

**Knowledge Sharing by Using Knowledge Management Systems to
Support Decision-Making Processes in Multinational Corporations**

A thesis submitted to the University of Manchester for the degree of
Doctor of Philosophy
In the Faculty of Humanities

2013

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LIST OF ABBREVIATIONS

- ADP:** Adaptability
- AMOS:** Analysis of Mean and Covariance Structures
- AVE:** Average Variance Extracted
- C.R.:** Critical Ratio
- CFA:** Confirmatory Factor Analysis
- CFI:** Comparative Fit Index
- CMIN/DF:** Normed Chi Square
- CON:** Consistency
- DM:** Decision Making
- DMA:** Decision Making Analysis
- DMP:** Decision Making Processes
- DMS:** Decision Making Speed
- DSS:** Decision Support Systems
- EME:** Europe and Middle East
- EU:** European Union
- HRM:** Human Resources Management
- ICT:** Information and Communications Technology
- IFI:** The Incremental Index of Fit
- INV:** Involvement
- IT:** Information Technology
- KBV:** Knowledge-Based View
- KM:** Knowledge Management
- KMSs:** Knowledge Management Systems
- KS:** Knowledge Sharing
- ME:** Middle East

MIS: Mission

MNCs: Multinational Corporations

OC: Organisational Culture

OE: Organisational Effectiveness

PIS: Problem Identification Speed

PRE: Perceived Ease of Use

PRU: Perceived Usefulness

RBT: Resource-Based Theory

RBV: Resource-Based View

RMSEA: Root Mean Square Error of Approximation

SEM: Structural Equation Modelling

SIC: Squared Inter-construct Correlations

TAM: Technology Acceptance Model

TLI: Tucker-Lewis Index

TPB: Theory of Planned Behaviour

TRA: Theory of Reasoned Action

ABSTRACT

In the current global market, knowledge is viewed as a source of competitive advantage. In particular, it has become a crucial factor for Multinational Corporations (MNCs). MNCs are searching for appropriate ways to manage and use their knowledge effectively and efficiently. Their challenge is how to facilitate the sharing of knowledge and maximise the value from all available knowledge assets. In response to this, MNCs use Knowledge Management Systems (KMSs) for sharing, utilising and integrating knowledge as well as supporting Decision-making Processes. Therefore, the primary concern of this research is to examine knowledge sharing by using KMSs to support decision-making processes in MNCs. The study extends the existing literature on KMSs, knowledge sharing, and decision-making processes by proposing and empirically testing a new conceptual model in MNCs.

For this purpose, a mixed-methods approach has been designed, combining semi-structured interviews and a questionnaire to collect data from MNCs participants from Europe and the Middle-East. In the first phase of this study, 42 semi-structured interviews were conducted with participants from 32 different MNCs in 12 countries to explore the main factors affecting knowledge sharing by using KMSs to support decision-making processes. A conceptual framework comprising four core dimensions was developed using thematic analysis. In the first dimension, *Knowledge Management Systems*, three themes were identified: technology acceptance, communication tools, and KMSs usage. In the second dimension, *Knowledge Sharing Practices*, the three themes were: content, willingness to share, and external factors. In *Culture*, the themes were: national culture, organisational culture, and information technology culture. In the fourth dimension, *Decision-making Processes*, extent of analysis and speed of decision-making were identified.

This study went a step further than merely identifying the factors that affect KS. A conceptual model and twelve hypotheses were developed based on the findings of the thematic analysis, literature review, and the research objectives. The new model comprises seven constructs: organisational culture, perceived ease of use and perceived usefulness of using KMSs, KMSs usage, knowledge sharing, decision-making processes and organisational effectiveness. A survey was conducted to collect data on participants' perceptions to test the model. Responses from 221 KMSs users were analysed. Structural equation modelling was conducted to test the hypothesised relationships. The results revealed that all hypotheses are statistically significant. KMSs usage and organisational culture have a positive and significant impact on knowledge sharing, with organisational culture having the largest impact. KMSs usage, knowledge sharing and organisational culture have a significant effect on decision-making processes; knowledge sharing has the biggest impact, followed by KMSs usage, and a marginally positive impact of organisational culture. Moreover, perceived ease of use has a strong and positive significant impact on the perceived usefulness of KMSs. Perceived usefulness, perceived ease of use, and organisational culture have a positive and significant effect on KMSs usage, with organisational culture having the largest impact. Finally, organisational culture, decision-making processes and perceived usefulness have a positive and significant impact on organisational effectiveness, but decision-making processes have the biggest impact.

This study has practical implications for different stakeholders in MNCs, including managers, decision makers, KMSs designers, IT specialists, and consultants, in linking KMSs usage and knowledge sharing with decision-making processes and organisational effectiveness, and by focusing on organisational culture in knowledge management.

DECLARATION

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DEDICATION

I dedicate this thesis to

Ghada Soliman

She is the inspiration for my writing and my life. Without having her as a wife, supporter, and friend in my life, I would not have been able to study and work long hours to finish my PhD. I appreciate all her sacrifices. Thank you from the bottom of my heart for being there for me.

My little princess: Jodie

She is the source of my joy and happiness; without her smile I could not have overcome the stress and difficulties of my PhD.

This work is dedicated to them.....

ACKNOWLEDGEMENT

First and foremost, all thanks to Allah for assisting me in the completion of this thesis; without His guidance and grace this research would not have been completed.

I would like to express my deepest sense of gratitude and thanks to my extraordinary supervisor *Dr. Nadia Papamichail*, for giving me the chance to work under her supervision in my MSc. and PhD studies, and for her constructive guidance, invaluable comments, advice, support and encouragement in both academic and personal life. It has been an honour to be one of her students.

I would like also to express my deepest appreciation and thanks to *Prof. Simon French* for his knowledge, help and support during the first three years of my PhD. I am also thankful to my second supervisor *Prof. Peter Kawalek* for his valuable time and comments on this work.

Profound respect and deep thanks go to my lovely parents, *Mohamed & Kawthar*, for inspiring me throughout my life. I appreciate all their efforts, which made me who I am. I value all their prayers, support and love. I am very proud to be their son. Also, big thanks go to my brother *Ashraf*, and to my sisters *Maisa* and *Salma* for their encouragement and endless support.

I am indebted to the *Egyptian government* for providing me with the opportunity to carry out this research.

I would like to express my sincere thanks to my colleagues and friends in the Manchester Business School for their cooperation and help throughout my PhD, especially my office mate *Moataz Alhilou* for sharing the ups and downs of research with me.

Finally, I would like to thank *Prof. Rashed Abdelgleil*, who taught me several lessons in life. Without him I would not have had the opportunity to come and study in the UK, he will always be in my heart and mind. May Allah bless his soul, Amine.

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- Abdelrahman, M. Papamichail, K. and French, S. (2013- In Press), “Assessing Knowledge Management Systems Usage in Supporting Decision Making Processes in Organizations” in “ *Building Competitive Public Sector with Knowledge Management Strategy.*” Hershey, PA: IGI Global
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CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION

This chapter introduces the PhD thesis entitled “Knowledge Sharing by Using Knowledge Management Systems to Support Decision-making Processes in Multinational Corporations”. The chapter is divided into seven sections. The first and second provide an introduction and background to the research. The third section introduces the research aims and objectives. The fourth and the fifth sections present the significance and assumptions of the study respectively. Section six describes the research process. An outline of the thesis is presented in the last section.

1.2 BACKGROUND

In the age of science, technology and mass communications, economic life is driven by a competitive search for advantage and profit based on the exploitation of new knowledge (Garvey and Williams, 2002). Knowledge has been considered as a source of competitive advantage and has become a crucial factor for organisations in the current global market (Gupta and Govindarajan, 2000; Lee and Choi, 2003; Nonaka, 1995; Wang and Noe, 2010). Therefore, in this highly competitive environment, Multinational Corporations (MNCs) are increasingly recognising an urgent need to institutionalise knowledge sharing (KS) as a means of obtaining the best value from all available knowledge assets (Goh, 2007). However, effective KS between different units overseas is a challenge for MNCs, as there are so many unprecedented difficulties facing managers outside their organisations, along with environmental “forces for change”, such as globalisation, emerging technologies, emerging best business practices, government regulations, politics, competitive global financial markets, limited availability of knowledge workers, and higher worker turnover rates (Cuffe, 2007). As Montazemi *et al.* (2012) emphasise, the effective sharing of organisational knowledge is particularly relevant for MNCs, as it is considered a significant source of competitive advantage in their global strategy. Therefore, in order to succeed in the global society, MNCs need to identify, evaluate, create, evolve and develop their knowledge assets since knowledge is one of their major economic resources (Metaxiotis *et al.*, 2003).

Moreover, with the advent of the knowledge economy and the increasing size of the knowledge society, organisations continue to seek new ways of leveraging and sharing knowledge to support decision-making processes (DMP) (DeTienne and Jackson, 2001). Nemati *et al.* (2002) state that knowledge management (KM) initiatives can facilitate the capturing, coding and sharing of knowledge within organisations, which is expected to result in well informed DMP. Zhang and Lu (2007) draw attention to the importance of incorporating a knowledge management paradigm into an enterprise's business processes in order to assist knowledge workers to make decisions efficiently and effectively; the challenge in today's dynamic economy is "how to manage enterprise knowledge" so that knowledge workers can use it effectively and efficiently in their daily work. Furthermore, Coakes *et al.*, (2008, p.21) state that "the increased amount of knowledge within any organisation working in the current complex and changing environment is well known. What is however, arguable, are the ways in which the organisations can cope with obtaining and sharing this knowledge so that future organisational members can benefit from past experiences".

Technology plays a vital role in business, as it helps employees to access the knowledge they need when they need it, and provides the tools with which decision makers and users can leverage their knowledge in the context of their work (Chong and Chong, 2009; Bals *et al.* 2007). Over the past three decades, many organisations have developed information technology-based systems (IT-based systems) designed specifically to facilitate the sharing, integration and utilisation of knowledge, referred to as knowledge management systems (KMSs). These systems are part of the agenda in many of today's leading MNCs (Nielsen and Michailova, 2007).

