable workers who have the probability of contributing and sharing knowledge and skills with others.

The impact of performance appraisals on organisational knowledge sharing

As can be seen in Table 9.16, the results suggest that all respondents, SMEs and large organisations, agree that performance appraisals to promote knowledge sharing initiatives are the least influential (fourth). A possible explanation is that factors within the internal environment might affect the performance appraisal process. For instance, an organisation's culture can assist or hinder the process. Some researchers claim that

the reward or incentive system could increase a person's motivation in doing knowledge sharing, but reward system also considered able to build negative habit such as a habit to hold knowledge they have (Pearisamy, 2006). Study done by Peariasamy (2006) found that reason why employees hoard knowledge is because performance appraisal system focuses more on individual efforts but not clear on knowledge sharing activities. Therefore, employees are not aware of the importance of knowledge sharing to them and to the organisation. More importantly, employees need to be informed that by sharing knowledge, their performance reward will not be affected.

The relationship between human resource practices and different sizes of organisation in the implementation of knowledge sharing in organisations.

The study also sought to investigate if there is a relationship between human resource practices and size of organisations in the implementation of knowledge sharing. This was investigated using Spearman rho.

It is hypothesised that:

H1: There is a relationship between human resource practices and size of organisations in the implementation of knowledge sharing in organisations.

Table 9.17 : Correlations result between human resource practices and different size of organisations.

			Size of Organisation	HR Practices
Spearman's rho	Size of Organisation	Correlation Coefficient	1.000	-.068
		Sig. (2-tailed)	.	.187
		N	384	384
	HR Practices	Correlation Coefficient	-.068	1.000
		Sig. (2-tailed)	.187	.
		N	384	384

Table 9.17 presents the results of Spearman's rho and reveals that there is no significant correlation between human resource practices and size of organisations in the implementation of knowledge sharing ($r = -.068$, $N = 384$, $p \geq 0.05$). This value is not significant at the 5% level. The null hypothesis is not rejected. In other words, in larger organisations, human resource practices are not necessarily less influential to the implementation of knowledge sharing than in smaller organisations.

9.6. Conclusions and recommendations

This chapter addressed research objective no six of the study (Table 1.1 in Chapter 1). This study examines the influence of organisational factors (structure, culture and human resources practices) on the implementation of knowledge sharing.

1. According to the questionnaire survey and semi-structured interview findings, the following variables associated with organisational structure were identified as highly influential or influential on the implementation of knowledge sharing in organisations:

   - Complexity

   - Flexibility and decentralisation

   - Formalisation

   - Stratification.

2. In general, it can be concluded that:

   - Size appears to impact complexity at a decreasing rate

   - Size and formalisation appear positively correlated

   - A decreases in size leads to flexibility and decentralisation

   - Size appears to impact stratification at a decreasing rate.

3. Based on the results, it is concluded that organisational structure influences the implementation of knowledge sharing in organisations. However, organisations differ in the way they use 'complexity, centralisation, formalisation, and stratification' in terms of organisational structure dimensions. Such variation in

application, when influenced by contextual or situational factors, leads to the development of diverse organisational structures. This finding shows that managers need to consider the impact of the complexity of their organisational structure on the implementation of knowledge sharing. If managers understand their organisation's structure type, they can consider the degree of fit required between their company's knowledge-sharing initiatives and the organisation's structure (See Subsection 9.3.3).

4. Similarly, the findings revealed the variables associated with organisational culture that highly influence or influence the implementation of knowledge sharing in organisations:

   - Uncertainty avoidance

   - Collectivism

   - Long-term orientation

   - Power distance

   - Masculinity.

5. In general, it can be concluded that:

   - Size appears to impact uncertainty avoidance at a decreasing rate

   - Size appears to impact collectivism at a increasing rate

   - Size and long-term orientation appear positively correlated

   - Increases in size lead to power distance

   - Size appears not to impact masculinity.

6. The results show that organisational culture has an influence on knowledge sharing in construction organisations. The dimensions of culture as described by Hofstede (1984) influence knowledge sharing in different ways. This study reveals that short-term orientation, power distance and masculinity negatively impact knowledge sharing. The effect of collectivism on knowledge sharing can be both positive and negative. Managers should evaluate the culture of their organisation in conjunction with an assessment of their knowledge-sharing initiatives. Cameron and Quinn (2006) note that no one organisational culture type is best. However, the results of this study suggest that in a Malaysian construction environment, an uncertainty

avoidance culture highly influences the implementation of knowledge-sharing initiatives (See Subsection 9.4.3).

7. Also, the findings revealed the variables associated with human resource practices that highly influence or influence the implementation of knowledge sharing in organisations:

    *   Training and development

    *   Rewards and incentives

    *   Recruitment and selection processes

    *   Performance appraisals

8. In general, it can be concluded that:

    *   Size appears to impact training and development at a decreasing rate

    *   Size appears to impact rewards and incentives at an increasing rate

    *   Size and rewards and incentives appear positively correlated

    *   Size appears to impact recruitment and selection at an increasing rate

    *   Size appears not to impact performance appraisals.

9. Overall, the results acknowledge the influence of organisational structure, culture and human resource practices on knowledge sharing in the construction business environment. The results of the study also show that organisational structure and culture are significantly correlated with the size of the organisation in the implementation of knowledge sharing. However, human resource practices show no significant correlation; thus, human resource practices should be carefully developed and planned continuously in an organisation. If the human resource practices are in the process of change or adaptation, it is vital for organisations to be sensitive to the impacts that the new human resource practices will have on the organisation's knowledge-sharing behaviour. Well-designed human resource practices can help to improve the knowledge sharing behaviour among employees in an organisation. Furthermore, it is essential that organisational structure and culture be incorporated in most human resource practices, as organisations are essentially culture entities (Cook and Yanow, 1993) and therefore, regardless of

what organisations do to manage knowledge, the influence of the organisation's culture is much stronger (McDermott and O'Dell, 2001). Therefore, the research findings suggest that top management should review their human resource practices and conduct them in a way that develops knowledge sharing in the organisation.

The developments of a model key that encapsulate factors that impact upon the successful implementation of knowledge sharing in organisation are discussed in detail in the next chapter.

CHAPTER 10. MODEL DEVELOPMENT: KEY FACTOR IMPACTING THE SUCCESSFUL IMPLEMENTATION OF KNOWLEDGE SHARING.

10.1. Introduction

This chapter focuses on the development of a model to establish the key factors that have an impact on the successful implementation of knowledge sharing in organisations. It outlines a methodology practice to improve knowledge sharing by bringing together the best practices established through the literature review, the views of key informants in the industry as well as the responses from a survey of managers in Malaysian construction organisations. Chapter 10 addresses objective 7 of the study: "to develop a conceptual model that encapsulates the key factors that impact upon the successful implementation of knowledge sharing in organisations".

This chapter is structured as follows to show the process of the development of the model pertaining to this study:

- Section 10.2 introduces the definitions of a model.

- Section 10.3 discusses the need to develop a model.

- Section 10.4 presents the development process of the model in order to improve knowledge sharing in Malaysian construction organisations.

- Section 10.5 discusses the link between key factors that impact upon the successful implementation of knowledge sharing, knowledge-sharing approaches, and organisational performance.

- Section 10.6 gives a summary of the findings of the model.

10.2. What is a model?

The term 'model' must first be explained or defined clearly in order to fully appreciate its meaning and to avoid confusion. A model has many different uses and meanings, including: a conceptual framework for organising and integrating information; a diagrammatic system of measurement (i.e. mathematical and statistical models); and a conceptual structure successfully developed in one field and applied to some other field in order to guide research and practice (i.e. an analogy) (Marx, 1976, as cited in Earp and Ennett, 1991).

A definition put forward by Jarvelin and Wilson (2003) is that a model provides a working strategy, a scheme containing general and major concepts and their interrelations. It orients research towards specific sets of research questions and forms the basis of formulating empirically testable research questions and hypotheses (Jarvelin and Wilson, 2003). Similarly, Nachmias and Nachmias (1992: p. 44) state that a model is "a representation of reality: it delineates certain aspects of the real world as being relevant to the problem under investigation; it makes explicit the significant relationships amongst the aspects and it enables the formulation of an empirically testable proposition regarding the nature of these relationships". Therefore, most academic research uses a model at the outset because it helps the researcher to illustrate the research question under investigation.

A model can be viewed as the likeness of something (Nachmias and Nachmias, 1981); therefore, the presentation of a model must include a definition of the key terms and relationships. Casti (1997) defines the taxonomy of models that include experimental, logical, mathematical/computational and theoretical aspects. Most knowledge management models are theoretical in the sense that they are an imagined mechanism or process that has been developed to describe a phenomenon. Theoretical models are based on hypothesised relationships among factors. Within this taxonomy, models are further categorised by their purpose (Small and Sage, 2005):

- Predictive – enables us to predict what a system's behaviour will be.

- Explanatory/descriptive – provides a framework in which past observations can be understood as part of an overall process. These models are also called

descriptive because they are explicit descriptions that capture and organise information.

- Prescriptive – provides a picture of the real world as it will be if certain postulates (prescriptions) of formal axiomatic rules of behaviour are applied.

Many researchers and scholars have used the term 'model' interchangeably with theory, or have used it to mean the visual representation of the elements of a theory (Earp and Ennett, 1991). Models differ from theory in that they are not usually concerned with global classes of behaviour but with specific types of behaviour in specific contexts. They are often informed by more than one theory, as well as by empirical findings (Earp and Ennett, 1991).

On the other hand, a model is different from a framework. A framework describes the phenomenon in a the form of key factors, constructs or variables and their relationships for the purpose of theory building (Miles and Huberman, 1994), whilst a model tends to contain initiatives that go beyond a framework and includes rich descriptions of particular approaches and unique solutions (Adair et al., 2003). Yusof and Aspinwall (2000) make a distinction between a model and a framework; they refer to a model as a set of answers to the questions of 'what is' and the overall concepts or elements, whereas a framework is a set of answers to 'how to' questions and provides an overall way forward. Frameworks are different from theory because the purpose of theory is to explain and predict a phenomenon (Kerlinger, 1986). In the context of this study, the definition of a model is derived from works by Earp and Ennett (1991: p. 164) and is "a diagram or proposed causal linkages among a set of concepts believed to be related either to particular problems…" Conceptually, their study also refers to factors or variables as abstract terms that can be empirically observed or measured. Hence, a model, through concepts denoted by boxes and processes delineated by arrows, provides a visual picture that represents the research questions under investigation (see Figure 10.3).

10.3. Why a model is needed?

The previous chapters show that knowledge sharing plays an important role in improving organisational performance (see Chapter 8). Due to various constraints that cannot be avoided (i.e. being busy, time constraints, pressure, budget issues, competition, etc.– see Chapter 6), it is impossible for construction organisations to force their employees to share their knowledge or to prevent them from leaving the company. However, in certain circumstances, the loss of knowledge can be minimised to a reasonable level. This study identifies and discusses key factors that are believed to impact upon the successful implementation of knowledge sharing in organisations, which in turn influences the performance of the organisation.

Organisations are becoming increasingly aware of the importance of knowledge sharing to survive and remain competitive. Current knowledge sharing models have been found to be lacking as they only focus on the relationships between factors that influence knowledge sharing. An integrated approach that is capable of a simultaneous investigation of the various factors that affect knowledge-sharing initiatives, knowledge-sharing approaches and its impact on organisational performance has not been widely attempted. This study aim to develop a holistic knowledge sharing model for the construction organisation in Malaysia that is based on an integrated approach, which combines key factors that impact on the implementation of knowledge sharing (input), knowledge-sharing approaches (process) and organisational performance (output).

There is currently no systematic method or practice of collecting and disseminating relevant and useful knowledge in the Malaysian construction industry (CIDB, 2008, 2006; Chowdry, 2005). It depends on the contractor to apply any approach to share their knowledge. It is argued that the absence of a knowledge-sharing model hinders continuous improvement efforts. Moreover, previous studies report that there is a dearth of empirical research and knowledge-sharing models for Malaysian construction organisations, resulting in the continuing need for the development and testing of such models (CIDB, 2008; Law and Ngai, 2008). Therefore, there is a need for a structured and coherent knowledge-sharing implementation model in Malaysia (Chowdry, 2005). As Fink and Ploder (2009) suggest, a common problem in introducing knowledge management (knowledge sharing) in organisations is the lack of clarity about which

methods (approaches) should be taken into consideration. The model will help construction organisations to identify boundaries and to undertake any necessary action needed to improve their knowledge sharing. To produce a model of best practices for construction organisations is one of the key tasks suggested by Latham (1994).

Moreover, in 2006, the deputy prime minister of Malaysia, Najib, stressed that knowledge management and knowledge-sharing models that are developed in the context of the Western social and cultural environment should be formulated and implemented in accordance with a country's culture and social norms (Najib, 2006). As the CIDB (2006) suggests, any model for managing knowledge in Malaysian construction organisations must take into account the "particular problems and social nature of construction organisations". As there is a lack of a proper model to guide contractors on the issues of knowledge-sharing approaches, this study intends to fill the gap by developing and validating a knowledge-sharing model that encapsulates the key factors that impact upon the successful implementation of knowledge-sharing approaches in Malaysian construction organisations. In this study, the development of a model for knowledge sharing is important for the following reasons:

- **Increasing understanding.** A knowledge-sharing model can help to improve the awareness and understanding of the knowledge-sharing domain (e.g. how things work, what drives these things and their major impacts) and to demonstrate the links between them. It provides a conceptual definition of formal and informal approaches to knowledge sharing and helps people to understand what formal and informal approaches to knowledge sharing are and what knowledge elements are involved. Thus, it will help to alleviate the confusion surrounding this discipline, as it will provide clarification of the knowledge-sharing phenomenon.

- **Integrating knowledge across disciplines**. A knowledge-sharing model can provide a more holistic view of knowledge-sharing approaches. It enables people to consider all its facets from a broader perspective. In addition, it helps people to reflect on, and conceptualise, knowledge sharing in an integrative manner.

- **Facilitating communication.** A knowledge-sharing model can facilitate the communication of knowledge-sharing approaches across an organisation. A model acts as a tool which provides a common vocabulary and language for people. It helps managers to communicate their vision of knowledge-sharing initiatives to

their employees and helps in the dissemination of knowledge-sharing implementation issues in the organisation.

- **It helps to determine the scope of knowledge-sharing approaches.** This is because a model sets the virtual boundaries of knowledge sharing for organisations to employ, as it outlines the phases and activities to be addressed as well as the elements and influences to be considered.

- **Identifying knowledge gaps.** A knowledge-sharing model can help managers and practitioners to determine whether they have considered all the relevant factors pertaining to knowledge-sharing implementation. It helps managers to cover and address the key issues of knowledge sharing which might otherwise be overlooked.

- **Assisting with decision-making and planning.** The implementation of a knowledge-sharing model facilitates the management of the implementation process and helps to coordinate and monitor organisational efforts in a more systematic and controlled manner.

- **Facilitating participation.** The implementation of a knowledge-sharing model can facilitate the participation of managers and can assist with the interaction between different levels of management and employees.

The proposed research model, which will deal with a wide range of issues, was built on the existing literature and research into the current situation of construction organisations in Malaysia. As a result, it can be directly applicable to Malaysian construction organisations. The main aim is to ensure that the model will assist construction organisations in their knowledge-sharing initiatives. The proposed research model, therefore, defines a generic methodology to guide Malaysian construction organisations to systematically and effectively check the possibilities of improving knowledge sharing in their organisations. The development of the model was scrutinised and verified by a panel of professionals and the final model incorporates their views and comments (see Chapter 11). Having discussed the definition and the rationale for developing a model, the next section discusses the development of a knowledge-sharing model in the context of the present study.

10.4. The development process of the knowledge-sharing model.

The development of a knowledge-sharing model in this study involved five stages, shown in Table 10.1 below:

Table 10.1: The development of a knowledge-sharing model.

Stage	Development	Output	
1	Literature analysis	Common themes and factors relating to approaches to knowledge sharing. Produced a list of 64 factors involved in knowledge sharing.	Chapters 2, 3
2	A pilot study using semi-structured interviews	Identify the main problems in managing knowledge in Malaysian construction organisations. Produced a list of 12 formal and 7 informal approaches to knowledge sharing.	Chapter 4
3	Questionnaire survey	The list of 81 factors was then sent to respondents to rank.	Appendix A
4	Semi-structured interviews	See if they support the findings from the questionnaire survey.	Chapters 5-9
5	Assessment and validation	Seventeen experienced practitioners in Malaysian construction firms were consulted for their comments and views.	Chapter 1 and 11

The next section presents the literature on the various knowledge sharing critical success factors in previous studies and providing the methodology to collect and analyse the data.

10.4.1. Key factors for successful implementation of knowledge sharing in organisations

There are certain factors or areas which are vital for the successful implementation of knowledge sharing. These factors are known as "critical success factors" (CSFs). They are also known as key success factors or key result areas. In general, areas, matters or actions which are useful in the successful practices of a plan, process, project or business are known as CSFs (Megdadi et al., 2012). According to Wong (2005), when it comes to the practices of knowledge management, those "activities and practices" which are helpful in knowledge management are known as CSFs. Therefore, the terms CSFs and key factors are used interchangeably in this study.

Organisation sharing knowledge for so many reasons. There are also different driver that fuel knowledge sharing. Organisation might share knowledge to reduce production costs, faster completion of new product development projects, team performance, organisation innovation capabilities, organisation performance including sales growth and revenue from new products and services etc. Organisational approaches for knowledge sharing differ from one organisation to another. Similarly, the approaches which organisation put forward for measuring their knowledge sharing success as well as the time frame for judging knowledge sharing success differ greatly. What is perceived to be a highly successful knowledge sharing for one organisation may not be seen to be so by another organisation. There are organisations, which choose to continue with their knowledge sharing initiatives after three or five years the initiatives start. There are some that might measure the success of their knowledge sharing after 10-15 years. It is therefore important to understand the modus operandi of an organisation involved in knowledge sharing before the judgment is made whether the organisation is successful at knowledge sharing or not.

Within the field of strategic management, the definition of key success factors is closely related to the CSFs concept (Amberg et al., 2005). CSFs were introduced by Rockart and the MIT Sloan School of Management in 1979 as a way to help senior executives define their information needs for the purpose of managing their organisations (Rockart, 1979). In the literature, several definitions of CSFs exist. Representing one of the most frequently cited definitions, Rockart (1979) uses ideas from Daniel (1961) in defining CSFs as "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation" (p. 85). In a similar

fashion, Bruno and Leidecker (1984) define CSFs as "those characteristics, conditions or variables that, when properly sustained, maintained, or managed, can have a significant impact on the success of a firm competing in particular industry", while Pinto and Slevin (1987) regard CSFs as "factors which, if addressed, significantly improve project implementation chances" (p.22). CSFs are considered to be an important issue when implementing knowledge management in any sector (Wei et al., 2009; Wei and Mohammed, 2007). Hence, the present study seeks to consider CSFs as a significant part of knowledge management implementation to improve knowledge sharing which will be reflected in organisational performance improvement. It has been argued that generally business organisations fail to implement knowledge management successfully because they are not able to identify the critical factors for successful knowledge-sharing implementation (Greiner et al., 2007). As a result, they may face risk when implementing knowledge sharing. Because knowledge-sharing implementation is one of the management issues not appropriately valued by leaders in organisations, and because there is a lack of academic and scholarly endeavour, more investigation into the CSFs of knowledge sharing is still needed (Razi and Abdul Karim, 2010).

Many authors have attempted to draw up a comprehensive list of CSFs for successful implementation of knowledge sharing in different study contexts. Recent studies have been comprehensively reviewed so that unified CSFs for knowledge sharing can be identified. Amongst the studies conducted to identify knowledge sharing CSFs, the most comprehensive lists of success factors have been presented by Wong (2009); Bishop et al. (2008); Wei and Mohammed (2007); Moffett, McAdam, and Parkinson (2003); Egbu et al. (2001a); Liebowitz (1999); Davernport et al. (1998); and Skryme and Amidon (1997). Some of the pertinent studies on CSFs for knowledge management and knowledge sharing will now be reviewed.

Skyrme and Amidon (1997) presented one of the earliest sets of CSFs for practising knowledge management. They highlighted seven CSFs based on lessons drawn from an international study of the practices and experiences of leading organisations in the UK in knowledge management, namely knowledge leadership, a knowledge-creating and sharing culture, a well-developed technology infrastructure, strong links to a business imperative, a compelling vision and architecture, systematic knowledge processes and continuous learning.

Davernport et al. (1998) conducted a study to explore the practices of 31 knowledge management projects in 24 companies in the US. One of their objectives was to determine the factors associated with the companies' effectiveness. Among these projects, 18 were classified as successful. From these, eight CSFs were identified and inferred to have contributed to their effectiveness. These eight CSFs are senior management support, a knowledge-friendly culture, a technical and organisational infrastructure, a standard and flexible knowledge structure, clear purpose and language, economic performance or industry value, multiple channels for knowledge transfer, and change in motivational practices. However, since this was an exploratory study, it was agreed by Davernport et al. (1998) that linking the identified factors to the success of knowledge management should be viewed as hypothesised, not proven.

Around the same time, Liebowitz (1999) proposed six key features that made knowledge management successful in organisations in the US. His six key features were a knowledge management strategy with support from senior management, a chief knowledge officer or equivalent, a knowledge management infrastructure, knowledge ontologies and repositories, knowledge management systems and tools, incentives to encourage knowledge sharing and a supportive culture. Egbu et al. (2001a), in their study of UK construction organisations, suggest that the development of successful knowledge management programmes involves due cognisance of many factors. These involve people, processes, content and technology, organisational factors, political factors, strategy, trust, motivation, commitment, core competencies, communication, structure, culture, climate and leadership. Similarly, Moffett et al. (2003) suggest that the success of knowledge management effort depends on many factors. They highlighted the following CSFs: a friendly organisational culture, senior management leadership and commitment, employee involvement, employee training, trustworthiness, teamwork, employee empowerment, an information systems infrastructure, performance measurement and benchmarking, and knowledge structure. Wong (2009), through an empirical study, proposes a set of 11 CSFs that affect the successful implementation of knowledge management, which he believes to be more suitable for small and medium enterprises in Malaysia. He proposes management leadership and support, culture, information technology, strategy and purpose, measurement, organisational infrastructure processes and activities, motivational aids, resources management training and education, and human resources management.

Another approach was used by Wei and Mohammed (2007) in their study of Malaysian construction organisations. They derived theoretically a set of factors from various literature sources, namely organisational strategy, organisational structure, support mechanisms (IT), management development (conflict handling, mistake handling and risk taking), communication, trust, motivation and learning.

Bishop et al. (2008) discuss the CSFs that ensure the effectiveness of knowledge management initiatives, with particular focus on the effect of people-oriented success factors in the context of UK construction organisations. Their research suggests that organisations need to consider several key areas, particularly understanding and defining knowledge management, establishing a fit with the needs of individuals and the business, integration of the initiatives into the organisation and daily lives of staff, the implementation of knowledge management champions and a supporting team, the establishment of top-level support, demonstrating and communicating benefits and success, determining the suitability of financial and non-financial rewards, and achieving a balance between people and IT. Other writers have also identified, based on various study contexts, different CSFs that can aid and lead to successful implementation of knowledge sharing between individuals in an organisation. Table 10.2 shows that the number of CSFs written about within the literature varies from six (the least, e.g. Liebowitz, 1999) to twelve (the most, e.g. Egbu et al. (2001), indicating that a relatively small number of success factors should be the focus of attention for an organisation seeking to be successful in its knowledge-sharing initiatives. While there are some similarities in the studies, they cannot be generalised. However, all the studies were conducted by authors in different time spans, backgrounds and regions but still we see that these are more alike same only difference is of words or their arrangement. Based on the review of literatures undertaken, ten key factors are to be considered and determined in this study: 1) technology, 2) leadership and support, 3) organisational culture, 4) knowledge sharing strategies, 5) motivation aids, 6) training, 7) communication channels, 8) performance measurement, 9) human resources management, and 10) organisational structure. Each of the factors will be discussed in Section 10.5.

Table 10.2: Comparison between the authors's proposed success key factors and those of other studies.

Authors / General Factors	Skyrme & Amidon (1997)	Davernport et al. (1998)	Liebowitz (1999)	Egbu et al. (2001)	Moffett (2003)	Wong (2009)	Wei and Mohammed (2007)	Bishop et al. (2008)	**Researcher Proposition**
Technology	A well-developed technology infrastructure	Technical and organisational infrastructure	KM infrastructure; knowledge ontology's & repositories	Content & technology	Information systems infrastructure	IT	Support mechanism (IT)	Achieve a balance between people and IT	(8) Technology
Leadership & support	Knowledge leadership	Senior management appreciation	A chief knowledge officer, or equivalent; Support from senior management	Leadership commitment	Senior management; Leadership & commitment	Organisational infrastructure (CKO, team and roles); management leadership and support		KM champions & a supporting team; establish top-level support	(7) Leadership & support
Culture	A sharing culture	A knowledge-friendly culture	A supportive culture	Culture Trust	A friendly organisational culture; Trustworthy teamwork	Culture (trust, collaboration, openness & problem solving)	Trust	Integrate culture into organisation & daily lives of staff	(7) Organisational Culture
Organisational strategy	Systematic organisational knowledge process; strong link to a business imperative; a compelling vision & architecture; standard, flexible knowledge structure		KM strategy	Strategy	Knowledge structure	Strategy and purpose	Organisation strategy	Understanding and defining KM ; establishing a fit with the needs of individuals and the business	(7) Knowledge sharing strategy
Motivation		Different	incentives to	Motivation		Motivational	Motivation	Financial and	(6) Motivation

		motivational practices	encourage knowledge sharing			aids		non-financial rewards	
Training	Continuous learning			Core competencies	Employee training	Training and education	Learning		(5) Training
Communication		Multiple channels for ks; clarity of purpose and language		Communication			Communication	Demonstrate & communicate benefits and success	(4) Communication channels
Measurement		Link to economic performance or industry value			Performance measurement benchmarking	Measurement			(3) Performance measurement
People				People	Employee involvement; employee empowerment	Human resources management			(3) Human resources management
Organisational structure				Structure			Organisation structure		(2) Organisational structure
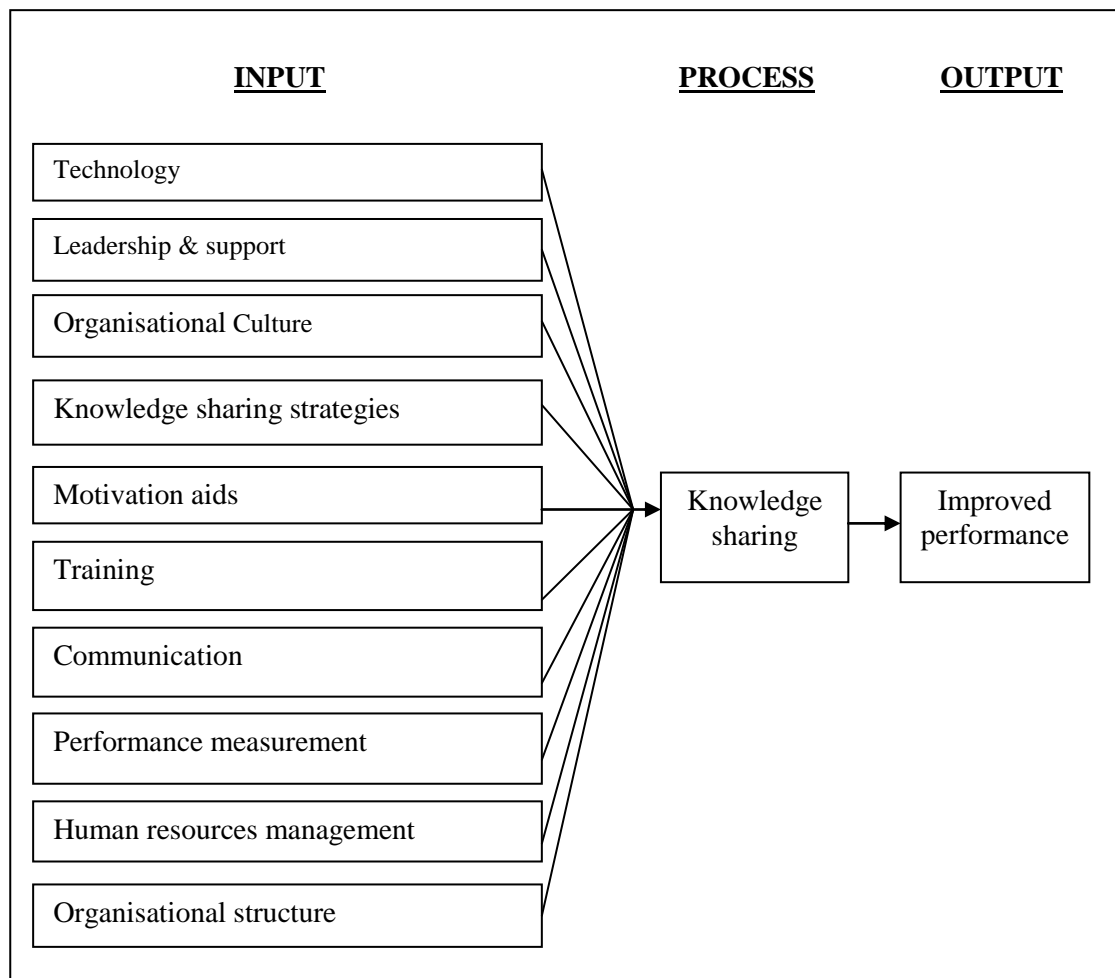
Figure 10.1: Proposed key factors for successful implementation of knowledge sharing for improved performance.