Since the initiation of information systems (IS) there has been on-going research to explore and examine the factors that persuade individuals to accept and use technology. Moreover, internationalisation and globalisation create a need to know how managers make decisions in different parts of the world, and how different KMSs can support the DMP (Martinsons and Davison, 2007). Bose (2004) highlights that KMSs can facilitate KS by ensuring knowledge flow from the person(s) who know to the person(s) who need to know throughout the organisation. Therefore, MNCs are always looking for support from their IT departments to utilise, facilitate and use their existing knowledge effectively and efficiently (Montazemi *et al.*, 2012). However, many organisations have found difficulty in implementing KMSs successfully. It is demonstrated that in many

organisations technology has failed to have much impact on the way knowledge is transferred and shared. Additionally, Kostova *et al.* (2008, p.997) point out that “MNCs have complex internal environments, with spatial, cultural, and organisational distance, language barriers, inter-unit power struggles and possible inconsistencies and conflict among the interests, values, practices, and routines used in the various parts of the organisation”. In the complex environment of MNC units, particular coordination mechanisms and tools to facilitate KS are required (Ghoshal and Bartlett, 1995; Gupta and Govindarajan, 2000; and Sia *et al.*, 2010). Furthermore, competitive advantage in MNCs depends not only on existing knowledge but also on Organisational Culture (OC), systems, policies and practices to accumulate, integrate and share organisational knowledge within the organisational boundaries (Michailova and Minbaeva, 2012; Minbaeva *et al.*, 2003). Wang and Noe (2010) suggest that MNCs need to pay close attention to cultural issues in developing organisational practices and global systems that will facilitate KS, as there is no single universal set of practices that can be used to facilitate KS.

Accordingly, in order to understand the role of KMSs in facilitating KS in MNCs to support the DMP, further research is needed; the subject has not received significant attention in the literature and there are few empirical studies on this particular research issue. This topic is important for MNCs because they are attempting to use KMSs to connect all employees and branches together all over the world. Understanding the influence of these factors will enable managers, system designers and developers to understand and consider users’ perception in a given technological system. Carton and Adam (2005) recommend researchers to do more on the role and impact of IT-based systems for decision making (DM). Likewise, O’Donnell and David (2000) suggest that researchers should put more effort into studying how IT-based systems influence decisions. Bolloju *et al.* (2002) draw attention to the fact that researchers in the fields of Decision Support Systems (DSSs) and KMSs have not effectively considered the combination of such systems and the interdependencies between knowledge sharing and the DMP. Choi *et al.* (2010) say that little is known of the precise role of KMSs on KS, which in turn influences organisational performance.

Nag and Gioia (2012) suggest a need to understand how key decision makers utilise knowledge in their organisations by using what they know and seeking out what they

don't know to guide the creation of unique knowledge-based competencies. Also, KS among geographically distributed subsidiaries of MNCs and diversified employees using KMSs to support DM has not been thoroughly explored. Wang and Noe (2010) state that more research is needed to understand how KS can be promoted and how such culture can affect the dynamics of KS among employees and teams. Moreover, more studies are needed regarding KS in the emerging economies of Africa, the Middle-East and South America, as the majority of studies have been carried out in Western countries, although the effect of non-Western influences on KS in Chinese culture has been studied. There is thus a gap in the literature regarding the use of KMSs in supporting the DMP, especially in MNCs, that requires further research.

Accordingly, this research contributes to our understanding of KS in different fields, by reviewing and integrating the literature from several disciplines. To make the best use of the knowledge available in MNCs and create the best value, this study aims to extend the resource-based view (RBV), and knowledge-based view (KBV) in the context of investigating the impact of sharing knowledge as an organisational resource by using KMSs to support DMP and examining its impact on organisational effectiveness (OE). Also, to better understand users' perceptions regarding the usefulness and ease of use of using KMSs, this study aims to extend the technology acceptance model (TAM) in the context of KMSs usage, specifically in the context of MNCs.

1.3 PURPOSE OF THE STUDY AND OBJECTIVES

The overall purpose of this study is to explore the role of KMSs in facilitating KS to support the DMP in MNCs. The four research objectives are:

- Explore KMSs applications, knowledge sharing practices and decision-making processes in MNCs.
- Identify the factors that affect knowledge sharing by using KMSs to support decision-making processes in MNCs.
- Develop a structural model to examine the relationships between the factors that affect knowledge sharing by using KMSs to support decision-making processes in MNCs.
- Test the empirical validity of the proposed research model in the context of Multinational corporations in Europe and the Middle-East.

1.4 SIGNIFICANCE OF THE STUDY

This study focuses on understanding the factors that influence KS by using KMSs to support the DMP. The setting is MNCs; research on KS in MNCs has grown considerably over the last fifteen years (Michailova and Mustaffa, 2012). Almeida *et al.*, (2002); Gupta and Govindarajan (2000) highlighted that MNCs are recognised as organisations whose advantage is derived from their ability to obtain and utilise knowledge across borders. Moreover, KS is important for MNCs, because organisational knowledge is influenced by the extent to which KS occurs between employees (e.g. Cabrera and Cabrera, 2005; Gupta and Govindarajan, 2000; Nonaka, 1994; Polanyi, 1962; Tsoukas and Vladimirous, 2001; Wang and Noe, 2010).

The main emphasis of this study is on MNCs operating in Europe and the Middle East (EME). Most of the writings regarding the Middle East concentrate on political turmoil and conflicts in the region, which would lead one to assume it to be an unsuitable market for MNCs (Mellahi *et al.*, 2011). However, the Middle East is a target market for many of the world's largest MNCs, most of which achieve a sustained profitability because of their operations in the region (Kavoossi, 2000). Indeed, most of the MNCs operating in the region are at the top of the list of the Fortune 500. Mellahi *et al.* (2011) highlighted the fact that "MNCs have succeeded in establishing themselves as the dominant players and control a significant share of the market in nearly all Middle Eastern countries", especially in sectors such as the hospitality and retail sectors, the fast-food industry, and the oil sector. Moreover, Godley and Shechter (2008) state that "some parts of the globe have remained aloof. Given its economic and political importance, the most glaring omission is the Middle East". Wang and Noe (2010) state that more studies are needed regarding KS in the Middle East, as the majority of studies have been carried out in Western countries. Furthermore, Roberson (2013) describing the relationship between Europe and the Middle East, states that "Europe's trade and commercial relations have been increasingly effective throughout the region, evolving strategies which work to ensure vital economic development between the two regions". Therefore, given the recent increase in the number of MNCs in the Middle East, this study aims to further our knowledge of the context of MNCs in managing KS in EME, and to shed light on the factors that affect KS by using KMSs to support the DMP. The main justification for choosing MNCs operating in EME lies in the fact that there is still a dearth of knowledge on this important region.

This research contributes to our understanding of KMSs usage and KS in several ways. First, it reviews and integrates the literature from different disciplines to investigate how KS using KMSs can support DMP in MNCs. For example, studies of KS have been conducted in *information systems* (e.g. Choi *et al.*, 2010; Huber, 2001; King and Marks, 2008; Kulkarni *et al.*, 2006), *organisational culture* (e.g., Al-Alawi *et al.*, 2007; David *et al.*, 2000; Kankanhalli *et al.*, 2005; Michailova and Minbaeva, 2012), *decision making* (e.g., Martinsons and Davisonb, 2007), *international business* (e.g., Monteiro *et al.*, 2008; Nielsen and Michailova, 2007; Riege, 2007), and *organisational effectiveness* (e.g., Choi *et al.*, 2010; Lee and Choi, 2003; Zheng *et al.*, 2010). However, although several studies relating to KS have been conducted on information systems, organisational science, decision making, international business and organisational effectiveness, there is a gap in the literature regarding the use of KMSs in supporting the DMP, especially in MNCs, and no study has been conducted to consider all variables used in this study to date.

Second, this research has theoretical contributions to make, through applying RBV, KBV, and TAM in a new context of sharing knowledge through using KMSs to support DMP in MNCs. It contributes to the research on TAM by understanding users' perceptions regarding the usefulness and ease of use of using KMSs in knowledge sharing and DMP in MNCs. It also extends RBV by showing how KMSs can support DMP and KS, and by considering organisational culture (OC) as a vital factor which affects knowledge sharing, KMSs usage, DMP and organisational effectiveness to make the best use of knowledge available in an organisation and create the best value. Furthermore, it extends KBV in the context of KS through showing the impact of OC and KMSs usage in deploying and sharing knowledge assets in MNCs, giving a better understanding of knowledge as a competitive resource and linking it with KS, DMP and OE.

Third, this study provides a new conceptual framework that identifies the factors that affect KS. The conceptual framework will make an important contribution to the literature of IS, KMSs usage and KS which will help MNCs to identify new ways of leveraging and sharing knowledge to support their DMP.

Fourth, the model proposed in this study speaks the language of business by examining the relationships between organisational culture, perceived ease of use and perceived

usefulness of using KMSs, KMSs usage, knowledge sharing, decision making processes and organisational effectiveness in the context of MNCs in Europe and the Middle-East (EME). Thereby, this study is distinguished from existing empirical work on KMSs and KS as it examines a wider range of variables that affect KS.

Fifth, most qualitative studies regarding KS provide a rich, in-depth examination of the organisational context in which it occurs, and most of the quantitative studies suffer from significant limitations such as measuring KS by using either willingness or intention to share knowledge, and questionnaires completed by a single source or country during one time period. These limitations do not allow researchers to explore KS in different regions and rule out possible alternative explanations for significant results. Therefore, this study contributes by using mixed methods with rich data for a current empirical study of participants in MNCs in a diverse cross-section of businesses, at different managerial levels, of different nationalities, and in different countries of Europe and the Middle East.

Finally, this study has many contributions and implications for different stakeholders such as managers, decision makers, KMSs designers, IT specialists, and consultants in MNCs.

1.5 DEFINITIONS AND ASSUMPTIONS

There are seven major concepts in this study: knowledge sharing, knowledge management systems, perceived ease of use, perceived usefulness, organisational culture, decision-making processes, and organisational effectiveness. While there is no general consensus on the definitions of these terms, (Table 1-1) defines them as used in this study.