All those 10 factors in Table 10.1 and Figure 10.1 above have been discussed as critical factors that should be addressed in order to ensure the successful implemention of knowledge sharing in organisation. Ignorance and oversight of the necessary ones will likely hinder and organisation's effort to realise its full benefits. The following section introduces the proposed research model developed for this research, identifying the key variables and their relationships.

10.4.2. The proposed research model

Research on knowledge sharing has focused on three factors, namely enablers/input, process and organisational performance (Lin, 2007; Lee and Choi, 2003; Rajagopalan et al., 1993). However, such factors are usually investigated in isolation (Lee and Choi 2003). Enablers or input are factors concerned with how organisational mechanisms enhance knowledge in a consistent manner thereby resulting in the sharing of knowledge (Zawiyah et al., 2012). Process or knowledge management activity, on the other hand, consists of the creation, storage; sharing and evaluating of knowledge (see Section 1.1 in Chapter 1 of the thesis). Meanwhile, organisational performance is seen as "a process of assessing progress towards achieving pre-determined goals, including information on the efficiency by which resources are transformed into goods and services, the quality of these outputs and outcomes, and the effectiveness of organisational objectives" (Amartunga and Baldry, 2003: p. 172) (Subsection 8.5.1 in Chapter 8 of the thesis). While several researchers have focused on factors that influence knowledge sharing (see Chapter 9 of the thesis), others have enquired into the relationship between knowledge sharing and organisational performance (see Section 8.6 in Chapter 8 of the thesis). There has yet to be a holistic model that looks into the effectiveness of knowledge sharing (Lin 2007). The approach by Lin (2007), Lee and Choi (2003), and Rajagopalan et al. (1993) has been employed here (see Figure 10.2) to examine the relationship between factors that enable knowledge sharing, the knowledge-sharing approaches and the impact on organisational performance.
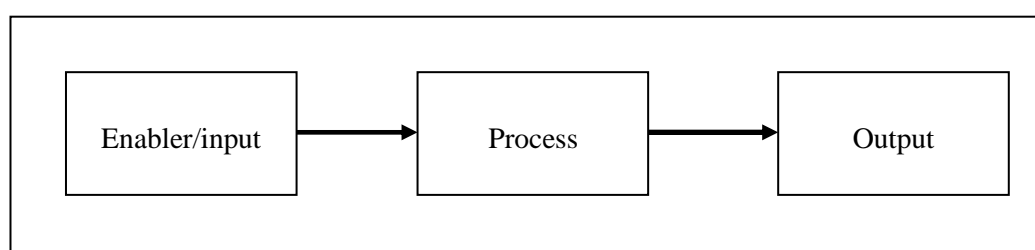
Figure 10.2: Enablers/input, process and output.

(Source: Lin (2007), Lee and Choi (2003), and Rajagopalan et al. (1993)

10.4.3. Proposed constructs

The proposed research model comprises of the enablers/input (key factors that impact the successful implementation of knowledge sharing), the process (knowledge-sharing approaches), and the outcomes (organisational performance). To this end, the study proposes a simple, yet pragmatic model for the study of knowledge-sharing approaches. In summary, the proposed research model illustrates the relationship among variables as shown in Figure 10.3. In total, the model consists of 39 variables. An understanding of these factors and how they interact in complex ways to improve knowledge-sharing approaches in organisation is important for improve organisational performance. These factors will be discussed in more detail; demonstrating the link between key factors that impact the successful implementation of knowledge sharing, knowledge-sharing approaches, and organisational performance.

INPUT	PROCESS	OUTCOME
KEY FACTORS 1. Technology 2. Leadership & support 3. Organisational culture 4. Knowledge sharing strategies 5. Organisational structure 6. Motivation aids 7. Training 8. Communication channels 9. Human resources management 10. Performance measurement	**FORMAL KNOWLEDGE-SHARING APPROACHES** 1. Internet technologies 2. Mentoring 3. Open and conducive environment 4. Training to improve coaching 5. Intranet technologies 6. Recruitment and selection 7. Clear communication channels 8. Flexible organisational structures 9. Performance measurement system 10. Appraisal and reward system 11. Knowledge leader or champion 12. Knowledge sharing policy **INFORMAL KNOWLEDGE-SHARING APPROACHES** 1. Face-to-face social interaction 2. Personal relationships 3. Social events 4. Conducive workplace settings 5. Community of practice 6. Spontaneous informal communications 7. Story telling	**IMPROVED ORGANISATIONAL PERFORMANCE** 1. Increases efficient operations and reduces costs 2. Improves better decision- making 3. Improves project delivery and services to market faster 4. Improves ways of working and minimises unnecessary duplication 5. Improves client/customer service 6. Improves speed and effectiveness 7. Improves the identification and dissemination of best practices 8. More agile and better able to respond to organisational changes 9. Inspires creativity and innovation. 10. Enhances employees' retention rates

Figure 10.3: Proposed knowledge-sharing model

10.5. The link between knowledge sharing influential factors, knowledge-sharing approaches, and organisational performance.

i. Technology

Different authors have analysed the significance of technology an important mechanism in knowledge management (Papoutsakis, 2007; Symonds et al., 2003; Egbu and Botterill, 2002; Egbu et al., 2001; Elliot and O'Dell, 1999) and considered it as a very important CSF for knowledge sharing implementation. Davernport and Prusak (1998) found that IT systems had a positive relationship on knowledge sharing. They conclude that IT improves an organisation's performance as well as increasing the rate of knowledge sharing within the organisation. Research done by Papoutsakis (2007) found that the use of IT for knowledge sharing within an organisation as an important tool for managing organisational knowledge in order to improve business performance.

ii. Leadership and support

A study conducted by Andersen and APQC revealed that one crucial reason why organisations are unable to effectively leverage knowledge is because of a lack of commitment of top leadership to sharing organisational knowledge or there are too few role models who exhibit the desired behavior (Hiebeler, 1996). Top management plays a major role in the implementation of knowledge sharing. This factor was considered as CSF by different authors. Like management leadership and support (Wong, 2005), knowledge leadership (Skryme and Amidon, 1997), senior management support (Davenport et al., 1998), leadership (Holsapple and Joshi, 2000); (Hasanali, 2002); (APQC, 1999) and senior leadership support (Liebowitz, 1999). This knowledge sharing leaders and teams commitment is needed to accelerate the establishment of the required environment within which people are able to share knowledge and are allowed to assimilate as well as practice the knowledge gained. Consequently, the support and commitment provided by the knowledge sharing leaders and teams should therefore be ongoing in improving organisation performance by contributing towards the success of knowledge sharing, eventually making leadership a critical factor in supporting knowledge-sharing approaches.

iii.   Organisational culture

While culture is not the only determinant in the success or failure of a business, a positive culture nevertheless can bring significant advantage to an organisation in terms of providing an enjoyable working environment that increases organisation performance. This will inevitably increase the level of teamwork, sharing of knowledge, and openness to new ideas among workers (Goffee and Jones, 1996). A culture that acknowledges the importance of sharing knowledge amongst organisations are in fact important and should therefore be crucially considered especially when implementing knowledge sharing initiatives in organisation. More recently, Aydin and Ceylan (2009) also showed that cultural dimensions were related to organisational performance. It has been argued that nurturing a knowledge sharing culture and establishing the right climate for knowledge sharing is a fundamental issue for successful organisational performance that maintains competitive advantage (Almahamid et al., 2010). Culture was suggested as a CSF by many authors like culture by (Wong, 2005; Hasanali, 2002; APQC, 1999), supportive culture (Liebowitz, 1999), knowledge friendly culture (Davenport et al., 1998) and knowledge creating and sharing culture (Skryme and Amidon, 1997).

iv.   Knowledge sharing strategies

Strategy should be developed about the implementation of knowledge sharing. Without proper strategy, any plan will fail (Megdadi et al., 2012). This factor was suggested by many authors with different names like strategy and purpose (Wong, 2005), strong link to business imperative, vision and architecture (Skryme and Amidon, 1997), clear purpose and language (Davenport et al., 1998) and strategy (APQC, 1999).

v.   Motivation aids

Motivation aids such as incentives including recognition and rewards have been recommended as interventions to facilitate knowledge sharing and help build a supportive culture (Nelson et al., 2006; Liebowitz, 2003; Hansen et al., 1999). This factor was suggested as CSF by authors as motivational aids by (Wong, 2005), change in motivational process (Davenport et al., 1998) and incentives to encourage knowledge sharing (Liebowitz, 1999). To encourage knowledge sharing behavior, motivation aids are important. Ian et al. (2004) noted that motivation aids should be incorporated to

organisation strategies as seen as a technique which organisation can apply in order to achieve higher productivity in accordance with goals.

vi.   Training for knowledge sharing

Training is another important factor for successful implementation of knowledge sharing. Organisational members need to be aware of the needs to share knowledge and to recognise it as a key resource for the viability of a company. This issue can be addressed if proper basic training is provided to the employees. Through such training, they will have a better understanding of the concept of knowledge sharing (Moffett et al., 2003). It also helps to frame a common language and perception of how they define and think about knowledge (Wong, 2005). Yahya and Goh (2002) showed that training related to creativity, team building, documentation skills and problem solving had a positive impact on the overall knowledge sharing initiatives. Training in both the short–term and long-term can have positive effects on the performance of organisation Muscatello (2003).

vii.   Communication channel

Communication can enhance knowledge sharing because it can ensure that business and IT potential are integrated effectively (Rockart et al., 1996). As suggested by Luftman and Brier (1999), "for knowledge sharing to succeed, clear communication is an absolute necessity". Using internal marketing can create an understandable and clear generally-shared language for the whole organisation and helps an organisation achieve its goals by putting it into systems, processes, and structures (Karimi et al., 2011).

viii.   Performance measurement

Performance measurement is another critical factor posited that would ensure successful knowledge sharing implementation. It is important that an organisation considers its performance measurement on both its tangible and intangible assets. This is because knowledge sharing measures must be embedded in the overall business performance model, and not be a marginal "add-on" to the core measures (Gooijer, 2000). In order to improve knowledge sharing approaches, effective ways of measuring knowledge sharing behavior are needed (Small and Sage, 2005). As previously discussed, there are two types of knowledge: tacit and explicit. Regardless of the type of knowledge (tacit or explicit), its contribution must be measurable not only by traditional financial measures

but also by other performance measurements. Knowledge must be measured because the intellectual capital of an organisation includes the brain of its employees, their know-how, the processes and customer knowledge that they create (Choi, 2000). Thus, it is clearly necessary to include performance measurement system as a key factor for the successful knowledge sharing implementation

ix.   Human resources management

Study by Cabrera and Cabrera (2010) presented evidence that suggests good human resource management have significant impact on knowledge sharing in organisations. According to the studies conducted by Cabrera and Cabrera (2010), organisations that focused on human resource management such as work design, staffing, training and development, performance appraisal, compensation and rewards, culture, and technology produced not only foster knowledge sharing by creating an environment conducive for sharing, but also enhanced positive attitudes toward sharing initiatives. Similarly, study by Kuo (2011) found that human resource management result in better organisational learning, organisational innovation, and knowledge management capability, which ultimately contributes to achieving organisational performance.

x.   Organisational structure

Organisational structure has been emphasised for successful implementation of knowledge sharing. For instance, O'Dell and Grayson (1998) noted that organisational structure should be designed for flexibility (as opposed to rigidity) to encourage sharing and collaboration across boundaries within the organisation and across the supply chain. Similarly, study by Gold et al, (2001) found that organisations with flexible and organic structure are more likely to achieve the perceived benefits of knowledge sharing than those organisations that are rigid and bureaucratic.

10.6. Conclusions and recommendations

This chapter discussed the development of the model underpinning this research. The model should encourage contractors to understand how and why it is necessary to improve knowledge-sharing approaches. The model provides a graphical representation of the key factors that impact upon the successful implementation of knowledge-sharing approaches in the context of Malaysian construction organisations.

Several key factors were elicited that need to be addressed within knowledge-sharing initiatives. These key factors relate to: 1) technology, 2) leadership and support, 3) organisational culture, 4) knowledge sharing strategies, 5) motivation aids, 6) training, 7) communication channels, 8) performance measurement, 9) human resources management, and 10) organisational structure.

This chapter has filled a knowledge gap by providing an appropriate model to help current Malaysian construction organisations to improve their knowledge-sharing approaches, where one did not exist before. Providing information about the key factors that impact upon the successful implementation of knowledge sharing will give Malaysian construction organisations an idea of how to fully exploit formal and informal knowledge-sharing approaches and hence improve organisational performance. Accordingly, the key factors generated from both empirical investigations and from the outcomes of a literature synthesis were considered when devising the model for this study. In doing so, the sixth objective of the current study, which is "to develop a conceptual model that encapsulates the key factors that impact upon the successful implementation of knowledge sharing in organisations", was addressed.

The following chapter deals with validation of the proposed knowledge-sharing model.

CHAPTER 11. VALIDATION OF THE PROPOSED MODEL

11.1. Introduction

Having discussed the rationale and development of the model in the previous chapter, this chapter discusses the validation of the proposed model. Chapter 11 addresses objective 8 of the study: "To validate the proposed conceptual model".

Accordingly, the chapter is divided into three main sections

- Section 11.2 discusses the validation of the proposed model.

- Section 11.3 presents feedback analysis.

- Section 11.4 gives a summary of the findings of the model.

11.2. Validation of the proposed knowledge-sharing model

The aim of the validation process is to present the model to respondents in the Malaysian construction organisations in order to minimise the threat to the reliability and validity (and furthermore increase the chances of generalisability) of the refined model. Furthermore, this validation approach is closely interwoven with the concept of triangulation, which is a useful approach to ensure the validity and reliability of qualitative research (Hair et al., 2007; Saunders et al., 2007).

The data were collected via a web-based survey. Web-based surveys are gaining in popularity (Dillman, 2000). Sproull (1986) found that data collection via e-mail has the advantages of producing adequate data, enhancing response rates, and engendering a willingness to further participate with the minimum expenditure of the researcher's time and effort and a high degree of convenience for the respondents. An online survey technique was chosen, since it is easier to access a large number of people and also provides an efficient way to collect responses from contractors situated in different geographical locations in Malaysia.