Table 1- 1: Constructs and Definitions of Main Concepts

Constructs	Definitions	Source
Knowledge Sharing (KS)	The process by which knowledge is transferred from one person to another, from individuals to groups, or from one group to another group.	(Davenport and Prusak, 2000)
Knowledge Management System (KMS)	Any system that automates the input, storage, transfer and retrieval of knowledge. These include contextual taxonomy for knowledge (meta-knowledge), systems for capturing various types of knowledge from useful lessons learned, systems for classifying knowledge documents, systems for locating the relevant experts, technology to facilitate sharing of expertise (groupware, video- conferencing, and so on), repositories for structured as well as unstructured information, etc.	(Kulkarni <i>et al.</i> , 2006)
Perceived Ease of Use (PRE)	The degree to which a person believes that using a particular system would be free of effort.	(Davis, 1989)
Perceived Usefulness (PRU)	The degree to which a person believes that using a particular system would enhance his or her job performance.	(Davis, 1989)
Organisational Culture (OC)	A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to these problems.	(Schein, 1985)
Decision-making Processes (DMP)	The variables that may conceivably be affected by the use of computer-based systems such as: <ul style="list-style-type: none"> • Problem identification speed: the elapse in time from when a problem first arises and is first noticed. • DM speed: the time from when a decision maker recognises the need to make some decision, to the point in time when he or she renders judgment. • The extent of analysis in DM: the reflective thought and deliberation given to a problem and the array of proposed responses. 	(Leidner and Elam, 1993, 1995; Miller and Friesen, 1980)
Organisational Effectiveness (OE)	The degree to which an organisation realises its goals.	(Daft, 2009)

Some major assumptions are made in this study are listed below:

- 1- All constructs in this study are measurable through employee perceptions.
- 2- Each MNC has a recognisable and distinguishable set of culture and KMSs.
- 3- Multinational Corporation in this study refers to headquarter or branches located in Europe or the Middle-East.

1.6 RESEARCH PROCESS

The research process is guided by the research question and research objectives. The research question is: *What are the factors that affect knowledge sharing by using KMSs to support decision making processes in MNCs?* With this question in mind, the research process began. Figure 1-1 illustrates the research activities and the output of this study.

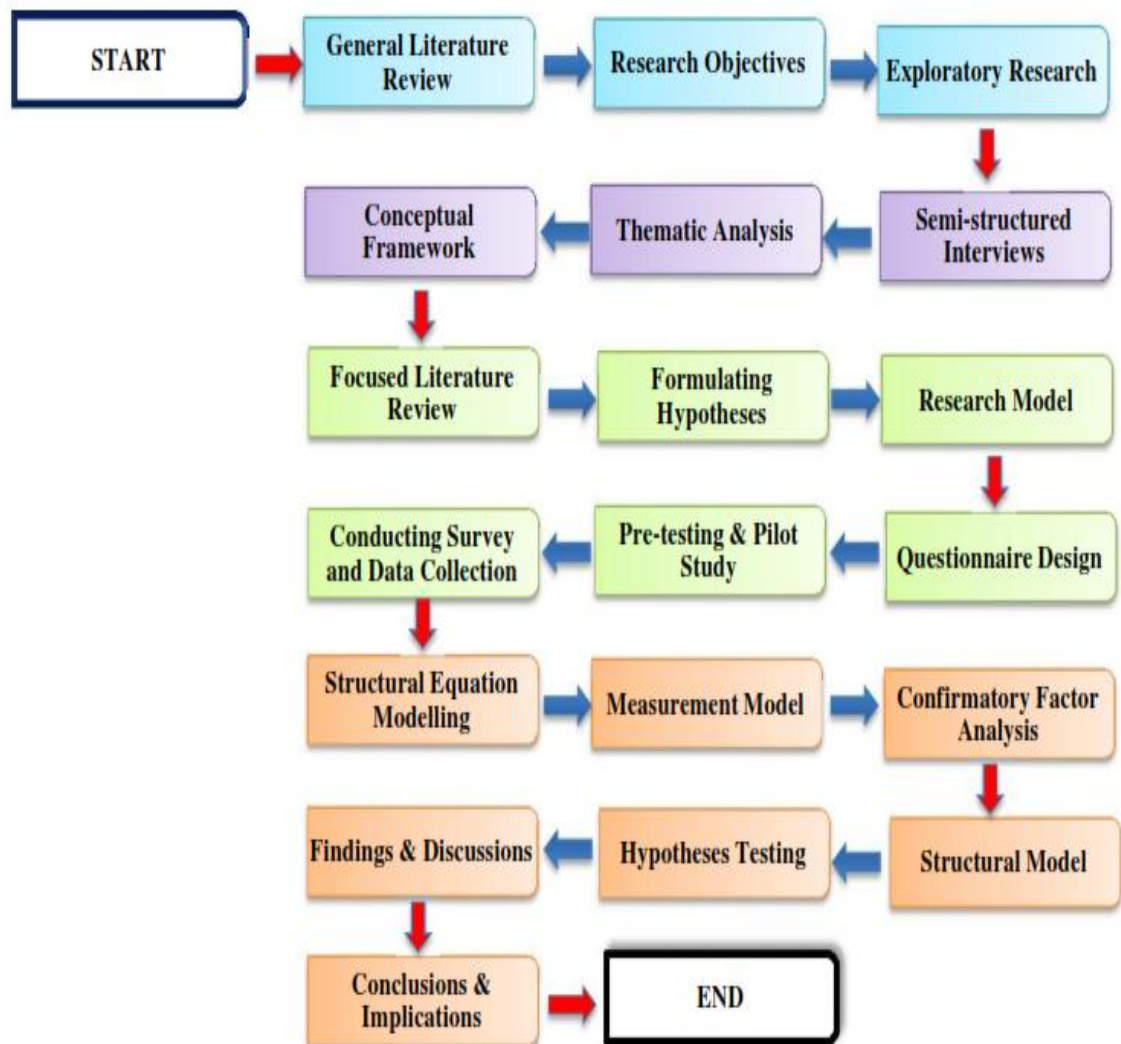


Figure 1- 1: Research Process

The research process consists of several stages, and the end of each stage is the start of the next one. The first stage started with a general overview of literature to understand concepts and terms, and frame the research question and objectives. The start had an exploratory nature because of the fact that, to date “not much has been written about the topic or population being studied, and the researcher seeks to listen to informants and to build a picture based on their ideas” (Creswell and Clark, 2007). In this phase of research, the literature was used inductively to avoid restricting the questions asked while conducting semi-structured interviews with the participants.

The second stage began with the semi-structured interviews, followed by thematic analysis. The results of the thematic analysis were used in developing the conceptual framework and shaping the next phase of the research which contributed to the findings of the thesis.

The third stage of the research process started with the focused literature review. At that point, the literature was used deductively as a basis for formulating the hypotheses. To test the hypotheses empirically, a survey approach was used to test the model. The survey questionnaire was designed based on previously validated, reliable scales and survey instruments used in related studies. The questionnaire was pre-tested in a pilot study and the necessary adjustments were made. The final survey was constructed and distributed via a web-based survey engine.

In the final stage, structural equation modelling (SEM) was used to analyse the data, examine the measurement and structural models, and test the hypotheses. At the end of the research process, the findings were discussed, followed by the conclusions and implications of the study; research limitations were highlighted for further research.

1.7 AN OVERVIEW OF THE CHAPTERS

This section briefly explains the structure of the thesis. The thesis comprises eight chapters, and five appendices. *Chapter one* presents a general description of the study, introduces the research question, objectives, significance of the study and the research process.

Chapter two discusses in detail various theories such as the technology acceptance model (TAM), resource-based view (RBV) of the firm, and the emerging knowledge-based view (KBV). This chapter is organised around the concepts used in the study, and different theoretical streams. It addresses the gap in the literature through exploring: knowledge management (KM), knowledge management systems (KMSs), organisational culture (OC), decision-making processes (DMP) and organisational effectiveness (OE), and their implications for MNCs.

Chapter three examines the mixed methods research strategy used to answer the research question and to achieve the research objectives. The chapter describes the choice of research methods and presents the research methodology of both the qualitative and the quantitative phases.

Chapter four describes the exploratory research and the qualitative phase of this study; its purpose is to provide readers with a rich overview of the procedures which the researcher carried out during this stage of data collection and analysis. The chapter summarises the semi-structured interview process, data collection, thematic analysis, and the conceptual framework.

Drawing on a focused literature review and the conceptual framework, *chapter five* summarises, interprets, discusses the findings of the semi-structured interview analysis and presents the conceptual model proposed in this study. This model proposes twelve hypotheses to be tested and analysed.

Chapter six outlines the data collection and quantitative analysis used to test the proposed conceptual model. It discusses the steps taken to collect the data, the sampling issues, explains scale items that were selected to measure the underlying latent factors, reports on the pre-testing of the survey instrument, presents pilot study results, discusses the data analysis techniques, reliability and validity of the latent factors, reports the results via descriptive analysis and structural equation modelling analysis, and presents the reliability and the validity of constructs along with hypothesis testing.

Chapter seven summarises, and discusses the findings of chapters six in relation to the research question and objectives presented in chapter one, prior research and theories presented in chapter two, and the hypotheses presented in chapter five. It discusses the

hypothesised model and the twelve hypotheses regarding the relationships between the constructs in the structural model.

Chapter eight summarises the results and conclusions of the thesis, discusses the theoretical and managerial implications of the findings, highlights the limitations of the study, and makes suggestions for further areas of research.

This chapter introduced the research topic, the research question and objectives, and the research process, and gave an overview of the whole thesis. The next chapter is a review of literature relevant to the study topic.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter sets the theoretical background for the study by reviewing the literature and prior research that pertain to the research question and objectives. This review is organised around the concepts used in this study and different theoretical streams that are relevant to the study. This work synthesises the literature from the disciplines of knowledge management and decision making to address the gap in the literature. The research explores knowledge sharing and decision making in MNCs through the use of knowledge management systems. The following sections give an overview of the literature in the following topics which concerning this study: knowledge management (KM), knowledge management systems (KMSs), organisational culture (OC), decision-making processes (DMP) and organisational effectiveness (OE) and their implications for MNCs.

2.2 THEORETICAL ARGUMENTATION

Although research into KS is increasing, there is no single, comprehensive, well developed theoretical framework that thoroughly explains the nature and dynamics of KS has yet been developed (Michailova and Minbaeva, 2012; Minbaeva *et al.*, 2003; Wang and Noe, 2010). Research on KS has drawn upon a wide range of theories, such as the resource-based view (RBV) of the firm and the emerging knowledge-based view (KBV). However, some research is not explicitly grounded in any theory (Wang and Noe, 2010). The aim of this research is to investigate KS by using KMSs to support DMP in MNCs; accordingly the technology-acceptance model was also considered. The following sections describe those theories with a link to this study.

2.2.1 Resource-Based View

The RBV was initially promoted by Penrose (1959) and later expanded by others (Wernerfelt 1984; Barney, 1991). The view that knowledge can and should be managed arises most obviously among those who advocate RBV of the firm, which was first developed by Grant (1991). Subsequently, Grant discussed the centrality of knowledge

to the resource-based theory (Grant, 1996). The RBV or resource-based theory (RBT) suggests that organisations' competitiveness comes from unique bundles of tangible and intangible assets that are valuable, imperfectly imitable, rare and sustainable (Barney, 1991). Organisations possess and control different types of resource, such as assets, capabilities, management skills, organisational processes, organisational routines, organisational attributes, information and knowledge (Barney, 1991; Barney, 2001; Daft, 2009). Organisations' resources in RBV theory can be defined as "all assets, capabilities, organisational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney, 1991, p.101). Accordingly, knowledge can be considered as a resource that is always located in an individual or a collective, or embedded in a routine or process (David *et al.*, 2000).

The RBV assumes that organisations build and sustain their competitive advantage by using critical resources that are unique and organisation-specific; it takes the organisation as the unit of analysis. The RBV makes two assumptions in analysing the sources of firms' competitive advantage: heterogeneity and immobility. Organisations may be heterogeneous within an industry in terms of the resources that they control. Such heterogeneity may last for a long time as the resources are not always mobile. Mobility refers to the ability of other organisations to obtain or imitate the resources (Barney, 1991; Barney, 2001). Barney (1991) points out the traits that the organisation's resources must have if they are to be a source of sustained competitive advantage; they must be valuable, rare, imperfectly imitable and non-substitutable. However, even if the resource has all these traits, its value will depend on the specific market-context in which the resource is applied (Barney, 2001).

2.2.1.1 Implications for Knowledge Sharing

The notion that knowledge can and should be managed emerges most obviously among those who advocate a resource-based view of the firm (Edwards *et al.*, 2009). The RBV provides a theoretical view in studies in which KS are embedded, facilitating the understanding and evaluation of the full range of an organisations' resources. According to the RBV, organisations might develop resources in one branch or organisational unit and then use them in other branches or units, implying resource sharing or transfer within the boundaries of that organisation. Similarly, organisational ability uses knowledge as a source of sustainable competitive advantage that can enhance

organisational effectiveness and competitiveness (Michailova and Minbaeva, 2012). Moreover, it is essential for organisations to consider how to transfer knowledge from experts who have it to others who need it (Hinds *et al.*, 2001), so they seek to emphasise and exploit knowledge-based resources that already exist in the organisation (Cabrera and Cabrera, 2005; Damodaran and Olphert, 2000; Davenport and Prusak, 2000). Therefore, to make the best use of knowledge available in an organisation and create the best value, this study aims to extend the RBV through KMSs to support DMP, and to investigate OC as a dimension affecting KS, DMP and OE.

2.2.2 Knowledge-Based View

In the current economy “where the only certainty is uncertainty” the one sure source of lasting competitive advantage is knowledge (Nonaka, 1995). The KBV of the organisation is at the centre of the RBV (Conner and Prahalad, 1996; Grant, 1996; Zheng *et al.*, 2010), indicating that the most important source of an organisation’s sustainable competitive advantage is its ability to create and utilise knowledge (Grant, 1996; Kogut and Zander, 1992; Nonaka, 1995; Prahalad and Hamel, 1990). The KBV points out the importance of understanding the organisational processes to access and utilise knowledge owned by its employees (Grant, 1996). It has developed the view of the firm as a bundle of resources from the RBV, focusing on the most strategically valuable and perhaps the only source of competitive advantage and one definition of a firm is “an institution where the issues of creating, acquiring, storing and deploying knowledge are the fundamental organisational activities” (Grant, 1996; Grant and Baden-Fuller, 1995). There have been few theoretical contributions on the nature and major assumptions to theoretically frame and empirically test the KBV.

Some researchers use RBV and KBV interchangeably. However, they are different because the KBV is considered as a development of the RBV, and it does not apply the RBV logic (Barney, 2001). The KBV focuses on knowledge as the most and possibly the only strategically important resource, but the RBV perceives a firm as a bundle of unique resources and capabilities, one of which is knowledge. Moreover, the KBV is seen in many studies as a development of several research streams, including the RBV and organisational learning theories (Grant, 1996; Eisenhardt and Santos, 2002; Foss *et al.*, 2010; Michailova and Minbaeva, 2012; Minbaeva *et al.*, 2003).

Grant (1996) stresses that effective coordination among organisational members is the challenge of the KBV, as their knowledge is specialised and needs to be integrated. Grant and Baden-Fuller (1995) define the KBV as “an emerging theory of the existence, organisation and competitive advantage of the firm, which is based upon the role of firms in creating, storing and applying knowledge”. This knowledge will have competitive effects when they are difficult to be replicated by competitors (Minbaeva *et al.*, 2003). It is embedded in and present throughout organisational culture, policies, practices, systems and employees (Michailova and Minbaeva, 2012). Grant and Baden-Fuller (1995) and Grant (1996) summarised the basic assumptions of knowledge in the KBV as shown in (Table 2-1):

Table 2-1: Basic Assumptions of Knowledge in the KBV

Value Added	Knowledge is the key productive resource of the firm in terms of contribution to value added and strategic significance.
Different types of Knowledge	Knowledge comprises information, technology, know-how, and skills. Different types of knowledge vary in their transferability. Transferring tacit knowledge as compared to transferring explicit knowledge is costly and slow.
Subject to economies of scale and scope	Knowledge is subject to economies of scale and scope: initial creation of knowledge is more costly than its subsequent replication.
Cognition	Knowledge is created, acquired and stored by individuals. Due to the cognitive and time limitations of human beings, individuals must specialise in their ability to create, acquire and store more knowledge.
Knowledge Application	The creation of value for the organisation typically requires the application of numerous different types of specialised knowledge.

2.2.2.1 Implications for knowledge sharing

The KBV treats KS through the organisational capacity to integrate knowledge within existing structures of the organisation and share the integrated knowledge between individuals (Michailova and Minbaeva, 2012). It emphasises the importance of considering knowledge characteristics. For example, Szulanski (1996) explores the knowledge characteristics that influence the degree of KS by identifying motivational factors and knowledge-related factors that create internal “stickiness” of knowledge in organisations and impede their internal sharing. KS does not occur automatically; it may require substantial organisational efforts aimed at encouraging close relationships between organisations’ members (Michailova and Minbaeva, 2012). Accordingly, organisations should invest in systems which are symbolised by continuous social

interactions, communication of ideas, sharing of knowledge and other acts associated with the social character of learning (Minbaeva *et al.*, 2003). The KBV considers the organisation as a set of knowledge-assets and the role of the organisation is creating, organising and deploying these assets to create value from them (Grant, 1996). Also, information technology (IT) is important for organisations in making the best use of these resources. Alavi and Leidner (2001) point out that IT can play a significant role in the KBV of the firm when information systems are used to synthesise and enhance inter- and intra-KM. Thus, organisational culture and KMSs can be perceived as the organisation's plan of deploying and sharing knowledge assets. Thus, to better understand knowledge as a competitive resource and link it with KS and DMP, this study aims to extend the KBV in the context of KS.

2.2.3 Technology Acceptance Model

Since the initiation of information systems (IS) there has been on-going research to explore and examine the factors that persuade individuals to accept and use technological systems. This issue is important for MNCs because they attempt to use KMSs to connect all employees and branches together all over the world. Understanding the influence of these factors will enable managers, system designers and developers to understand and consider users' perceptions towards a given technological system. There are various theories regarding user acceptance, like Theory of Planned Behaviour, (TPB) Theory of Reasoned Action (TRA) and Technology Acceptance Model (TAM), but TAM is the most-used theory in this area and has a clearer focus on the use of technological systems in IS research.

To understand the importance of users' acceptance of technology in organisations, numerous IS researchers have explored and developed models. The most widely used model TAM, developed by Davis (1989, 1993). TAM explains individuals' behaviour based on perceived usefulness (PRU) and perceived ease of use (PRE) towards a particular technological system; this will determine the actual use of the technology. In this model both constructs PRU and PRE are significantly correlated with intended use and actual system usage and PRU is also seen as being directly impacted by PRE (Davis, 1986, 1989).

2.2.3.1 Implications for knowledge sharing

Davis (1989) defines PRE as “the degree to which a person believes that using a particular system would be free of effort” and PRU as “the degree to which a person believes that using a particular system would enhance his or her job performance”. Although several studies have applied the TAM and proved the reliability and validity of its core constructs PRU and PRE, there is considerable argument among researchers as to whether these constructs are sufficient to explain users’ acceptance and usage of new technology (Moon and Kim, 2001; Segars and Grover 1993; Venkatesh and Davis, 2000). Other factors, such as organisational culture, system design features and training might affect the acceptance and usage of new systems (such as KMSs in KS, which is the focus of this study); this is likely to vary with the technology, usage, context, organisation and target users (Wang and Noe, 2010). Accordingly, to better understand users’ perceptions regarding the usefulness and ease of use of using KMSs in KS, this study aims to extend the TAM in the context of this research.

2.3 KNOWLEDGE AND KNOWLEDGE MANAGEMENT

KM has been widely researched over several decades, regarding the creation, storage, sharing, and application of knowledge in organisations (Alavi *et al.*, 2006). In the current global market, knowledge is considered as a source of competitive advantage and has become a crucial factor for organisations. Accordingly, organisations are searching for appropriate ways to manage and use their knowledge effectively and efficiently (Ordóñez de Pablos, 2006). This section summarises the history of knowledge and knowledge management. The difference between data, information and knowledge will be explored.

2.3.1 Knowledge

Knowledge has been a subject of interest and inquiry for thousands of years, since at least the time of the ancient Greeks, and no doubt even before that (Edwards, 2009). In contemporary society, the most important source of wealth is knowledge (Gupta and Govindarajan, 2000). Knowledge can be considered as one of the most important resources in any organisation as it can provide a sustainable competitive advantage (Wang and Noe, 2010; Lee and Choi, 2003). Grant (1996) points out the importance of applying and using knowledge, stating that “Knowledge is viewed as residing within the

individual, and the primary role of the organisation is knowledge application rather than knowledge creation”. Professionals and practitioners highlight the importance of knowledge, recognising it as the key to any organisation’s survival, informing both decisions and actions (NetIKX, 2013). Grant (1996) highlights the main characteristics of knowledge as: transferability, capacity of aggregation, suitability, specialisation in knowledge acquisition and knowledge requirements of production. Similarly, knowledge can be characterised as easy to codify, complex, specific and available (Michailova and Minbaeva, 2012; Minbaeva *et al.*, 2003; Zander and Kogut, 1995). KM enables organisations to take advantage of the knowledge available both internally and externally.