The selection of appropriate respondents was also an important aspect of this research. An 'expert opinion' validation using a questionnaire accompanied by the proposed model was distributed to 30 experts. They were selected based on four criteria: they involved in the pilot study data collections, they participated in the previous questionnaire survey or semi-structured interviews, their e-mail address were available and they were interested in validating the model. Thirty validation questionnaires were sent to Malaysian contractors, but only seventeen responses were completed and returned. Each of these seventeen experts had over six years of field experience in the construction industry. They consisted of different levels of management (top, middle and junior) and different sizes of contractors in Malaysia (SMEs and large). The co-operation of potential respondents was obtained through e-mail and telephone, followed by a letter (see Appendix F) to the organisations/link persons who had expressed a willingness to approach potential respondents.

A sample of the validation questionnaire and feedback is presented in Appendix E. The questionnaire for validating the proposed knowledge-sharing model consisted of three parts. The first part focused on general questions regarding the respondents' organisation with respect to job title or position, number of employees and years of experience.

The second part of the questionnaire used a quantitative validation approach. The questions focused on whether the content of the model was explicit: was it likely that the factors in the knowledge-sharing model would result in the successful implementation of knowledge sharing in the organisation? Did the model cover most of the issues that managers would expect to encounter in knowledge-sharing approaches? This part also covered the level of understanding of the knowledge-sharing model and whether they would recommend using the knowledge-sharing model in their organisation.

The third part used a qualitative validation approach. An open-ended question was posed to elicit the experts' suggestions as to how any aspects of the proposed knowledge-sharing model might be improved. Hence, the validation approach was conducted to address:

- The construct validity of the proposed knowledge-sharing model by confirming whether the construction organisations agree to the key factors identified in the model

- The validity of the processes within the core organisational drivers embracing the proposed model

- The level of understanding of the proposed knowledge-sharing model

- The usability and functionality of the proposed knowledge-sharing model

- The suggestions for improving the proposed knowledge-sharing model

More than 50 per cent of the experts (17 out of 30) answered the questionnaires. The experts consisted of two junior, ten middle and five senior managers, representing ten small, four medium and three large Malaysian construction organisations. The combination of these people provided rich information for validation. According to Fox et al. (2003), the validation assessment will not be effective unless it comprises an appropriate balance of all the necessary expert knowledge. Given that the respondents had an average construction work experience of over six years they can be regarded as 'experts' in project development in Malaysia. The feedback received from the current validation survey could be accepted as the opinion of the appropriate 'experts' and the knowledge provided considered as sufficient for analysis and recommendations. Table 11.1 gives details of the experts involved in the validation process.

Table 11.1 reveals that most of the respondents (15 out of 17) noted that the presented factors in the model for knowledge-sharing approaches are explicit. All of the respondents also indicated that the factors in the knowledge-sharing model are likely to impact on the successful implementation of knowledge sharing in organisations. In terms of coverage, 16 out of 17 respondents agreed that the model covered most of the issues of knowledge-sharing initiatives that they expected. The participants also noted that the knowledge-sharing model was easy to understand (with a mean value of 2.066). In terms of recommendations, all of the respondents (17) involved in the study would recommend the knowledge-sharing model for use within their organisation.

Table 11.1: The experts involved in the validation process of the knowledge-sharing model.

Size	Coding	Position	Experience in Malaysian construction Industry	Factors explicit	Successful implementation	Coverage	Level of understanding	Recommendation to use
		Manager	Years	Yes/No	Yes/No	Yes/No	Mean	Yes/No
Small	S1	Middle	16-20 years	Yes	Yes	Yes	2	Yes
	S2	Middle	11-15 years	Yes	Yes	Yes	2	Yes
	S3	Junior	6-10 years	Yes	Yes	Yes	2	Yes
	S4	Junior	11-15 years	No	Yes	Yes	2	Yes
	S5	Middle	>20 years	Yes	Yes	Yes	2	Yes
	S6	Middle	6-10 years	Yes	Yes	Yes	2	Yes
	S7	Senior	11-15 years	Yes	Yes	Yes	2	Yes
	S8	Senior	11-15 years	Yes	Yes	Yes	2	Yes
	S9	Senior	>20 years	Yes	Yes	No	2	Yes
	S10	Senior	11-15 years	Yes	Yes	Yes	2	Yes
Medium	M1	Middle	11-15 years	Yes	Yes	Yes	2	Yes
	M2	Middle	11-15 years	Yes	Yes	Yes	2	Yes
	M3	Senior	>20 years	Yes	Yes	Yes	2	Yes
	M4	Senior	>20 years	Yes	Yes	Yes	2	Yes
Large	L1	Middle	11-15 years	No	Yes	Yes	2	Yes
	L2	Middle	6-10 years	Yes	Yes	Yes	2	Yes
	L3	Senior	>20 years	Yes	Yes	Yes	2	Yes
			Yes	15	17	16	Mean=2.066	17
			No	2	0	1		0

Meaning of scale: Level of understanding (1= Very easy to understand; 2= Easy to understand; 3= Difficult to understand; 4= Very difficult to understand; 5= Cannot understand at all)

11.3. Feedback analysis

The feedback received from this validation survey could be accepted as the opinion of the appropriate experts and the knowledge provided could be considered as sufficient for analysis and for the recommendations. The model was updated accordingly, based on the comments and views received from the experts. The feedback received from the experts confirmed that the developed model can be used to improve knowledge sharing in Malaysian construction organisations. Overall, all the experts commented that the model could be used as a guide or reference to improve knowledge sharing within contractor firms. Table 11.2 presents some of their comments and professional views.

Table 11.2: Comments and suggestions received on the knowledge-sharing model.

Size	Code	Position	Feedback
Large	L1	Middle	The model looks very interesting. I am wondering how flexible the model is in terms of whether it must be a complete package, meaning that all the factors have to reflect knowledge sharing or have some factors is possible?, and that knowledge sharing is working. I ask this because if an organisation takes a look at the model they will be very fearful that they have to undertake a lot to achieve successful knowledge sharing. A mechanism to indicate that it is package-oriented would give the end user a lot more room to implement what is within their capacity and motivate them to improve further as they see the benefits of knowledge sharing in terms of performance improvement, productivity growth, knowledgeable staff, higher turnover and other factors that will improve organisations. I hope my feedback and comments are useful to your study. All the best!
	L2	Middle	The model can be easily understood by contractor firms in Malaysia that wish to gain benefits from their investment in knowledge management initiatives. The model further enhances/improves our understanding by clearly depicting the role of HRM (through its good practice strategies) in nurturing the culture of sharing among employees. However, the influence of local workforces' cultural values on the successful implementation of this model should be of prime importance among the policy makers and implementers.
	L3	Senior	It is highly usable and will be practical to implement and can be considered as a tool to improve awareness of the importance of knowledge sharing for achieving organisational outcomes.

Size	Code	Position	Feedback
Med	M1	Middle	Please make sure that this "knowledge sharing model" can be easily accessible and is suitable for different sizes of organisation and various level of management in order to make sure of its effectiveness.
	M2	Middle	As a practitioner, I may need to know what types/kinds of organisational performance can be influenced most by knowledge sharing (i.e. business performance, operational performance). This can be done through the factor analysis. You may look into similarity or differences to see if it will have any effect on your detailed analysis.
	M3	Middle	Put more emphasis on how to ensure the successful implementation of knowledge sharing activities in the organisations. Perhaps you can give good model from the UK as a benchmark to apply in Malaysia.
	M4	Middle	I would use this in small scale (at department level) as a trial.
Small	S1	Mid	The model needs to be presented in a more attractive way and it should provide some examples so that it can be easily understood.
	S2	Mid	A comparison study between European countries and developing countries should take into consideration measuring the success, effectiveness and efficiency of this model.
	S3	Junior	A proper model for knowledge sharing is much needed. With overloaded information makes staff confused and keep on repeating the same mistake frequently.
	S4	Junior	Knowledge sharing must have guidelines for the easy understanding of technical knowledge
	S5	Middle	The questionnaire fulfils the purposes of knowledge sharing model in order to improve the awareness and understanding within our construction industries
	S6	Middle	Overall a good and clear model based on statistical analysis. Vision and commitment from top leadership is important. How can you gain this? Budget allocation? Where can we get a budget for those knowledge sharing initiatives? How about the issue of transparency and trust? What about workers from different locations? How can this model improve the bottom line (direct implication)? How can you sustain this model? How can you align this model to business operation and policy? How can the customer benefit from this model?
	S7	Senior	The knowledge sharing model is clear and easy to understand. Knowledge sharing is important to practice in an organisation, but it takes time to develop/improve because senior employees are reluctant to accept knowledge from junior employees.
	S8	Senior	Good reference for organisation and staff.
	S9	Senior	The proposed model must have a user friendly system, be compatible and must have an economical approach in order to be used in an organisation.
	S10	Senior	The model looks very practical and can help to improve the management process.

The first feedback from a middle manager of a large organisation (L1) was:

"The model looks very interesting. I am wondering how flexible the model is in terms of whether it must be a complete package, meaning that all the factors have to reflect knowledge sharing or have some factors is possible? And that knowledge sharing is working. I ask this because if an organisation takes a look at the model they will be very fearful that they have to undertake a lot to achieve knowledge sharing. A mechanism to indicate that it is package-oriented would give the end user a lot more room to implement what is within their capacity and motivate them to improve further as they see the benefits of knowledge sharing in terms of performance improvement, productivity growth, knowledgeable staff, higher turnover and other factors that will improve organisations. I hope my feedback and comments are useful to your study. All the best!"

All the factors compiled in this model do not exert the same amount of influence on the successful implementation of knowledge sharing in all organisational settings. Formal and informal approaches to knowledge sharing are all interconnected, with each factor influencing the other in a nonlinear fashion. The relative importance of each of these factors is influenced by the business objectives of the organisation, its structure, business practices and policies in terms of its reward system, culture, human resources practices etc. A certain amount of knowledge is shared between individuals all the time, regardless of the circumstances in the organisation. The absence of one or more of these factors in an organisation does not preclude all knowledge sharing. However, the knowledge-sharing model presented here proposes that the factors are strongly interrelated, and if each factor on its own is favourable to knowledge sharing, together they create the ideal environment for knowledge sharing in organisations. The model indicates that the ten key factors for knowledge sharing are embedded within the organisational structure, organisation culture and human resources practices of the organisation environment.

The second feedback from a middle manager of a medium organisation (M1) suggested:

"Please make sure that this "knowledge sharing model" can be easily accessible and is suitable for different sizes of organisation and various level of management in order to make sure of its effectiveness".

The model is recommended for use in SMEs and large construction organisations and at various levels of management. However, this model may require alteration because the influence of organisational culture, structure and human resource practices in every organisation is different. There is also a need to apply the model to an actual organisation in order to observe its effectiveness. However, this will be suggested for future research related to knowledge sharing in Malaysian construction organisations.

The fourth feedback from a middle manager of a small organisation (S6) was:

"Overall a good and clear model based on statistical analysis. Vision and commitment from top leadership is important. How can you gain this? Budget allocation? Where can we get a budget for those knowledge sharing initiatives? How about the issue of transparency and trust? What about workers from different locations? How can this model improve the bottom line (direct implication)? How can you sustain this model? How can you align this model to business operation and policy? How can the customer benefit from this model?"

Based on this research, knowledge sharing should be continuously promoted and barriers should be overcome. The strategies for promoting knowledge sharing may be company-specific. However, strong support was found for linking knowledge sharing with reward and performance appraisal. Support from top management in encouraging employees to share knowledge via various formal and informal knowledge-sharing approaches is strongly recommended. More effort must be made and awareness must be created to ensure that people understand the benefits of knowledge sharing.

The sixth feedback from a senior manager of a small organisation (S7) was:

"The knowledge sharing model is clear and easy to understand. Knowledge sharing is important to practice in an organisation, but it takes time to develop/improve because senior employees are reluctant to accept knowledge from junior employees".

Primarily, the cultures of the organisations need to be addressed if knowledge management (knowledge sharing) is to be of benefit. Each organisation has its individual culture and only they can say what initiatives need to be set up to encourage a culture change. Knowledge management is a long-term goal without any short cuts. If it is to bring long-term benefit to the organisation, it will take a considerable period to have systems up and running with sufficient time to be validated and for benefits to

percolate to the organisation's performance. For example, the Wates group, a medium UK building company, stated it took four and a half years before staff accepted the concept of sharing knowledge (CPN, 2000).

Clearly, the feedback received from the experts reflects their support of a model to improve knowledge sharing for improved performance in Malaysian construction organisations. The model developed through this research should yield various strategic results, inducing a better understanding of and solutions for the major key factors. It was not designed to be a prescription for the major factors, but to provide a holistic insight into understanding the key factors in order to improve knowledge sharing for improved performance in Malaysian construction organisations. However, it is expected that further changes to the model will be required due to the changing needs of the Malaysian construction industry. Hence, it is flexible to allow for future improvement. From the above comments and feedback, more work and effort is needed to bring construction organisations together to support the future implementation of this model. Further initiatives leading to the application of this model would lead to its continuous improvement.

11.4. Conclusions and recommendations

This chapter discussed the steps involved in validation of the proposed conceptual model that encapsulates the key factors that impact upon the successful implementation of knowledge sharing in organisations. Thirty validation questionnaires survey were sent to the expert in the Malaysian construction organisations but only seventeen responses were completed and returned. These experts are professionals who are regarded as capable to form an accepted scientific opinion on the proposed model. The assessment by knowledgable managers will result in improved and will enhance creadibility of the proposed model. The feedback received from this validation survey could be accepted as the opinion of the appropriate experts and the knowledge provided could be considered as sufficient for analysis and for the recommendations. In doing so the final objective of this current study, which is "to validate the proposed conceptual model" was addressed. The next chapter presents the conclusions, recommendations and suggestions for future research arising from this PhD research.

CHAPTER 12. CONCLUSIONS AND RECOMMENDATIONS

12.1. Introduction

This final chapter concludes this research. Accordingly, this chapter is structured as follows:

- Section 12.2 briefly discusses the research process of the study.

- Section 12.3 addressing the achievement of research objectives.

- Section 12.4 presents the limitations of the study.

- Section 12.5 presents the recommendations for future work

12.2. The research process

This research determines that, generally, construction organisations in Malaysia do have knowledge sharing within the organisation and also plan to invest in a number of formal knowledge-sharing approaches. Unfortunately, it seems that construction organisations are unable to fully utilise the benefit of formal and informal approaches to knowledge sharing in their organisations. Nevertheless, it is hoped that construction organisations, with the help of this study, will be able to apply the key factors as a guideline to achieve the successful implementation of knowledge sharing. It is anticipated that the research findings will assists construction organisations to better understand the various approaches to knowledge sharing so that action can be taken to overcome unwarranted gaps. In addition, this study may provide insights for SMEs and large construction organisations into how to properly frame their knowledge sharing initiatives in the right perspectives, and serve as a guideline to discover and to further observe the importance of the above-mentioned approaches to knowledge sharing within organisations. The "key factors" proposed in this study could help businesses, especially construction organisations, to better organise their knowledge-sharing initiatives for improved

performance, as well as to achieve sustainable competitive advantage with high value-added growth potential in Malaysia.