The implementation of KM is not only directed towards influencing organisational productivity, corporate effectiveness and business performance, but it is also aimed at improving total business value. Knowledge, as an organisational asset, enables organisations to sustain their competitive advantage and this is one of the most important reasons for increasing interest in implementing KM (Bolloju *et al.* 2002). As a result, organisations require inputs of several kinds of knowledge that usually comes from different people. Only a fraction of knowledge is stored on computers, and the majority of an organisation’s intellectual property resides as knowledge in the minds of its employees (Papamichail and Maridakis, 2006). As a result, it is important to understand the concept of knowledge and knowledge taxonomies because they influence theoretical developments in the area of KM.

2.3.1.1 Data, Information and Knowledge

In order to think effectively about the challenges of managing knowledge, it is essential to distinguish between data, information and knowledge (David *et al.*, 2000), terms which have significant and discrete meanings within the KM domain. Pearlson and Saunders (2006), state that *Data* are specific, objective facts or observations standing alone; such facts have no intrinsic meaning, but can be easily captured, transmitted, and stored electronically. Turban *et al.* (2010) define *Information* as data that are organised and analysed in a meaningful way. Alavi and Leidner (1999) state that *knowledge* is not radically different from *information*, but Pearlson and Saunders (2006) clarify the difference and define *Knowledge* as a mixture of contextual information, experience,

rules and values. David *et al.* (2000) view data as raw or unabridged descriptions or observations about states of past, present, or future worlds; information as patterns that individuals find or imbue in data; and knowledge as a product of human reflection and experience. Turban *et al.* (2010) also differentiate between information and knowledge, defining the latter as the understanding, awareness or familiarity acquired through education or experience; anything that has been learned, perceived, discovered, inferred or understood. Hoffer *et al.* (2005) share the opinion regarding the differentiation between data, information and knowledge; in the information technology context, knowledge, especially, is different. Whereas data are a collection of facts, measurements and statistics; information is organised or processed data; but knowledge is information that is contextual, relevant and actionable. See (Figure 2-1).

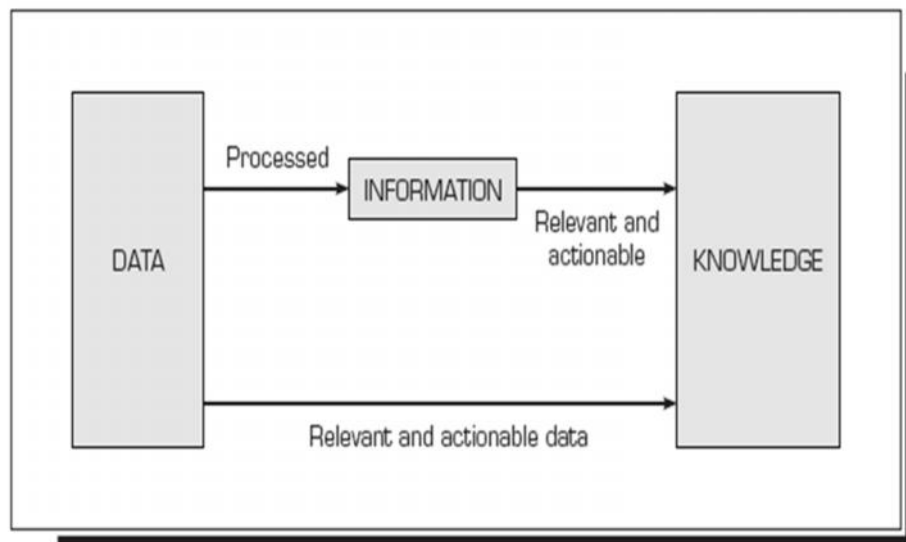


Figure 2- 1: Data, Information and Knowledge (Source: Pearlson and Saunders, 2006)

However, researchers do not always agree on the differences, if any, between information and knowledge. For example, Nonaka (1994) distinguishes between information and knowledge; he considers information to be just a flow of messages while knowledge is based on information and justified by one's belief. Some researchers consider that all information is knowledge, whereas knowledge is more than just information (know-how) (Wang and Noe, 2010). In IS research, researchers tend to use "knowledge" to propose that there is value and uniqueness in examining KMSs compared to the traditional IS (Alavi and Leidner, 2001). However, some researchers

use information and knowledge interchangeably and emphasise that there is not much difference between them in KS research (Bartol and Srivastava, 2002; Huber, 1991; Wang and Noe, 2010).

Knowledge is richer and deeper than information and more valuable because someone has thought deeply about that information and added his or her own unique experience, judgment and wisdom (Pearlson and Saunders, 2006). The differences are shown in (Table 2-2).

Table 2-2: The Difference between Data, Information and Knowledge

Data	Information	Knowledge
<p>Simple observations or objective facts of the world:</p> <ul style="list-style-type: none"> ▪ Context free ▪ Easily captured ▪ Easily structured ▪ Compact, quantifiable ▪ Has no intrinsic meaning 	<p>Data with relevance and purpose:</p> <ul style="list-style-type: none"> ▪ Specific context ▪ Needs consensus on meaning ▪ Human mediation necessary ▪ Often garbled in transmission ▪ Must be considered within the context that it is received and used 	<p>Valuable information that was synthesised and contextualised to provide value:</p> <ul style="list-style-type: none"> ▪ Hard to capture electronically ▪ Hard to structure ▪ Often tacit ▪ Hard to transfer ▪ Highly personal to the source ▪ Richer, deeper and more valuable than information

(Source: Pearlson and Saunders, 2006)

Day and Wendler (1998) underlines that knowledge is unlike other assets and has the following characteristics:

- *Extraordinary leverage and increasing returns.* Knowledge is different from other assets; it is not subject to diminishing returns. When it is used, it is not consumed. Its users can add to it, and increase its value.
- *Fragmentation, leakage, and the need to refresh.* At the same time as knowledge grows, it branches and fragments. Thus, an organisation must continually revise and update its knowledge base to retain it as a source of competitive advantage.
- *Uncertain value.* It is not easy to estimate the impact of an investment in knowledge because there are a lot of indefinable aspects.

- *Uncertain value of sharing.* In the same way, it is difficult to estimate the value of sharing the knowledge, or even who will gain the most benefit.

2.3.1.2 Types of Knowledge

Organisational knowledge exists in a collective mind which is created and developed through communication, interpretation and shared meanings. Moreover, organisational knowledge flows in the organisation when new practices and experiences are evaluated and shared (Courtney, 2001). Several different types of knowledge are recognised in the literature. Polanyi (1962) highlights the differences between *tacit* and *explicit* knowledge. Tacit knowledge is “knowledge which is contained within a person’s head and is difficult or impossible to express, write down and codify. Tacit knowledge is of great interest to organisations because it involves knowledge that leads to effective practices, policies and procedures”. Explicit knowledge, on the other hand, is “easily collected, organised and transferred through digital means. It can be readily articulated, written down, codified and shared” (Courtney, 2001). However, Edwards (2009) points out that “it is important to realise that tacit and explicit knowledge are not mutually exclusive concepts. Rather, any piece of knowledge has both tacit and explicit elements”, as shown in Figure 2-2.

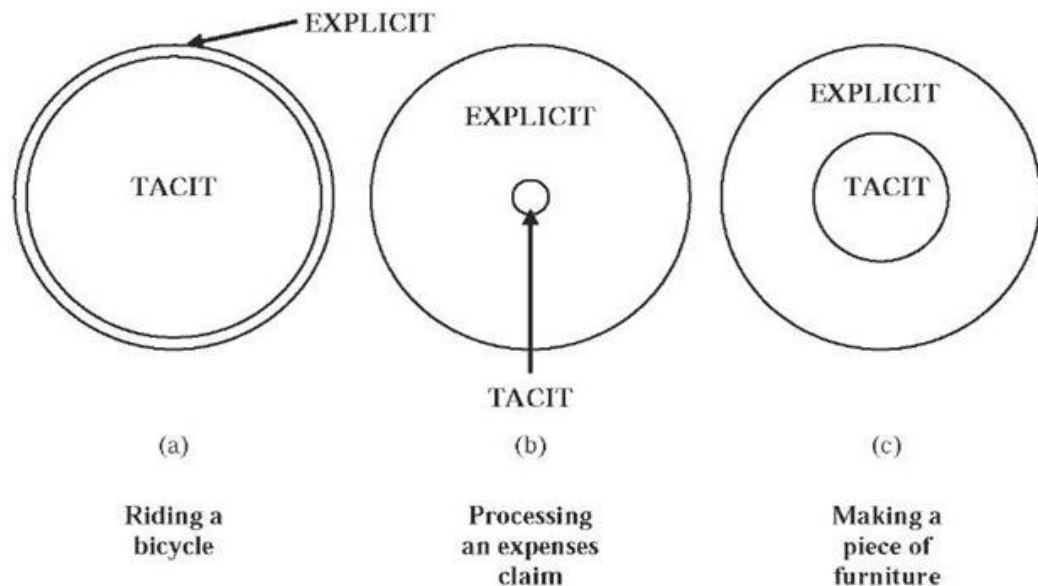


Figure 2- 2: The Relationship between Tacit and Explicit Knowledge (Source: Edwards, 2009)

The size of the inner circle in figure 2-2 represents the amount of tacit knowledge, where the tacit core is at the heart of the knowledge that we “cannot tell” Figure 2-2(a) shows a

case where the knowledge is almost totally tacit. Figure 2-2(b) displays primarily explicit knowledge where the tacit core is very small. Figure 2-2(c) shows an in-between case where a substantial proportion of both tacit and explicit knowledge is involved (Edwards, 2009).

Pearlson and Saunders (2006) highlight that one way of thinking about knowledge is to consider the different types of knowing (*knowing what – knowing how – knowing why*). Knowing *what* is often based on assembling information and eventually applying it. It requires the ability to recognise, describe and classify concepts and things. Knowing *how* is to know how to do something; it requires an understanding of an appropriate sequence of events or the ability to perform a particular set of actions. Finally, knowing how and knowing what can be synthesised through a reasoning process that can result in knowing *why*. Knowing *why* is the causal knowledge of why something occurs. These types of knowledge are illustrated in (Figure 2-3).

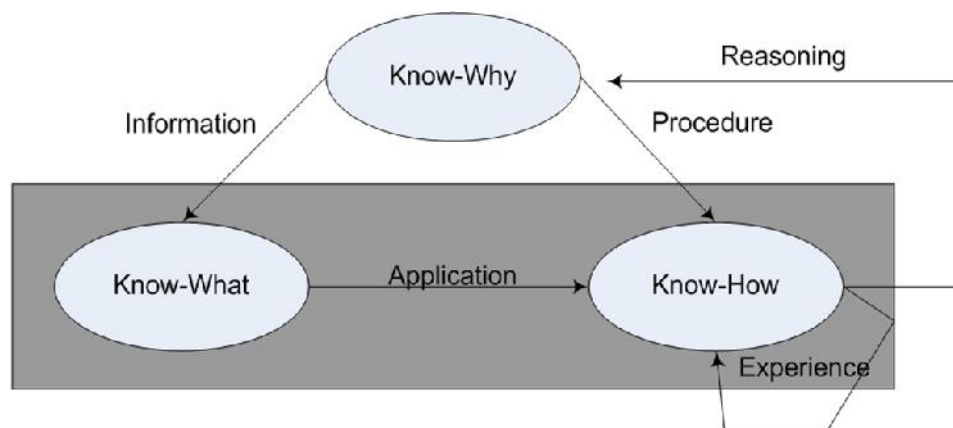


Figure 2- 3: Taxonomy of Knowledge (Source: Pearlson and Saunders, 2006)

Organisational knowledge is usually derived from individual knowledge, so KMSs can support the acquisition, organisation and communication of both tacit and explicit knowledge of employees (Bolloju *et al*, 2002). Alavi and Leidner (2001) also discuss and summarise the knowledge taxonomies in their research, focusing on designing KMSs to support these different types of knowledge and the flows among them. Knowledge taxonomies and examples are summarised in (Table 2-3).

Table 2-3: Knowledge Taxonomies and Examples

Knowledge Types	Definitions	Examples
Tacit	Knowledge is rooted in actions, experience, and involvement in specific context	Best means of dealing with specific customer
Cognitive tacit:	Mental models	Individual's belief on cause-effect relationships
Technical tacit:	Know-how applicable to specific work	Surgery skills
Explicit	Articulated, generalized knowledge	Knowledge of major customers in a region
Individual	Created by and inherent in the individual	Insights gained from completed project
Social	Created by and inherent in collective actions of a group	Norms for inter-group communication
Declarative	Know-about	What drug is appropriate for an illness
Procedural	Know-how	How to administer a particular drug
Causal	Know-why	Understanding why the drug works
Conditional	Know-when	Understanding when to prescribe the drug
Relational	Know-with	Understanding how the drug interacts with other drugs
Pragmatic	Useful knowledge for an organization	Best practices, business frameworks, project experiences, engineering drawings, market reports

(Source: Alavi and Leidner, 2001, p.113)

Effective KM requires the consideration of both tacit and explicit knowledge (Edwards, 2009). Nonaka (1994) points out that new organisational knowledge is created by a dialectical relationship between tacit knowledge, which is “rooted in actions, experience and involvement in specific context”, and explicit knowledge, which is “articulated and generalised knowledge”. This relationship can be represented as a spiral of knowledge creation consisting of four types of knowledge conversion: socialisation, combination, externalisation and internalisation (Figure 2-4).

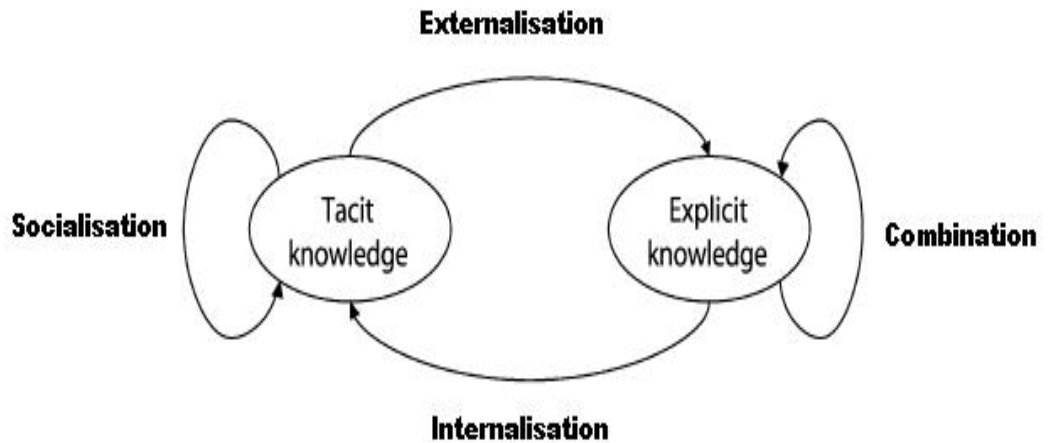


Figure 2-4: Nonaka's model of knowledge creation (Source: Nonaka, 1994)

In Nonaka's model, individuals interact with others to create knowledge through four modes. *Socialisation* involves the conversion of tacit knowledge to tacit knowledge among individuals, that is the creation of new knowledge from shared tacit knowledge. This sharing of tacit knowledge between individuals is supported by joint activities, the organisational environment and informal communication. Individuals can acquire tacit knowledge by observation, imitation and practice.

Combination is the creation of new knowledge through the exchange and combination of explicit knowledge held by individuals in the organisation. The exchange may be through KS, or through interactions through meetings, e-mail and casual conversations. The integration of the exchanged knowledge and its reconfiguration through sorting, adding, categorisation and re-contextualising, can help to create new explicit knowledge. Combination requires active use of organisational media, computerised networks, employee suggestion systems and organisational routines to capture knowledge.

Externalisation involves the conversion of tacit knowledge into explicit knowledge. It takes place when individuals use "metaphors" to articulate their perspectives in order to reveal hidden tacit knowledge that is otherwise hard to communicate. Externalisation enables tacit knowledge to be understood by others, and occurs through collective reflection, dialogue and techniques that facilitate expressing one's ideas.

Finally *internalisation* implies the conversion of explicit knowledge into tacit knowledge, through training, education, coaching and KS programs. It involves taking

explicit knowledge and deducing new ideas or taking constructive action (Bolloju *et al.*, 2002).

Thus, knowledge can represent valuable assets to organisations when they are shared through socialisation, combination, externalisation and internalisation in the form of know-how (Nonaka and Takeuchi, 1995).

2.3.2 Knowledge Management

The era of knowledge economy requires effective KM implementation and the development of knowledge-based organisations to ensure their success (Binney, 2001). Edwards (2009, p.471) highlighted that “more recently, interest in managing knowledge has grown in step with the perception that increasingly we live in a knowledge-based economy”. Therefore, organisations are constantly striving to employ the best KM practices in their processes and business activities to derive a competitive advantage (Akbar, 2003; Gupta and McDaniel, 2002; Ofek and Sarvary, 2001; DeTienne and Jackson, 2001).

With roots in organisational learning and innovation, the idea of KM is not new (Gupta and Govindarajan, 2000). Edwards *et al.*, (2009, p.S114) state that “Knowledge management is a term that was coined less than 30 years ago, even though it refers to a set of activities that must have been occupying the minds of humans for millennia. How to make use of what we know? How to find out what others know? How to come up with new ideas? These are just a few of the facets of what has become known as KM”. Many views and definitions of KM are available in the literature and between professionals; these definitions vary widely and often seem arbitrary, but the concept makes sense when approached as a discipline, rather than a set of technologies.

Holsapple and Joshi (2004) define KM as “An entity’s systematic and deliberate efforts to expand, cultivate, and apply available knowledge in ways that add value to the entity, in the sense of positive results in accomplishing its objectives or fulfilling its purpose”. Davenport and Prusak (2000) define KM as “an effort to capture not only explicit factual information but also the tacit information and knowledge that exists in an organisation, usually in the minds of employees in order to advance the organisation’s mission”. Nakra (2004) defines it as “a concept, a way of doing business, under which information

is turned into actionable knowledge and made available effortlessly in a usable form to the decision-makers and other users”. It is considered as the discipline of capturing knowledge-based competencies, and storing and diffusing them in order to add value; the organisations that excel at KM tend to be the ones that value individuals and provide an atmosphere for personal growth and development.

There are also definitions by professionals and experts. Jennex *et al.* (2008) used an expert panel to generate a composite definition of KM as, “the process of selectively applying knowledge from previous experiences of decision-making to current and future decision making activities with the express purpose of improving the organisation’s effectiveness”. The Network for Information and Knowledge Exchange (NetIKX) defines KM as, “the set of ideas that help to understand the nature of the knowledge and how it is used in decisions and actions. It is helping managers to create, organise, store, use and enhance the knowledge resources available to them. From a different perspective, knowledge management is about extending a manager's toolset, giving him/her greater opportunities to make the right decisions and a greater chance of achieving the desired strategy” (NetIKX, 2013).

Definitions of KM varied according to its purpose and how it will be employed. In the context of this study, KM will use the definition by Rastogi (2000, p. 40): “KM is a systematic and integrative process of coordinating organisation-wide activities of acquiring, creating, storing, sharing, diffusing, developing and deploying knowledge by individuals and groups in pursuit of major organisational goals”.

Goh (2007) outlines three significant changes in the way knowledge was “managed” during the twentieth century. First, there was the industrial revolution in which knowledge was applied to industrial tools, processes and products. Second, in the productivity revolution proponents like Frederick Taylor and Henry Ford advanced the use of knowledge assets to improve the productivity of human labour. Third, in the present-day revolution, loosely termed the learning or knowledge revolution, knowledge is considered to be a manageable asset (Knowledge Management), employed to enhance business competitiveness. Taking advantage of its strategic benefits, companies under immense pressure to create new and novel ways to differentiate themselves, apply KM. As a result, most corporate strategies are now concerned with the creation, acquisition and sharing of knowledge.

2.3.2.1 Reasons for KM implementations

There are several reasons why organisations implement KM, and this section highlights the most important.

KM involves managerial efforts required to facilitate the activities of creating, acquiring, storing, diffusing, sharing, deploying and developing knowledge by individuals and groups (Davenport and Prusak, 2000; Rowley, 2001; Zheng *et al.*, 2010). Bolloju *et al.* (2002) state that knowledge as an organisational asset can enable an organisation to sustain competitive advantage, and this is one of the most important reasons for the increasing interest in KM.

KM practices capture the process of how internal and external knowledge is created, absorbed, positioned, digested and integrated into organisational memory (Zheng *et al.*, 2010). KM organises the sense-making mechanism through which organisational members can ascribe meaning to the shared knowledge, through rendering alternative meanings and deciding which course of action will be taken based on their new understanding (David *et al.*, 2000). Moreover, the sense-making mechanisms entailed in KM serve as antecedents to other consequences of culture such as ethical behaviour, commitment and self-confidence, which all have an influence on OE (Zheng *et al.*, 2010). Knowledge enables organisations to achieve their objectives through increasing the capacity for DM, as it is embodied in concepts, stories, language, rules and tools (David *et al.*, 2000). Furthermore, KM in organisations recognises the importance of employees as contributors to knowledge and the intellectual capital of their organisations. Gorry and Westbrook (2012) stress that organisations nowadays are considered as knowledge businesses, limited by what they know, and by the skills, experiences, intuitions, insights and relationships of their employees. The concern of KM is mainly improving knowledge creation, sharing and using it by employees at different organisational levels (David *et al.*, 2000).