In order to satisfy the research aims and objectives (Section 1.5 in Chapter 1), a three-staged research process was undertaken. Stage 1 of the research consists of pilot study and a detailed literature review of knowledge management and knowledge sharing in construction organisations. The preliminary literature review served to detect research problems. The literature review also helps to bring together all the possible factors that can contribute to improved knowledge sharing. The semi-structured interviews for the pilot study were conducted with 21 practitioners, including seven top, seven middle and seven junior managers from 21 construction organisations (seven small, seven medium and seven large). This stage revealed the factors that influence knowledge sharing, the knowledge-sharing practices used in organisations and also the relationship between knowledge sharing and improved organisation performance.

The main body of the research study is established at stage 2 of the research structure. At stage 2, the main study was carried out by using a postal questionnaire and semi-structured interviews. A total of 1000 questionnaires were sent out to managers in Malaysian construction organisations, and 384 were returned, giving a response rate of 38.4%. Further research was carried out by conducting semi-structured interviews with 28 practitioners at three different management levels (six top, sixteen middle and six junior managers) from 19 construction organisations (seven small, five medium and seven large). This stage was conducted in the knowledge of the findings from stage 1 of the research.

Stage 3 of the research consisted of the development and validation of the knowledge-sharing model for improved performance for Malaysian construction organisations. At this stage, the data collected from the web-based questionnaires survey were used and analysed to assist in the validation of the model. The model constitutes key factors that impact upon the successful implementation of knowledge sharing in organisations. It also presents the possible outcomes of practising knowledge-sharing approaches for improved performance. The following sections demonstrate the achievement and present the key findings related to each research objectives of the study.

12.3. Achievement of research objectives

The research objectives were developed in Section 1.5 of Chapter 1 in order to achieve the aims of the research. Altogether there were eight research objectives that were achieved through three types of input, namely: literature review, questionaire survey and semi-structured interviews. This section provides a brief summary of the key findings (presented in related chapters) to demonstrate the achievement of all eight objectives of the research.

12.3.1 Research objective one: To critically review the literature and document the perceptions of construction organisations (small, medium and large) towards knowledge-sharing approaches.

The first objective was achieved through review of literature and the findings are presented in the literature review Chapter 2 and 3. Chapter 2 investigated the theoretical foundation for studying knowledge management in organisations. It gives an overview of the nature and management of knowledge. Following this, the discussion moves onto knowledge sharing as the core research area of the study. Knowledge-sharing approaches can be seen as an important outcome for improving organisation performance. However, the absence of empirical studies of knowledge-sharing approaches in the developing countries, specifically SMEs and large Malaysian construction organisations, suggest large gaps in the body of knowledge in this area.

Chapter 3 begins with a literature review on organisational size on knowledge-sharing approaches. The review of literature on organisational size provides a broad contextual overview of characteristics of the SMEs and large organisations, while demonstrating the possible impact of organisational size on the adoption of knowledge-sharing approaches. A broad range of knowledge-sharing approaches has been mentioned in the literature. However, no systematic work exists on characterising a collective set of knowledge-sharing approaches in the construction organisations context. An appropriate knowledge-sharing approach which is relevant for the construction organisations will help them to keep in mind the important issues that should be dealt with when designing and implementing a knowledge-sharing initiative. It had been identified that there was a need for a better understanding of the knowledge-sharing approaches, their differences and characteristics. Thus, two knowledge-sharing approaches have been identified, namely formal approaches to knowledge sharing (an initiative that is well defined,

structured, systematically organised, using formal knowledge sharing approaches and usually presented in written form. Such initiative often embodies policies transpiring the life span of the organisation and should ideally not be rigid so as to accommodate changes that may occur in tandem with the organisational environment. It reflects internal knowledge within the organisation and aspires towards continued improvement), and informal approaches to knowledge sharing (an initiative that is unstructured, disorganised in form, occurring in ad hoc fashion and often undocumented or labelled as knowledge sharing. It reflects internal networking knowledge and occasionally results from external communications with the aim of improving internal knowledge sharing. Informal knowledge sharing may occur spontaneously without any official assistance from the management). The differences between formal and informal approaches to knowledge sharing have been highlighted and the features of each presented (Subsection 3.4.1 and 3.4.2 in Chapter 3). The construction organisation perceptions regarding knowledge-sharing approaches provide managers with the potentially important considerations. This will give construction organisations an idea of how to fully exploit formal and informal approaches to knowledge sharing and hence improve organisational performance.

12.3.2 Research objective two: To appraise and document the different approaches employed by construction organisations and managers for knowledge sharing.

The second objective was achieved through exploratory study involving: 1) interviews with managers of SMEs and large Malaysian construction organisations; and 2) questionnaire surveys. Findings of the exploratory study are presented in Chapter 5 of the thesis. Based on the previous discussion, typologies of knowledge-sharing approaches employ by organisations were proposed to facilitate knowledge sharing, which can be broadly classified under formal and informal knowledge-sharing approaches. The study identified 12 formal approaches and 7 informal approaches to knowledge sharing that are presently employed in Malaysian construction organisations (see Tables 5.1 and 5.7 in Chapter 5). The findings of the questionnaire survey revealed internet technologies, mentoring, and an open and conducive environment are the most highly used/used approaches in terms of formal knowledge sharing. The highly used/used informal approaches to knowledge sharing are face-to-face social interaction, personal relationships and social events. Another dimension is taken into account in

order to explore in more detail the extent to which formal and informal approaches are used by different size of the organisation and managerial levels. Overall, the results reveal that the size of the organisation and managerial level do not impact on the use of formal or informal knowledge-sharing approaches. In other words, large organisations do not necessarily use more formal approaches to knowledge sharing than small organisations. It is also not statistically shown that higher levels of manager use more formal approaches compared to lower levels of manager. This means that senior managers not only use formal approaches but also use informal approaches to knowledge sharing. All levels of manager use both formal and informal approaches to knowledge sharing in their work. The adoption and the implementation of a selected knowledge-sharing approach is not always a straight forward task. The challenge to the managers in the selection between the formal and informal approaches to knowledge sharing is to come up with a correct assessment of the existing conditions. There can be restrains that hinder the adoption and implementation process. Accordingly, it is appropriate and interesting to explore the challenges associated with the efforts of setting up and implementing knowledge-sharing approaches within the organisation.

12.3.3 Research objective three: To explore and document the main challenges that face construction organisations and managers in the setting-up and implementation of knowledge-sharing approaches.

Similar to second objective, the third objective was achieved through exploratory study involving: 1) interviews with managers of SMEs and large Malaysian construction organisations; and 2) questionnaire surveys. Findings of the exploratory study are presented in Chapter 6 of the thesis.

Chapter 6 provides the related literature regarding a large number of possible challenges in setting up and implementing knowledge-sharing approaches with the purpose of offering a more comprehensive and structured starting point for managers when auditing their organisation's current knowledge base and knowledge-sharing requirements. The challenges faced by construction organisations and managers in setting up knowledge-sharing approaches have been established (see Tables 6.3 and 6.7). In all, 10 challenges were identified. The finding of the study revealed that developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach was cited as the main challenge in setting up knowledge-sharing

approaches by both different sizes of organisation and different managerial levels. The main reason, however why most companies do not reach their knowledge sharing goals probably due to the lack of understanding and appreciation of the full benefits associated with knowledge sharing. Lack of a clear connection between the knowledge management strategy and overall company goals is another reason. Moreover, lack of a clear purpose or shared language and meaning of knowledge management (knowledge sharing) in the construction industry is one reason why developing a knowledge-sharing strategy and integrating this into the company's goals and strategic approach is challenging (Egbu, 2004).

In addition, 11 challenges in implementing knowledge sharing approaches were identified. Choosing an appropriate method to assess the impact of knowledge-sharing initiatives on business performance was cited as the main challenge in implementing knowledge-sharing approaches by both different sizes of organisation and different managerial levels. The results also indicate that there is no significant positive correlation between the challenges in setting up and implementing knowledge-sharing approaches and the size of organisation and managerial level. In other words, the larger size of the organisation and managers at higher levels do not necessarily find the challenges greater than smaller size/lower managers. All this challenges indicate there are many issues related to the knowledge sharing within construction organisations. This suggests it is necessary to assess whether the organisation is ready to setup and implement knowledge-sharing approaches. Careful consideration has to be made to avoid failures and unnecessary wastage in the implementation of knowledge management initiatives.

12.3.4 Research objective four: To specifically explore the readiness of organisations to set up and implement knowledge-sharing approach.

Similar to second and third objective, the fourth objective was achieved through exploratory study involving: 1) interviews with managers of SMEs and large Malaysian construction organisations; and 2) questionnaire surveys. Findings of the exploratory study are presented in Chapter 7 of the thesis. Chapter 7 discusses some views gleaned from a thorough review of the literature that can be used to assess the organisational readiness to setup and implement knowledge-sharing approaches. The results show that there are many factors to be considered by construction organisations before they are

really ready to set up and implement knowledge-sharing approaches. A list of variables for readiness to setup and implement knowledge-sharing approaches was derived from a thorough review of the literature on knowledge management and knowledge sharing, and then modified after interviews with 49 managers from 40 construction organisations (see Tables 7.1 and 7.4). Overall, 11 variables of organisation readiness to set up and 10 variables of organisation readiness to implement were identified. The study found providing a conducive workplace setting approach to promote knowledge sharing as most ready in Malaysian construction organisations to set up knowledge-sharing approaches. Similarly, the findings reveal providing training for education, personal and team development for effective knowledge sharing as most ready to implement knowledge-sharing approaches. There is no significant positive relationship between readiness to implement knowledge-sharing approaches and size of organisation. This suggests that larger organisations are not necessarily more ready to implement knowledge-sharing approaches than smaller organisations. Effective knowledge-sharing approaches in construction organisations depend on many factors. The factors have been highlighted and the features of each presented. These factors can provide a basis for organisations to evaluate their readiness to implement knowledge-sharing approaches.

12.3.5 Research objective five: To investigate the significance (importance and benefits) of knowledge sharing, and the extent to which knowledge sharing contributes to organisation performance.

Similar to previous objective, the fifth objective was achieved through two ways: questionnaire survey and semi structure interviews. Chapter 8 presented the findings of the study in relation to the significance (importance and benefits) of knowledge sharing and the extent to which knowledge sharing contributes to organisation performance. The study has considered the importance of knowledge sharing to organisations. Eleven factors were rated very important/important by the respondents (see Table 8.1). Training employees in knowledge sharing to improve the identification and sharing of best practices among employees across the organisation was cited as very important. The study also revealed that all organisations, irrespective of size, can benefit from the exploitation of knowledge sharing. Large organisations and SMEs can benefit from knowledge sharing in different ways according to the size of the organisation. This means that the organisation will need to look at how they can benefit more from knowledge-sharing approaches and exploit the benefit. All sizes of organisation also

had many similarities in their reasoning behind their importance, such as to encourage employees to share their knowledge, improve skills and knowledge, improve work efficiency, improve quality of work, and to assist in decision-making. The study has also considered the contribution of knowledge-sharing approaches to organisation performance. The three top contributions of knowledge sharing to organisation performance are: increases efficient operations and reduces costs, improves better decision-making, and improves project and services delivery to the market (see Table 8.7). It is expected that the performance of construction organisations may be improved if knowledge-sharing approaches is well understood and appropriately managed. Understanding the significance (importance and benefits) of knowledge sharing may assist construction organisations to take full advantage of the improvements in organisational performance.

12.3.6 Research objective six: To specifically investigate the degree of influence that organisational structure, culture and human resource practices play in the implementation of knowledge sharing in organisations.

The focus of Chapter 9 is on the organisational factors that affect knowledge sharing in the construction business environment. Overall, the results acknowledge the influence of organisational structure, culture and human resource practices on the implementation of knowledge sharing in Malaysian construction organisations. Organisational structure influences the implementation of knowledge sharing in organisations. The following variables associated with organisational structure were identified as being highly influential or influential on the implementation of knowledge sharing in organisations: complexity, flexibility and decentralisation, formalisation and stratification. However, organisations differ in the way they use 'complexity, centralisation, formalisation and stratification' in terms of organisational structure dimensions. Such variation in application, when influenced by contextual or situational factors, leads to the development of diverse organisational structures. This finding shows that managers need to consider the impact of the complexity of their organisational structure on the implementation of knowledge sharing. If managers understand their organisation's structure type, they can consider the degree of fit required between their company's knowledge-sharing initiatives and the organisation's structure.

Similarly, results show that organisational culture has an influence on knowledge sharing in construction organisations. Uncertainty avoidance, collectivism, long-term orientation, power distance and masculinity were found to highly influence or influence the implementation of knowledge sharing in organisations. However, the results of this study suggest that in a Malaysian construction environment, an uncertainty avoidance culture highly influences the implementation of knowledge-sharing initiatives. Managers should evaluate the culture of their organisation in conjunction with an assessment of their knowledge-sharing initiatives. Also, the findings reveal the variables associated with human resource practices that highly influence or influence the implementation of knowledge sharing in organisations: training and development, rewards and incentives, recruitment and selection processes and performance appraisals.

The results of the study also show that organisational structure and culture are significantly correlated with the size of the organisation in the implementation of knowledge sharing. However, human resource practices show no significant correlation; thus, human resource practices should be carefully developed and planned continuously in an organisation. Well-designed human resource practices can help to improve the knowledge-sharing behaviour among employees in an organisation. Every attempt should be made to look into the organisational structure, culture and human resource practices in such a way that they allow knowledge sharing to become embedded in the organisation. Data from the questionnaires and semi-structured interviews reveal that there is a need for a solution to improve knowledge sharing in order to improve organisation performance in Malaysian construction organisations. This suggests the need for an appropriate model for the successful implementation of knowledge sharing in organisations.

12.3.7 Research objective seven: To develop a conceptual model that encapsulates the key factors that impact upon the successful implementation of knowledge sharing in organisations.