Edwards, (2009) pointed out five characteristics of business processes which justify their use as a foundation for KM in organisations:

- Business processes have identifiable customers, whether internal or external. Knowledge is of little relevance to the organisation unless put to use for a customer of some kind.

- Business processes cut across organisational boundaries. Knowledge flows do not need to, and should not, obey the artificial boundaries within an organisation.
- Business processes consist of a structured set of activities. Choosing the appropriate way to structure activities is an important part of the knowledge.
- Business processes need to be measured. Without some form of measurement as a comparison, knowledge cannot be validated.
- While the parts of a business process are important, the overriding requirement is that the overall process works. Valid knowledge in an organisational context must take a holistic view.

Moreover, Pearlson and Saunders (2006) point out several trends that highlight the needs for businesses to manage knowledge:

- 1- *Sharing Best Practice*: KMSs capture best practices to disseminate the success and their experience within the organisation.
- 2- *Globalisation*: new computing and telecommunications technologies allow data, information and knowledge, albeit explicit knowledge, to flow instantly around the world. Thus, knowledge is portable and must be managed carefully.
- 3- *Rapid Change*: rapid change means that existing knowledge becomes obsolete faster and that employees must learn new skills in less time. Therefore, organisations need to be nimble and adaptive to compete in this rapidly changing environment.
- 4- *Downsizing*: downsizing tends to eliminate employees and remove knowledge, in the form of experience from the organisation. Accordingly, firms try to transfer this knowledge from the employee's mind to the organisation to make it accessible at any time, no matter whether the employee is available or not.
- 5- *Managing Information and Communication Overload*: data must be categorised in some manner to be easily accessible and useful rather than overwhelming, so data must be stored and organised in a simple form.
- 6- *Knowledge Embedded in Products*: the intangibles that add the most value to goods and services are becoming increasingly knowledge-based, so knowledge gives a distinctive competitive advantage to organisations.
- 7- *Sustainable Competitive Advantage*: in an age of increasing competition and unprecedented change, only one sustainable competitive advantage remains: the

capacity to learn; this represents a vital source in the organisation and enables it to innovate.

Although some organisations handle KM efficiently and effectively, many still face serious challenges in managing knowledge, such as: the difficulty of capturing tacit knowledge, lack of KM policies, lack of methods for mapping knowledge, and knowledge overload or collecting overwhelming quantities of knowledge (Shin, 2004).

Thus, in order to assist knowledge workers to make decisions efficiently and effectively, Zhang and Lu (2007) draw attention to the importance of incorporating a knowledge management paradigm into an enterprise's business processes; the challenge in today's dynamic economy is "how to manage enterprise knowledge" so that knowledge workers can use it effectively and efficiently in their daily work.

2.4 KNOWLEDGE MANAGEMENT SYSTEMS

Historically, a significant new business computer software application has evolved every ten years. For example, transaction processing systems were introduced in the 1950s, management information systems in the 1960s, decision support systems in the 1970s, knowledge management and executive information systems in the 1980s and electronic business and commerce systems in the 1990s (O'Brien, 2004). Over the past three decades, many organisations have developed information technology-based systems designed specifically to facilitate the sharing, integration and utilisation of knowledge, referred to as KMSs (Nielsen and Michailova, 2007). Alavi and Leidner (2001) define KMSs as "Information Technology based systems developed to support and enhance the organisational processes of knowledge creation, storage/retrieval, transfer, and application". They also point out that IT can be used as an enabler in KM initiatives, but stress that KM initiatives do not necessarily involve the implementation of IT solutions.

Organisations across all sectors recognise the critical role of effective KMSs in their future success (Shin, 2004). Turban *et al.* (2010) point out that KMSs are intended to help an organisation to cope with rapid change, turnover, downsizing and leveraging knowledge use by making the expertise of the organisation's human capital widely accessible. Moreover, KMSs can facilitate knowledge management by ensuring knowledge flows from the person(s) who know to the person(s) who need to know

throughout the organisation (Bose, 2004). Binney (2001, p.33) posited that “The KM spectrum has been developed to assist organisations in understanding the range of KM options, applications and technologies available to them”.

Chin (2004) believes that the KM approach is one of the reasons why some organisations reap the benefits of KMSs while others do not. Some examples are summarised in (Table 2-4).

Table 2- 4: KM Approaches

KM Approaches	Main focus
Technological	Enhancing KM quality by supplying tools for effective storage and sharing of knowledge
Intellectual asset	Enhancing KM quality by valuing knowledge assets in financial terms and reflecting them in accounting practices
Organisational learning	Facilitating knowledge creation and sharing by developing positive work environment or effective reward systems
Process	Enhancing KM quality by identifying key processes on which important knowledge flows, and managing them formally
Philosophical	Gaining a higher understanding of knowledge lead by asking questions such as ‘do we know what we do not know’ towards development of new ways of thinking

(Source: adapted from: Shin, 2004)

KMSs are expected to play a major KM role in enterprises that are increasingly confronted with paradoxical challenges of exploiting explicit knowledge resources and exploring new tacit knowledge. Such a knowledge creation and sharing infrastructure within the context of organisational know-how can provide organisations with the requisite agility to respond to the dynamic nature of organisations’ business imperatives (Wand and Noe, 2010). Moreover, KMSs are systems that automate the input, storage, transfer and retrieval of knowledge, and include tools for capturing various types of knowledge from useful lessons learned, classifying knowledge documents, locating the relevant experts, facilitating expertise and so on (Kulkarni *et al.*, 2006). Edwards, (2009) explained that there is a need to coordinate people, processes, and technology successfully in KMSs, as a KMS is more than just technology, and represents a deliberate, conscious attempt to manage knowledge, usually in an organisation. The interaction of the three elements, people, processes, and technology, is shown in Figure 2-5.

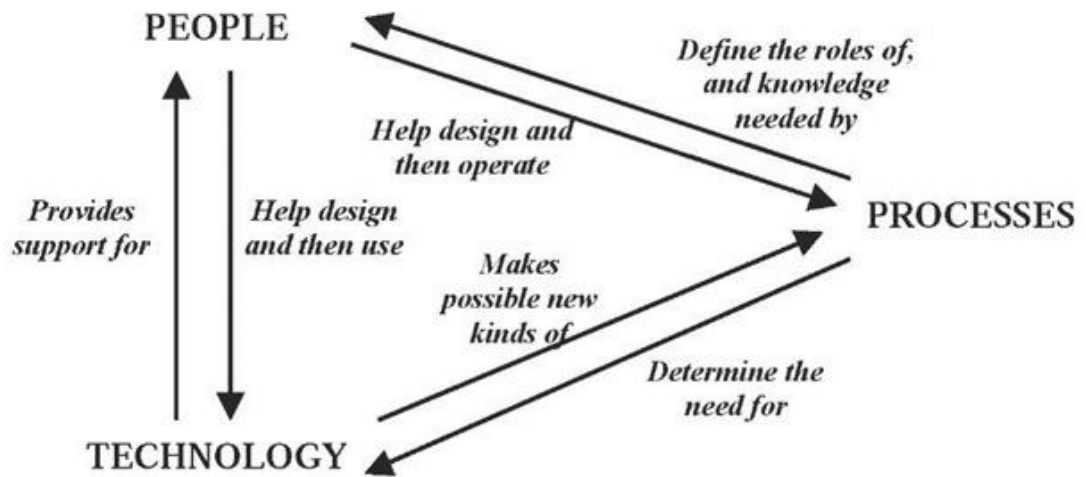


Figure 2-5: People, Processes, and Technology in a KMS (Source: Edwards, 2009, p.474)

2.4.1 Types of KMSs

Technology plays a vital role in business, as it helps employees to access the knowledge they need when they need it, and provides the tools with which decision makers and users can leverage their knowledge in the context of their work (Chong and Chong, 2009; Bals *et al.* 2007). However, Edwards (2009) also stressed that technology used in supporting KM does not have to be “KM software”; it can be generic software such as e-mail or an Intranet. KMSs use different IT media such as the Internet, Intranets, Extranets, Lotus Notes, Data Warehouses, Software filters and Agents to systematise, enhance, and expedite intra- and inter-firm KM (Alavi and Leidner, 1999). Bolloju *et al.* (2002) point out that in order to assist the creation of new knowledge effectively, KMSs must support not only the creation but also the gathering, organisation, sharing and dissemination of existing knowledge.

Nevo and Chan (2007) recommend that KMSs should be more strongly integrated with the overall technology in the organisation. There are different technology tools which support most of today’s KM applications in organisations; these technologies have been called “pervasive technologies” and include Internet/intranet technologies and generic web elements such as portals. Binney (2001) summarises the relationships and the support between technologies and specific KM applications, as shown in (Table 2-5).