The research has synthesised relevant literature and examined and interpreted the outcomes of questionnaires and semi-structured interviews to provide a comprehensive foundation for the development of a model to improve knowledge-sharing approaches for improved performance in construction organisations. The findings of the development of a conceptual model are presented in Chapter 10. The model should

encourage contractors to understand how and why it is necessary to improve knowledge-sharing approaches. The model provides a graphical representation of the factors that impact upon the successful implementation of knowledge-sharing approaches in the context of Malaysian construction organisations. Several key factors were elicited that need to be addressed within knowledge-sharing initiatives. These key factors relate to a knowledge sharing-based IT system, knowledge-sharing leaders and teams, a supportive environment for knowledge sharing, strategies for knowledge sharing, motivational aids for knowledge sharing, training for knowledge-sharing approaches, internal marketing for knowledge-sharing communication, knowledge-sharing performance measurement, a flexible organisational structure, and human resources. The model also constitutes factors that influence the implementation of knowledge sharing, which assist construction organisations to predict the organisational factors that could contribute to the successful implementation of knowledge-sharing approaches. The model also presents the possible outcomes related to the improvement in organisation performance. The successful implementation of this knowledge-sharing model, however, needs the careful consideration of a host of challenges, which can impinge on staff and organisation performance. Some of the potential challenges are highlighted in Chapter 6.

12.3.8 Research objective eight: To validate the proposed conceptual model.

Finally, the last objective is to validate the proposed research model. This was achieved through a web-based survey. This study developed questionnaire survey and collected data from 17 respondents of 17 organisations. The questionnaire for validating the proposed knowledge-sharing model consisted of three parts. The first part focused on general questions regarding the respondents' organisation with respect to job title or position, number of employees and years of experience. The second part of the questionnaire focused on whether the content of the model was explicit: was it likely that the factors in the knowledge-sharing model would result in the successful implementation of knowledge sharing in the organisation? Did the model cover most of the issues that managers would expect to encounter in knowledge-sharing approaches? This part also covered the level of understanding of the knowledge-sharing model and whether they would recommend using the knowledge-sharing model in their organisation. The third part of the questionnaire used an open-ended question to elicit the experts' suggestions as to how any aspects of the proposed knowledge-sharing

model might be improved. All the experts agreed that the key factors identified in the model are important and relevant and could be used as a guide or reference to improve knowledge sharing within contractor firms. Clearly, the feedback received from the experts reflects their support of a model to improve knowledge sharing for improved performance in Malaysian construction organisations. The findings of the study in relation to the validation of the proposed conceptual model are presented in Chapter 11.

Following the presentation of the above research findings that demonstrate the achievement of the research objectives, the next section will discuss the limitations of the study and the recommendations for potential future work.

12.4. Limitations of the study

Although the study has achieved some useful results, it also has some limitations.

- Although there have been a number of publications in the area of knowledge sharing in the construction industry, there is limited information on empirical study followed by solutions to improve knowledge-sharing approaches for improve organisation performance in Malaysian construction organisations. The government have tried to provide awareness on the importance of knowledge sharing to improve performance. However, there is still a lack of specific solutions dealing with key factors that contribute to knowledge sharing. This study has achieved this empirically.

- One major limitation of this study is the difficulty in tracing the construction organisations that have implemented formal knowledge-sharing approaches or knowledge management practices. This is due to the newness of this concept to construction organisations operating in Malaysia. An attempt was made to obtain a suitable population sample frame, including looking at the CIDB list of contractors involved in the best practices excellence award. Hence, this study is based on a relatively small sample.

- Another challenge in this study is the low response rate in the questionnaire survey. The initial low response rate is because of the problem of acquiring respondents' data according to the size of organisation due to confidentiality. To overcome this problem a personal contact approach was employed.

- Due to the limitation of finishing this research within the timeframe given by the sponsers, the model was validated by a relatively small number of practitioners. Perhaps, in future, the model and findings could be further validated by using quantitative methods on a large number of respondents.

Despite the limitations, this study provides an important step toward understanding knowledge-sharing approaches in construction organisations. Next section summarises ideas for potential future work.

12.5. Recommendations and future works

Some recommendations can be presented as follows:

12.5.1. Recommendations for Practitioners

Construction organisations may choose to consider these recommendations as a guide to help them cope with knowledge-sharing initiatives.

- It is undeniable that knowledge sharing has made a major impact to improve organisation performance including construction industry. As such, Malaysia CIDB, being a national body to spurce up the construction industry, should ensure that construction organisations provide opportunities for their contractors to be trained in the area of knowledge management and knowledge sharing. Training should not only concentrate on the general knowledge in using the IT for knowledge sharing that are costly and are designed specifically for larger organisation, but also person-based approaches in an effort to fully utilise the potential of the formal and informal knowledge-sharing approaches.

- The development of a knowledge-sharing model together with the key factors that are affect the successful implementation of knowledge sharing will enable managerial levels to adopt a proactive approach in improving knowledge sharing in an organisation. However the model has not been extensively tested on live organisations. It would therefore be of great interest to test and apply this model to other construction organisations in Malaysia and also in the developed and developing countries, for further establish its validity and application.

- Management plays a critical role in leading knowledge-sharing efforts. Management needs to support knowledge sharing in the organisation and provide visible support.

If the organisations truly want to improve performance, they should pay more attention to the objectives and strategies of knowledge sharing, and create top management directives that clearly specify what knowledge can be shared. The construction organisations should pay more attention to the nature of relationships and develop deeper relationships that promote trust between employees. It is also recommended that they make more time available to share their knowledge.

- Managers need to realise, however, that a particular knowledge-sharing approach or specific managerial action will not suit all organisations and that there are differences to be expected between SMEs and large organisations. The formal and informal approaches to knowledge sharing employed in the organisation should be tailored according to the size of the organisation and the managerial levels involved. There is no 'one size fits all'. The 'best' approach will be one that works well for a particular organisation. As such, the implementation of knowledge-sharing goals and strategies in an organisation's strategic planning and thinking will vary greatly.

- Various obstacles exist regarding the setting up and implementation of knowledge-sharing approaches in organisations. It is important to consider the type of culture, structure, and human resource practices within an organisation, since it could affect the way in which organisational members share knowledge. As a result, one could ascertain whether an organisation's culture, structure, and human resource practices could support or discourage the use of knowledge sharing for improved organisational performance.

12.5.2. Recommendation for Academics

- The study only examines individuals working for construction organisations (contractors) located in a single country (Malaysia). Thus, the findings reported here may be a reflection of organisations and country-specific attributes. As a result, the findings of this study might not be generalised to other organisations and countries. Hence, the suggestion that future researchers can take steps to test the proposed research model on different organisations and in different countries.

- In trying to capture the overall picture of knowledge sharing in Malaysian construction organisations, the data were collected from private companies. However, the results may be distorted by the difference in the nature of the tasks

undertaken by public organisations. Further empirical work is needed to test the degree to which the findings can be generalised to other organisations/industries.

- Since most respondents are from managerial positions (top, middle and junior managers), it must be recognised that these are the perceptions of management. A survey of a different group of respondents, for example knowledge workers (labours) may reveal a totally different perception of knowledge-sharing approaches in Malaysian construction organisations.

- This study contributes to an enhanced understanding of the influencing factors in knowledge sharing in construction organisations. Building on these results, several questions need to be addressed in future research. First, to what extent can the findings be replicated in other organisations and industries? One may hypothesize that similar findings may be revealed in large organisations in which hierarchy plays an important role. As such, all three influencing factors identified in the study (organisational structure, culture and human resource practices – refer Chapter 9 of the thesis) need further exploration in different organisational as well as industry contexts.

- It is recommended that there is ample scope for this study's research methodology to be taken up by other researchers in different industrial sectors and in other countries to yield rich comparative data and to further generalise the findings.

This chapter has outlined the summary of each chapter representing the achievement of this study. The aims and objectives were met, and this study has made significant contributions to the construction organisations as well as to knowledge in general. The limitations occurring during the execution of this research have been explained. These limitations can be a guide for future work in improving knowledge sharing, in particular knowledge-sharing approaches for improves organisation performance.

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Appendices

Appendix A	Questionnaire (main study)
Appendix B	Semi structured interview questions (main study)
Appendix C	Semi structured interview questions (pilot study)
Appendix D	Letter of invitation for telephone interview
Appendix E	Questionnaire (for the refining and validating knowledge sharing model)
Appendix F	Research participant consent form
Appendix G	Consent to use the material

Postal Questionnaire Survey

SCHOOL OF BUILT AND HUMAN ENVIRONMENT	Ref No.				
UNIVERSITY OF SALFORD					

Research Title: **Formal and informal approaches to knowledge sharing in Malaysian construction organisations for improved organisational performance.**

Return Address: Ida Nianti Mohd Zin
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Purpose of the survey

CIDB, in association with UiTM and University of Salford are engaged in a research project entitled "Formal and informal approaches to knowledge sharing in Malaysian construction organisations for improved organisational performance". The aim of this research is to improve formal and informal approaches to knowledge sharing in construction organisations in Malaysia for improved organisational performance. This survey is part of a PhD programme conducted at the University of Salford, England. As part of a University research programme, there is no commercial benefit attached to this research. Your data will be treated with the strictest confidentiality.

Conceptual definitions used for the research

Knowledge sharing: The process of exchanging knowledge (skills, experience, and understanding) among employees in an organisation for the purpose to improve organisational performance.

Formal approaches to knowledge sharing can be defined as initiatives that are well defined, structured, systematically organised; using formal knowledge sharing approaches and usually presented in written forms. Such initiatives often embody policies transpiring the life span of an organisation and should ideally not be rigid so as to accommodate changes that may occur in tandem with the organisational environments. It reflects internal knowledge within an organisation and aspires towards continued improvement.

Informal approaches to knowledge sharing can be defined as initiatives that are unstructured, non-organised in form, occurring in ad hoc fashion and often undocumented or labelled as knowledge management. It reflects internal networking knowledge and occasionally results from external communications with the aim of improving internal knowledge sharing. Informal knowledge sharing may occur spontaneously without any official assistance from the management.

Community of Practice is a term that describes a group of people who come together informally to interact and learn from one another to share ideas, interest, a craft, and/or a profession based on their common interests or problems; dispersed throughout the organisation.

Survey Instructions

As is the case with many questionnaire surveys, there may be questions which may appear irrelevant or impertinent to the respondents. However, it is necessary that all questions are

answered, as the questionnaire is designed to achieve particular research objectives, and it is hoped not to offend respondents in any way. If there are questions which you are unwilling or unable to answer, skip them and continue answering the remainder of the questions.

Please complete and return this questionnaire by post to the researcher at the address above or in the envelope provided **on or before 25th November 2010.**

PART ONE - General Information

1.1	**Please state your current job title/position :** Please tick **ONE** box (✓). ☐ Senior level manager: CEO/ Director/Managing Director/General Manager/Board of Executives. ☐ Mid-level manager: Project Director/Project Manager/QS/Senior Manager/Site Manager / Human Resource Manager/IT Manager/Knowledge Manager/Quality Manager. ☐ Junior-level manager: Site Personnel/Site Supervisor/Site Agents/Sub-Agents. ☐ Others (Please specify) : _____
1.2	**How many full-time employees work in your organisation?** (This includes regular employees as well as managers, executives, partners, directors and persons employed under contract – does not include sub contract labour). Please tick **ONE** box (✓). 1 – 10 ☐ 11-20 ☐ 21-50 ☐ 51 - 100 ☐ 101 - 250 ☐ More than 250 ☐
1.3	**Please indicate the length of time you have been involved/worked in the <u>Malaysian construction industry</u>?** Please tick **ONE** box (✓). Less than 1 year ☐ 2-5 years ☐ 6-10 years ☐ 11–15 years ☐ 16-20 years ☐ more than 20 years ☐
1.4	**Please indicate the length of time you have worked with the <u>current employer</u>?** Please tick **ONE** box (✓). Less than 1 year ☐ 2-5 years ☐ 6-10 years ☐ 11–15 years ☐ 16-20 years ☐ more than 20 years ☐

PART TWO – The following table shows the different formal and informal approaches that could be used by construction organisations for knowledge sharing.

In your view, please indicate (by circling the appropriate number) the extent to which the formal and informal approaches for knowledge sharing is currently used by your organisation.

Meaning of scale: 1 (Highly used), 2 (Used), 3 (Fairly used), 4 (Less used), 5 (Not used at all).

Formal and informal approaches to knowledge sharing used by your organisation	Level to which formal and informal knowledge sharing approaches is used				
	Highly used ➝ Not used at all				
Formal approaches to knowledge sharing					
Use of **intranet** technologies to encourage staff members to interact and share knowledge with each other and rest of the organisation.	1	2	3	4	5
Use of **internet** technologies to encourage staff members to interact and share knowledge with each other and rest of the organisation.	1	2	3	4	5
Use of **training** to improve coaching in enhancing knowledge sharing initiatives.	1	2	3	4	5
Use of **mentoring** for experienced employees to share their knowledge, experience and expertise with less experienced colleagues.	1	2	3	4	5
Employ a **knowledge leader or champion** to be responsible for knowledge sharing initiatives.	1	2	3	4	5
Use of **open and conducive environment** for employees to share ideas and concept (e.g. environment that promote trust and cooperation, teamwork, and continuous learning)	1	2	3	4	5
A written knowledge sharing **policy** is in place as a part of knowledge sharing initiatives.	1	2	3	4	5
Use of **appraisal and reward system** to motivate employees to share knowledge in the organisation.	1	2	3	4	5
Use of **performance measurement system** to evaluate the effectiveness and contributions of knowledge sharing initiatives.	1	2	3	4	5
Use of clear **communication channels** to promote the value and benefits of sharing knowledge (e.g. report, news bulletin, e-mail etc).	1	2	3	4	5
Use of **flexible organisational structures** to increase the level of employees' involvement in the sharing of knowledge.	1	2	3	4	5
Use of **recruitment and selection** of individuals with appropriate skills and attitudes as part of knowledge sharing initiatives.	1	2	3	4	5
Informal approaches to knowledge sharing					
Use of personal **relationships** to build trust and strengthen employees' relationships to enhance the sharing of knowledge informally.	1	2	3	4	5
Use of **community of practice** to encourage work interactions and the sharing of ideas, experiences and knowledge informally.	1	2	3	4	5
Use of **conducive workplace settings** of office layout for speaking, and sharing knowledge informally with colleagues and the meeting of people (e.g. pantry, communal area, meeting space, library and etc).	1	2	3	4	5

Use of **social events** such as lunches, drinks and dinners to provide informal settings to allow people to socialise, talk together and share knowledge.	1	2	3	4	5
Use of **story telling** in a workshop setting to stimulate informal knowledge sharing.	1	2	3	4	5
Use of spontaneous **informal communications** to encourage social interaction for smooth knowledge sharing.	1	2	3	4	5
Use of **face-to-face social interaction** to informally share ideas and knowledge.	1	2	3	4	5

PART THREE – Main challenges faced in the 'setting-up' and implementation of formal and informal approaches to knowledge sharing.

Section 3.1: Given your role in the organisation and the work you do, please kindly indicate (by circling the appropriate number) the extent to which these factors are a challenge associated with the 'setting-up'of formal and informal approaches to knowledge sharing.

Meaning of scale: 1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all).

Challenges in the 'setting-up'of formal and informal knowledge sharing approaches	Level of challenging Very Not → challenging				
Developing a **knowledge sharing strategy** and integrate this into the company's goals and strategic approach.	1	2	3	4	5
Providing a clear **understanding of what knowledge is vital** to the organisation future prosperity.	1	2	3	4	5
Developing concise **methodologies or "blueprints"** that address the meaning of knowledge sharing practices.	1	2	3	4	5
Justifying and gaining **management support and commitment** for budget on the development of a knowledge sharing strategy.	1	2	3	4	5
Create a **culture of trust and openness** to encourage knowledge sharing.	1	2	3	4	5
Set-up an appropriate **technology infrastructure** to support knowledge sharing practices.	1	2	3	4	5
Creating **flexible organisational structures** in providing employees with easy access to the knowledge they need.	1	2	3	4	5
Create clear **lines of communication** to raise awareness of knowledge sharing among employees.	1	2	3	4	5
Preparing for **dealing with something new/different** process as part of knowledge sharing initiatives, within the organisation in terms of business efforts, especially on how the business is to be operated.	1	2	3	4	5
Providing favourable **physical layout** of work space to stimulate informal knowledge sharing among employees (e.g. pantry, open office, meeting room, etc).	1	2	3	4	5

Section 3.2: **Please indicate the extent to which these factors are a challenge associated with <u>implementing</u> formal and informal knowledge sharing approaches (please circle the appropriate number).**

Meaning of scale: 1 (Very challenging), 2 (Challenging), 3 (Fairly challenging), 4 (Less challenging), 5 (Not challenging at all).

Challenges in <u>implementing</u> formal and informal knowledge sharing approaches	Level of challenging Very ⟶ Not challenging				
Choosing an appropriate **method to assess** the impact of knowledge sharing initiatives on business performance.	1	2	3	4	5
Reviewing **strategy and achievements** periodically for possible revision of knowledge sharing initiatives.	1	2	3	4	5
Determining **time and conversation format** for employees to talk with one another and share knowledge.	1	2	3	4	5
Getting employees to <u>**use intranet**</u> for knowledge sharing.	1	2	3	4	5
Getting employees to fully <u>**exploit the intranet**</u> for knowledge sharing.	1	2	3	4	5
Getting employees to <u>**use internet**</u> for knowledge sharing.	1	2	3	4	5
Getting employees to fully <u>**exploit the internet**</u> for knowledge sharing.	1	2	3	4	5
Running adequate **training** to build awareness and understanding of knowledge sharing programmes**.**	1	2	3	4	5
Maintaining **senior management support** for knowledge sharing.	1	2	3	4	5
Identifying and involving **knowledge sharing champions** to promote knowledge sharing practices.	1	2	3	4	5
Establishing **community of practice** and promoting its existence throughout the organisation as a means of facilitating knowledge sharing	1	2	3	4	5

PART FOUR – Readiness of organisations to 'set-up' and 'implement' formal and informal approaches to knowledge sharing

Section 4.1: **Please indicate the level of readiness of your organisation to 'set-up' formal and informal approaches to knowledge sharing (please circle the appropriate number).**

Meaning of scale: 1 (Very ready), 2 (Ready), 3 (Fairly ready), 4 (Less ready), 5 (Not ready at all).

Readiness in <u>setting-up</u> formal and informal approaches to knowledge sharing	Level of Readiness Very ————► Not Ready				
How ready is the organisation in developing a clear **strategy** for knowledge sharing?	1	2	3	4	5
How ready is the organisation in giving **support and commitment** toward setting up knowledge sharing initiatives?	1	2	3	4	5
How ready is the organisation in developing **trust** between employees as a basis for knowledge sharing?	1	2	3	4	5
How ready is the organisation in **set-up team members** to take the responsibility to facilitate knowledge sharing initiatives?	1	2	3	4	5
How ready is the organisation in **changing management style** and are actively participating in the change process?	1	2	3	4	5
How ready is the organisation in **empowering** its employees to seek for knowledge to make quality decisions?	1	2	3	4	5
How ready is the organisation in putting in place an adequate **standardised process** for knowledge sharing within the organisation?	1	2	3	4	5
How ready is the organisation in providing the appropriate **communication channels** to facilitate effective communication for knowledge sharing? (e.g. reports, bulletin, emails, etc)	1	2	3	4	5
How ready is the organisation in providing an annual **budget** for enhancing knowledge sharing practices?	1	2	3	4	5
How ready is the organisation in setting up **community of practices** as a starting point for knowledge sharing initiatives?	1	2	3	4	5
How ready is the organisation in providing a **conducive workplace setting** approach for promoting knowledge sharing to happen?	1	2	3	4	5

Section 4.2: **Please indicate the level of readiness of your organisation with the <u>implementation</u> of formal and informal approaches to knowledge sharing (please circle the appropriate number).**

Meaning of scale: 1 (Very ready), 2 (Ready), 3 (Fairly ready), 4 (Less ready), 5 (Not ready at all).

Readiness in <u>implementation</u> of formal and informal approaches to knowledge sharing	Level of Readiness
	Very ──ready──► Not
How ready is the organisation in implementing a process whereby **'individual' knowledge is converted into organisational knowledge** before the individual retires or leaves the organisation?	1　2　3　4　5
How ready is the organisation in implementing the optimisation of <u>**intranet technology**</u> to promote knowledge sharing environment?	1　2　3　4　5
How ready is the organisation in implementing the optimisation of <u>**internet technology**</u> to promote knowledge sharing across organisation?	1　2　3　4　5
How ready is the organisation in providing **training** for education, personal and team development for effective sharing of knowledge?	1　2　3　4　5
How ready is the organisation in implementing an approach for **flexibility** in providing easy user access to the knowledge they need?	1　2　3　4　5
How ready is the organisation with implementing a process of **recognition and rewarding** of employees for their contribution on knowledge sharing?	1　2　3　4　5
How ready is the organisation in implementing a process which involves **top management** in knowledge sharing initiatives?	1　2　3　4　5
How ready is the organisation in implementing a process of **hiring** people who possess knowledge and skills to promote knowledge sharing among employees?	1　2　3　4　5
How ready is the organisation in implementing a **performance measurement system** approach to evaluate the knowledge sharing initiatives?	1　2　3　4　5
How ready is the organisation in implementing an approach that provides **time** to encourage employees to interact and collaborate?	1　2　3　4　5

PART FIVE – The significance (importance and benefits) of formal and informal approaches to knowledge sharing in organisations

Section 5.1: In your view how important are the following variables that could be obtained from formal and informal knowledge sharing approaches in your organisation. Please indicate (by circling the appropriate number).

Meaning of scale: 1 (Very important), 2 (Important), 3 (Fairly important), 4 (Less important), 5 (Not important at all).

Formal and informal approaches to knowledge sharing in your organisation	Level of importance Very ⟶ Not important				
	1	2	3	4	5
Use of **intranet** for knowledge sharing in increasing network connectivity between internal and external individuals and so improving customer service.	1	2	3	4	5
Use of **internet** for knowledge sharing in increasing network connectivity between internal and external individuals and so improving customer service.	1	2	3	4	5
Training employees in knowledge sharing in improving identifying and sharing best practices among employees across the organisation.	1	2	3	4	5
A **knowledge sharing culture** in improving ways of working and minimising unnecessary duplication.	1	2	3	4	5
A clear **knowledge sharing policy** in enhancing business development and creation of new business opportunities.	1	2	3	4	5
Rewarding and recognising the value of employee's knowledge in enhancing employee retention rates.	1	2	3	4	5
Performance measurement for knowledge sharing in increasing efficient operations and reducing costs by eliminating redundant or unnecessary processes.	1	2	3	4	5
Clear lines of communication in quickly and effectively responding to key business issues.	1	2	3	4	5
Empowering knowledgeable and skilled employees in improving better decision making.	1	2	3	4	5
Use of **communities of practices** in collaboration and improving productivity and delivery products and services to market faster.	1	2	3	4	5
A **conducive environment** for sharing knowledge in encouraging the free flow of ideas to increase innovation and creativity.	1	2	3	4	5

Section 5.2: From the list of formal and informal approaches in section 5.1, please rank the three (3) most important approaches to knowledge sharing in your organisation.

Rank	Approaches to knowledge sharing	Reasons for their importance in my organisation
1		
2		
3		

Section 5.3: In your view, please kindly indicate the extent to which knowledge sharing in your organisation contributes to the following variables of organisational performance.

Meaning of scale: 1 (A very high level of contribution), 2 (Some contribution), 3 (Little contribution), 4 (Low level of contribution), 5 (No contribution at all)

The contributions of knowledge sharing to organisational performance	Level of contribution				
	Very ⟶ No contribution				
	1	2	3	4	5
Knowledge sharing **increases efficient operations and reduces costs** by eliminating redundant or unnecessary processes.	1	2	3	4	5
Knowledge sharing increases network connectivity between internal and external individuals and so **improves client/customer service**.	1	2	3	4	5
Knowledge sharing **improves better decision making** through opportunities for learning and skills development and consequent advancements in job responsibilities.	1	2	3	4	5
Knowledge sharing **improves project delivery and services to market faster**, as lessons learned from one project can be carried on to future projects resulting in continuous improvement.	1	2	3	4	5
Knowledge sharing **improves the identification and dissemination of best practices** among employees across the organisation.	1	2	3	4	5
Knowledge sharing environment gives employees the opportunity to communicate effectively and comfortably, which **inspires creativity and innovation**.	1	2	3	4	5
Knowledge sharing help with the integration of knowledge into work practices, and in so doing improves the **speed and effectiveness at which key business issues are addressed.**	1	2	3	4	5
Knowledge sharing **improves ways of working and minimises unnecessary duplication** as employees will be both more effective (adopting the most appropriate solutions) and more efficient (using less time and other resources).	1	2	3	4	5
Knowledge sharing **enhances business development and the creation of new business opportunities** as organisations can be more agile and better able to respond to organisational changes.	1	2	3	4	5
Knowledge sharing **enhances employees' retention rates as** they are able to use their full potential and in so doing, recognised in term of their value of skills and knowledge.	1	2	3	4	5

PART SIX –This question investigates the degree of influence that organisational structures, organisational culture and human resource practices play in the implementation of formal and informal approaches to knowledge sharing.

Please indicate (by circling the appropriate number) the level of positive influence of the following variables of organisational structures, organisational culture and human resources practices on the implementation of formal and informal approaches to knowledge sharing.

Meaning of scale: 1 (Very influential), 2 (Influential), 3 (Fairly influential), 4 (Less influential), 5 (Not influential at all).

The influence of organisational structures, organisational culture and human resources practices in the implementation of formal and informal approaches to knowledge sharing	Degree of Influence
	Very ⟶ Not Influential
How influential is a **flexible and decentralised** organisational structure impact on knowledge sharing in the organisation?	1 2 3 4 5
How influential is a structure where **different levels of managers'** impact on how quickly, easily and effectively knowledge could be shared between and among employees in the organisation?	1 2 3 4 5
How influential is a structure where **formal rules, regulations and controls** impact on how knowledge is shared in the organisation?	1 2 3 4 5
How influential is a structure where **different types of professionals and task differentiation** impact on how knowledge is shared in the organisation?	1 2 3 4 5
How influential does a culture where the less powerful members of organisation expect and accept that **power is distributed unequally** impact on how knowledge is shared in the organisation?	1 2 3 4 5
How influential does a culture in which members of an organisational society feel threatened by **uncertain situations, unknown, ambiguous or unstructured situations** impact on knowledge sharing in the organisation?	1 2 3 4 5
How influential does a culture which focuses on emotional roles between **women and men** impact on how knowledge is shared?	1 2 3 4 5
How influential does a culture where individuals are **integrated into groups,** having collective achievement and interpersonal relationships, impact on knowledge sharing in the organisation?	1 2 3 4 5
How influential does an organisational culture which fosters **long-term as opposed to short-term orientation** (or way of thinking) impact on knowledge sharing in the organisation?	1 2 3 4 5
How influential does **motivating** employees with reward and incentives to encourage employee attitudes to be more positive towards knowledge sharing impact on knowledge sharing in the organisation?	1 2 3 4 5
How influential does **training and development** in providing a better understanding on the concept of knowledge sharing initiatives impact on knowledge sharing in the organisation?	1 2 3 4 5
How influential does **recruitment and selection** process on selecting the right staff with the right attitude towards knowledge sharing impact on knowledge sharing in the organisation?	1 2 3 4 5
How influential does **performance appraisal** in promoting knowledge sharing initiatives impact on knowledge sharing in the organisation?	1 2 3 4 5

If you have any comments concerning the overall readability of the questionnaires, format, appropriateness of the measures and scales used, relevance of the questions, time taken to complete the survey or any other possible issues (if any) which might lead to improvements, then you are welcome to do so in the space provided below.

Thank you very much for taking part in this survey. We anticipate that, with your help, the results will assist greatly in improving the performance of Malaysia construction organisations. If you would like a summary of results, free of charge, please enter your name and contact address below.

Name and address: ....

....

....

Please post the complete questionnaire to the researcher **on or before 25ᵗʰ November 2010.**

Post to: Ida Nianti Mohd Zin
             Centre for Construction Project & Infrastructure Management (CPIM)
             Faculty of Architecture, Planning & Surveying
             Universiti Teknologi MARA
             40450 Shah Alam, Selangor Darul Ehsan, Malaysia.

----- Questionnaire prepared by Ida Nianti Mohd Zin ----

AIM & OBJECTIVES	MAIN DATA COLLECTION INTERVIEW QUESTIONS
Title: Formal and Informal approaches to managing knowledge in Malaysia construction organisations for improved performance **Aim:** To improve formal and informal approaches to knowledge sharing in construction organisations in Malaysia for improved organisational performance.	General Information Name of the company : Company address : Age of organisation (in year) : Numbers of permanent employees: Name of the respondent: Position/role: Date interview: Time start interview: End of interview: Total interview time:
OBJECTIVES 1. To critically review the literature and document the perceptions of construction organisations (small, medium and large) on formal and informal approaches to knowledge sharing.	

2. To appraise and document the different formal and informal approaches employed by construction organisations for knowledge sharing	Please, I am going to ask you about formality and informality in knowledge sharing. Let's start with the formality
	2.1 Can you describe the types of
	    ▪ Formal approaches to knowledge sharing employed in your organisation?
	    ▪ Informal approaches to knowledge sharing employed in your organisation?
	
	2.2 Please explain the extent to which the following formal and informal approaches to knowledge sharing are employed in your organisation?
	    2.2.1 Formal Use of IT/intranet for knowledge sharing
	    2.2.2 Formal Training for knowledge sharing
	    2.2.3 Formal Supportive environment for knowledge sharing
	    2.2.4 Informal network(relationship-base, COP, story telling)
	    2.2.5 Informal settings (physical office design layout, social events, knowledge fair)
	    2.2.6 Informal communication (face to face, e-mail, phone)
	
	2.3 Please, kindly enlighten to me as to the different strategies, if any, used by your organisation for formal knowledge sharing in your organisation?

3. To explore and document the main challenges that	3.1 In your view what, if any, are the main challenges in complying with strategies adopted for knowledge

face construction organisations in the 'setting-up' and implementation of formal and informal approaches to knowledge sharing	sharing in your organisation?
	   i. for setting up formal and informal approaches
	   ii. for implementation formal and informal approaches
	
	3.2 Please kindly give me some ideas/examples if any, of the main challenges in the
	   I. setting up
	   II. implementation
	   a. of formal and
	   b. informal approaches to knowledge sharing in your organisation?

4. To specifically explore the readiness of organisations to 'set-up' and implement formal and informal approaches to knowledge sharing	Thank you for answering the questions on challenges. The next part of the question is to explore how ready/prepared your organisation is towards:
	   I. Setting up formal and informal approaches to knowledge sharing
	   II. Implementing formal and informal approaches to knowledge sharing

5. To investigate the significance (importance and benefits) of formal and informal approaches to knowledge sharing in organisations	5.1 In your view, how do:
	   ▪ Formal approaches
	   ▪ Informal approaches to knowledge sharing benefits your organisation?
	
	5.2 How significant are these benefits. Please provide some examples.
	5.3 in what specific ways do
	   ▪ Formal approaches
	   ▪ Informal approaches to knowledge sharing impact on?
	
	5.4 Given the work you currently do, please kindly tell me how knowledge sharing impact on organisation performance?
	
	5.5 By considering how your job could change in the future i.e next 5 years, to what extent do you see the sharing of knowledge to be a priority, for the future, in your organisation? Why?

6. To specifically investigate the influence that organisational structures, culture and Human Resource practices play in the implementation of formal and informal approaches of knowledge sharing	6.1 How do flexible and decentralised organisational structures influence in the implementation of
	   ▪ formal and
	   ▪ Informal approaches to knowledge sharing in your organisation if at all?
	
	6.2 Please give me some ideas/examples of how flexibility decentralisation actually plays a role.
	
	6.3 How would you describe your organisational structure at large?

	6.4 in your view, how conducive is the organisation structure for knowledge sharing to happen? Please kindly provide some reasons/examples
organisational culture	6.5 How do differences in power distance (laws, rules, regulations, and controls) affect the way employees in your organisation share knowledge if at all? Please give me some ideas/examples of these.
human resource practices	6.7 How do reward and recognition influence in the implementation of: formal, and informal approaches to knowledge sharing in your organisation? Please give me some ideas/examples of these.
7. To develop and test a model that encapsulates the key factors that impact upon the successful implementation of formal and informal approaches to knowledge sharing in organisations	Thank you for the answer you have provided. The next questions I am going to ask are on formal and informal approaches to knowledge sharing in your organisations Let's start with the formality of knowledge sharing . 7.1 In your view, what would you say are the key factors that your organisation need in order to successfully implement formal approaches. Formal approaches like (refer framework ida) Thank you for your views on that. 7.2 Let's go o the second part. In your view, what would you say are the key factors that your organisation need in order to successfully implement informal approaches. Informal approaches include things like (refer framework ida) You have mentioned the key factors for successful implementation of formal and informal approaches to knowledge sharing in organisation. 7.3 Why are these factors important? Please give examples for: Formal approaches to knowledge sharing, and Informal approaches to knowledge sharing
End	You've been great. Thank you so much for your insights and experiences. I really appreciate the time you've taken to share your knowledge with me.

AIM & OBJECTIVES	PILOT STUDY INTERVIEW QUESTIONS
AIM To improve formal and informal approaches to knowledge management (KM) in construction organisations in Malaysia for improved organisational performance, and the development of an appropriate training programme to support the implementation and embedding of appropriate KM approaches.	
OBJECTIVES 1. To critically review the literature and document the perceptions of construction organisations (small, medium and large) on formal and informal approaches to KM.	
2. To appraise and document the different formal and informal approaches employed by construction organisations for KM	2.1 Please kindly enlighten me of any planned, authorised, and /or systematic Knowledge Management (Knowledge sharing) initiatives/approaches/strategies and the nature of these strategies. 2.2 Please kindly enlighten me of the main benefits of each of these approaches/strategies for Knowledge Management (Knowledge Sharing) in your organisation.

3. To explore and document the main challenges that face construction organisations in the 'setting-up' and implementation of formal and informal approaches to KM	3.1 Given your role in the organisation and the work you do, please kindly inform me of the main challenges that relate to your work or what you know about it to work:
	  3.1a: Please, I would be grateful to hear from you of the sort of challenges, if any, associated with coming up or putting in place a planned, systematic and authorised initiative/approach of KM/KS.
	  3.1b: Please kindly give me an idea when each of these ideas where first thought of/considered.
	  3.1c :Having put this planned, systematic and authorised knowledge management (knowledge sharing) initiatives in place, what challenges, if any, are encountered in actively implementing the, and making them work?
	  3.1d: Please kindly give me an idea when each of these approaches was first implemented.

4. To specifically explore the readiness of organisations to 'set-up' and implement formal and informal approaches to KM	4.1 By drawing on your experiences in the organisation and on your particular job role, what has actually been put in place to make sure that knowledge management (knowledge sharing) initiatives work? Please kindly give me examples of how they have been shown to work. 4.2 Please kindly let me know if there are approaches or mechanisms in place i.e. to suggest that the organisation is ready and have things in place to set up the initiatives. Please kindly give me examples here! 4.3 Please kindly let me know if there are approaches or mechanisms in place i.e. to suggest that the organisation is ready and having things in place to implement the initiatives. Please kindly give me examples here!

		4.4 Give me an idea of the sort of initiatives you put in place to <u>allow people to share their</u> knowledge, experience, information and to share lessons learned.
		4.5 <u>When was the planning or initiatives put in place</u>? Is it still in place? What are your views of how they are working?
1.	To investigate the significance (importance and benefits) of formal and informal approaches to KM in organisations	5.1 In your view, what are <u>the positive impacts / advantages of managing</u> knowledge in the context of organisation performance? (You may consider the work you do and your role in the organisation) 5.2 Please kindly inform me of the benefits, if any, of having a planned, organised, systematic and authoritative approach to knowledge management (knowledge sharing) in your organisation. 5.3 What <u>aspects of these planned and systematic approaches</u> would you say provides the <u>greatest benefits and why</u>?
2.	To specifically investigate the influence that organisational structures, culture and Human Resource practices play in the implementation of formal and informal approaches of KM	**Organisational Structure** 2.1 In your view, to what extent would you say that <u>the concentration of authority and decision making at the top management</u> level (and not below) <u>negatively or positively affects</u> KM/KS (or on a particular KM/KS initiative) 2.2 Given your roles and experiences, what are your view's as to how the different types of professionals, the different types of work they do and how they do their work, impacts positively or negatively on KM/KS (or on a particular KM/KS initiative) 2.3 In your view, what might you say about how your organisations puts forward exactly how things have to be done, who does what and when, and in what order actually affects how knowledge is shared in your organisation or in what you do? 2.4 By considering your role and what you know about your organisation, what are your views as to the extent to which having many managers, supervisors, decision makers at different levels may affect how quickly, easily and effectively knowledge could be shared between and among people? **Organisational Culture** 2.5 In your view, to what extent does having a clear lines of responsibility and authority which people have and accept impact on KM/KS in your organisation /or the work you do? 2.6 To the extent that information and authority flow in your organisation may or may not be based on "power" and "control", in your view how does this impact on KM/KS in your organisation or the work you do? 2.7 To the extent that your organisation may or may not be characterised as being mature, stable and relatively control in outlook and how things are done; how might this description of your organisation impact or affect / influence KM/KS in your organisation or the work you do? 2.8 To the extent that your organisation may or may not be considered as having an environment of risk taking and a creative environment, in your view, how might this impact or influence KM/KS?

	2.9 To the extent that your organisation may be seen as one where there is openness, harmony, fairness and where trust is considered important, in your view, how might this sort of environment impact on KM/KS? **Human Resource Practices** 2.10 In your view please kindly enlighten me of the different approaches, if any that are in place to motivate employees with regard to KM/KS in your organisation. 2.11 Please kindly enlighten me as to the extent to which training and development is used as a means of encouraging KM/KS. 2.12 In your view, to what extent does (i) performance management, (ii) recruitment and (iii) selection play any role in your KM/KS initiatives, and KM strategy? Please give me idea/examples of how each actually plays a role.
3. To develop and test a model that encapsulates the key factors that impact upon the successful implementation of formal and informal approaches to KM in organisations	

To;
Company XYZ
MALAYSIA

Dear Sir,

RE: TELEPHONE INTERVIEW FOR PhD

The above matter refers.

Currently, I am pursuing my study in PhD in Construction Management in Salford University, Greater Manchester, United Kingdom. My research relates to the Managing Knowledge in Malaysian Construction Organisation. I would like to seek your approval to allow me to carry out telephone interview in your organisation to complete my PhD thesis.

From the telephone interview session, I hope to be able to identify some issues on knowledge management in general; your perception, challenges, significance and also the issues related to organisational culture, organisational structure and human resource practices in implementing knowledge management approaches.

For your information, in order for me to compile all the data and information related to my research, I will need to interview the management level or top management staff to identify and understand all issues and factors that could influence the implementation of the knowledge management strategy.

I can assure you that all forms of data, documents and information obtained from my research will be treated with upmost confidentiality, such as the identities of the respondents, issues and other information related to your organisation, and will only be published in my thesis but will not be disclose to other parties.

Lastly, I sincerely hope that you will grant me the approval on my application. I highly appreciate your cooperation and attention in this matter.

Thank you.

Yours faithfully,

Ida Nianti Mohd Zin

QUESTIONAIRE FOR REFINING AND VALIDATING THE "KNOWLEDGE SHARING MODEL".

Part 1- Background information.

Q1. **Please state your current job title/position:** Please tick **ONE** box (✓).

☐ Senior level manager: CEO/ Director/Managing Director/General Manager/ Board of Executives.

☐ Mid-level manager: Project Director/Project Manager/QS/Senior Manager/Site Manager/Engineer/Human Resource Manager/IT Manager/Knowledge Manager/Quality Manager.

☐ Junior-level manager: Site Personnel/Site Supervisor/Site Agents/Sub-Agents.

☐ Others (Please specify) :

Q2. **How many full-time employees work in your organisation?** (This includes regular employees as well as managers, executives, partners, directors and persons employed under contract – does not include sub contract labour). Please tick **ONE** box (✓).

1 – 10   ☐   11-20 ☐   21-50 ☐

51 - 100 ☐   101 - 250 ☐   More than 250 ☐

Q3. **Please indicate the length of time you have been involved/worked in the Malaysian construction industry?** Please tick **ONE** box (✓).

Less than 1 years ☐   2-5 years ☐   6-10 years ☐

11-15 years   ☐   16-20 years ☐   More than 20 years ☐

Part 2 - The conceptual model is aimed at improving knowledge sharing approaches in construction organisations in Malaysia for improved organisational performance.

Q4. **Are the factors of knowledge sharing approaches (formal and informal) explicit?** Please tick **ONE** box (✔).

Yes ☐   No ☐

Q5. **Does the factors in the "knowledge sharing model" are likely impact upon the successful implementation of knowledge sharing in your organisation?** Please tick **ONE** box (✔).

Yes ☐   No ☐

Q6. **Does the "knowledge sharing model" cover much of the issues you would expect about knowledge sharing initiatives?** Please tick **ONE** box (✔).

Yes ☐   No ☐

Q7. **In your view, how will you rate the level of understanding of the "knowledge sharing model"?** Please indicate the relevant number (according to the likert scale given) in the box provided.

Meaning of scale: 1 (Very easy to understand), 2 (easy to understand), 3 (difficult to understand), 4 (very difficult to understand), 5 (Cannot understand at all).

Scale:

Q8. Would you recommend the "knowledge sharing model" for use within an organisation?

Yes ☐   No ☐

Part 3 - GENERAL COMMENTS

Q9. Please feel free to provide any further comments/suggestions regarding the model (i.e. any areas within the model that needs to be improves/included/omitted).

Thank you for your time.

Ida Nianti Mohd Zin

RESEARCH PARTICIPANT CONSENT FORM

Title of project   : Formal and Informal Approaches to Managing Knowledge in Malaysia Construction Organisations for Improved Performance.
Name of Researcher : Ida Nianti Mohd Zin
Name of Supervisor   : Professor Charles Egbu

Please complete this form   *(Delete as appropriate)*

➢I confirm that I have read and understood the information sheet
  for the above study and what my contribution will be.

YES	NO

➢I have been given the opportunity to ask questions (face to face
  Via telephone and e-mail)

YES	NO

➢I agree to take part in the interview

YES	NO

➢I agree to the interview being tape recorded

YES	NO

➢I agree to a digital images being taken during the research exercises

YES	NO

➢I understand that my participant is voluntary and that I can withdraw
  from the research at any time **without giving any reason**

YES	NO

➢**I agree to take part in the above study**

YES	NO

Name of participant   :
Signature   :
Date   :
Researcher:
Ida Nianti Mohd Zin
School of Built Environment, the University of Salford
Room 344, Maxwell Building, Salford, M5 4 WT, United Kingdom
Email: I.N.MohdZin@pgr.salford.ac.uk

<u>CONSENT TO USE THE MATERIAL</u>

Title of Project: Formal and informal approaches to knowledge sharing in Malaysian construction organisations for improved organisational performance

Name of Researcher: Ida Nianti Mohd Zin

Name of Interviewee:

Tel:

Please complete this form

Have you read the notes of your interview?   Yes / No

Do you want to change anything you have said?   Yes / No

Do we have permission to use your words?   Yes / No

What name would you like us to use to refer to you in thesis or papers?

_____

Signed_____ Date _____

****

Date of interview: Time:

Place of interview: Interviewer:

Ida Nianti Mohd Zin (PhD Student)
Research Institute of Built & Human Environment (BUHU)
School of Built Environment
Maxwell Building
University of Salford
M5 4WT Salford
Greater Manchester, UNITED KINDOM
(I.N.MohdZin@pgr.salford.ac.uk)   14 January 2009