Table 2- 5: Enabling Technologies Mapped to the KM Spectrum

	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and Creation
Knowledge Management Applications	<ul style="list-style-type: none"> ▪ Case-Based Reasoning (CBR) ▪ Help Desk Applications ▪ Customer Service Applications ▪ Order Entry Applications ▪ Service Agent Support Applications 	<ul style="list-style-type: none"> ▪ Data Warehousing ▪ Data Mining ▪ Business Intelligence ▪ Management Information Systems ▪ Decision Support Systems ▪ Customer Relationship Management (CRM) ▪ <i>Competitive Intelligence</i> 	<ul style="list-style-type: none"> ▪ Intellectual Property ▪ Document Management ▪ Knowledge Valuation ▪ Knowledge Repositories ▪ <i>Content Management</i> 	<ul style="list-style-type: none"> ▪ TQM ▪ Benchmarking ▪ Best practices ▪ Quality Management ▪ Business Process (Re)Engineering ▪ Process Improvement ▪ Process Automation ▪ Lessons Learned ▪ Methodology ▪ <i>SEI/CMM, ISO9XXX, Six Sigma</i> 	<ul style="list-style-type: none"> ▪ Skills Development ▪ Staff Competencies ▪ Learning ▪ Teaching ▪ Training 	<ul style="list-style-type: none"> ▪ Communities ▪ Collaboration ▪ Discussion Forums ▪ Networking ▪ Virtual teams ▪ Research and Development ▪ <i>Multi-disciplined Teams</i>
Enabling Technologies	<ul style="list-style-type: none"> ▪ Expert Systems ▪ Cognitive Technologies ▪ Semantic Networks ▪ Rule-based Expert Systems ▪ Probability Networks ▪ Rule Induction, Decision Trees ▪ <i>Geospatial Information Systems</i> 	<ul style="list-style-type: none"> ▪ Intelligent Agents ▪ Web Crawlers ▪ Relational and Object DBMS ▪ Neural Computing ▪ Push Technologies ▪ Data Analysis and Reporting Tools 	<ul style="list-style-type: none"> ▪ Document Management Tools ▪ Search Engines ▪ Knowledge Maps ▪ Library Systems 	<ul style="list-style-type: none"> ▪ Workflow Management ▪ Process Modeling Tools 	<ul style="list-style-type: none"> ▪ Computer-based Training ▪ Online Training 	<ul style="list-style-type: none"> ▪ Groupware ▪ e-Mail ▪ Chat Rooms ▪ Video Conferencing ▪ Search Engines ▪ Voice Mail ▪ Bulletin Boards ▪ Push Technologies ▪ Simulation Technologies
<ul style="list-style-type: none"> ▪ Portals, Internet, Intranets, Extranets 						

(Source: Binney, 2001, p.38)

Turban *et al.* (2010) state that a KMS is not just technology or a product; it is more a methodology that can be applied to business practices. However, IT is crucial to the success of every KMS as it provides the enterprise architecture upon which KM is built. KMSs use three sets of technologies: *communication, collaboration and storage and retrieval.*

- *Communication technologies* allow users to access needed knowledge, and to communicate with each other, e.g. e-mail, Internet, corporate Intranets, and other Web-based tools. Even fax machines and the telephone are used for communication, mainly when the practical approach to knowledge management is adopted.
- *Collaboration technologies* provide the tools to perform group work. Groups can work together on common documents at the same time or at different times; in the same place or even in different places. Other collaborative computing capabilities, such as electronic brainstorming, enhance group work especially for knowledge contribution. Additional forms of group work involve experts working with individuals trying to apply their knowledge. This requires a high level of collaboration. Other collaborative computing systems allow an organisation to create a virtual space so that individuals can work online anywhere and at any time.
- *Storage and retrieval technologies* using a database management system to store and manage knowledge. This works reasonably well in storing and managing most explicit knowledge. However, capturing, storing, and managing tacit knowledge usually requires a different set of tools; electronic document-management systems and specialised storage systems. These storage systems have come to be known as knowledge repositories.

There are different kinds of KMSs which can be used in KS and to support DMP in several ways, including allowing employees to have direct access to knowledge and also to experts. Maier (2010) states that KMSs could be any of the following:

- 1- *Document based*: any tools that can permit creation, sharing and management of formatted documents such as Lotus Notes, distributed databases, and web pages.
- 2- *Ontology/Taxonomy based*: these tools are similar to document technologies. Ontology is used to summarise the documents by Author, Subject, Organisation etc., as in XML-based ontology.
- 3- *Artificial Intelligence technologies*: use a customised representation system to represent problems or opportunities.

- 4- *Network Maps*: maps that can show the flow of communication between organisation and individuals.
- 5- *Social computing tools*: tools that can provide a more organic approach to the creation of a KMS.

As a result, there are plenty of tools available in organisations which can support KM, KS and DMP; these tools known as KMSs. Turban *et al.* (2010) suggest that most KM software packages include one or more of the following tools: Collaborative Computing Tools, Knowledge Servers, Enterprise Knowledge Portals, Electronic Document Management, Knowledge Harvesting Tools, Search Engines, Knowledge Management Suites and Intelligent Techniques. These are summarised below:

- *Collaborative Computing Tools*: this is the shared computerised work when two or more people work together (e.g. by using screen sharing). Collaborative tools provide many ways of supporting group work, including electronic brainstorming and idea categorisation (e.g. Lotus Notes/Domino, Quickplace, eRoom).
- *Knowledge Servers*: these contain the main knowledge management software, including the knowledge repository, and provide access to other knowledge, information, and data (e.g. Intraspect Software Knowledge Server, the Hyperwave Information Server, the Sequoia Software XML Portal Server).
- *Enterprise Knowledge Portals (EKP)*: the electronic doorways into many KMSs. They are an ideal way to configure KMSs. Most combine data integration, reporting mechanisms, and collaboration, while document and KM is handled by a server (e.g., OpenText, Verity, IBM/WebSphere Portal Server).
- *Electronic Document Management (EDM)*: a method for processing documents electronically, including capture, storage, retrieval, manipulation, and presentation. EDM systems focus on the document in electronic form as the collaborative focus of work (e.g., Lotus Notes, FYI, Livelink, Xpedio).
- *Knowledge Harvesting Tools*: for capturing knowledge and monitoring an organisation's group memory; they capture the context of use, such as who used the information, when, for what purpose, how it was combined with

other information, and what people said about it. They then make the information available for sharing and reuse (e.g., Knowledge Mail, Active Knowledge, Knowledge X).

- *Search Engines*: programs that find and list websites or pages (designated by URLs) that match some user-selected criteria (e.g., Google, Verity, Yahoo).
- *Knowledge Management Suites*: are complete KM solutions out-of-the-box. They consist of a comprehensive set of tools; they integrate the communication, collaboration, and storage technologies into a single convenient package. They can access internal databases and other external knowledge sources (e.g. IBM/Lotus, PeopleSoft, Microsoft KM suites, SAP, ORACLE).
- *Intelligent Techniques*: database management systems exhibiting artificial intelligence features that can support the user, often including expert systems and intelligent agents (e.g. Data Mining, Neural Networks, Expert Systems, Case-based reasoning, Fuzzy Logic, Generic Algorithms).

Thus, it is clear that expert or knowledge-based systems software, and artificial intelligence (AI) software more generally, do have a role to play in supporting knowledge management although, in addition, so does more conventional software (Edwards *et al.*, 2005).

2.4.2 Reasons for KMSs implementations

KMSs are ineffective if they are not used (Kulkarni *et al.*, 2006). Accordingly, organisations implement and use KMSs for several reasons; Davenport and Prusak (2000) highlight three main reasons. First is to enhance the availability of knowledge in organisations, through the use of maps, hypertext, yellow pages and directories. The second reason is to build a KS culture, through creating tools for employees to share knowledge and the third is to develop a knowledge infrastructure that can create a suitable environment for collaboration that is necessarily supported by technology. Although organisations are applying KMSs with the assumption that the OE, efficiency and competitiveness will increase (Shin, 2004), but according to Edwards *et al.*, (2005) no system is flawless as there are many failures in KM cases. Knowledge is a resource that is not consumed when used, but it can become old over time. Therefore, as

knowledge is shared and disseminated, individuals will start to develop, create, and identify new knowledge or update and revise old knowledge which they replenish into KMSs. Accordingly, knowledge must be shared and updated regularly, so that it grows over time (Wang and Noe, 2010).

2.4.3 Implications of KMSs in MNCs

MNCs are always looking for support from their IT departments to utilise, facilitate and use their existing knowledge effectively and efficiently (Montazemi *et al.*, 2012). Kostova *et al.* (2008, p.997) point out that “MNCs have complex internal environments, with spatial, cultural, and organisational distance, language barriers, inter-unit power struggles and possible inconsistencies and conflict among the interests, values, practices, and routines used in the various parts of the organisation”. Therefore, KS in the complex environment between MNCs units requires particular coordination mechanisms and tools to facilitate KS (Ghoshal and Bartlett, 1995; Gupta and Govindarajan, 2000; and Sia *et al.*, 2010).

KMSs succeed in playing a vital and dynamic role in enabling employees in MNCs to easily find expertise residing in the organisation and to support interactions between employees (Dennis and Vessey, 2005). MNCs recognise the need to integrate all types of knowledge in formal IS, KMSs and using modern IT to systematise, enhance, and expedite intra- and inter-firm KM (Alavi and Leidner, 1999).

Technology helps employees in accessing the knowledge they need when they need it (Chong and Chong, 2009). However, no system is flawless and there are many examples of failure in KM. Malhotra (2004) states that “failures typically happen when the KM effort mostly relies on technology and does not take in hand whether the proposed system will meet the objectives and needs of the organisation and its employees”. However, Chong and Chong (2009) state that many organisations are still struggling with KM implementation and in this knowledge-based economy it represents the core competency that can determine their success. One of the main limitations to the use of KMSs by MNCs is the implicit assumption that there is an effective physical infrastructure for KS that addresses temporal and spatial characteristics, for example, time zones and geographical characteristics of MNCs (Shin, 2004).

Monteiro *et al.* (2008), suggest that MNCs can create value from their knowledge assets and from the internalisation of their gathered knowledge. Moreover, there is a broad consensus nowadays in view of MNCs as “an international network that creates, accesses, integrates and applies knowledge in multiple locations” (Almeida *et al.*, 2002). Therefore, KS is a significant issue in MNCs and KM cannot be effective unless knowledge is shared.

Nielsen and Michailova (2007) emphasise that any discussion of KMSs needs to recognise that there are different views of what constitutes knowledge, the most widely recognised three views of knowledge and their implications for KMSs in MNCs being: When knowledge is viewed as an *object*, the KMS tends to focus on gathering, storing and sharing knowledge, and head office is responsible for the centralised customisation of information by employee users. When knowledge is seen as a *process*, the typical KMS focuses on knowledge flows and the sharing of predominantly explicit knowledge. The view of knowledge as a *capability* suggests a focus on knowledge creation, and the building of core competencies through a combination of tacit and explicit knowledge.

2.5 KNOWLEDGE SHARING

With the advent of the knowledge economy and the increasing size of knowledge societies, organisations continue to seek new ways of leveraging and sharing knowledge to support DMP (DeTienne and Jackson, 2001). The primary objective of most KM research and practice is to facilitate effective and efficient KS among organisational members (Shin, 2004; Davenport and Prusak, 2000; Nonaka *et al.*, 1998).

Effective KS is not moving knowledge from one location to another, but the basic notion is that the sharing of viable knowledge should assist with collaborative problem solving between people, directly and indirectly, supported by networks and tools (Wang and Noe, 2010). KS refers to the provision of know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures (Cummings, 2004). Although, in reality, KS is still challenging for managers, organisations exert a lot of effort to utilise, implement and apply the knowledge that they have to make actual use of this knowledge and to be reflected in organisational performance (Gold *et al.*, 2001; Zheng *et al.*, 2010). KS occurs through different means

and tools in organisations, including written documents, telephone, face-to-face communication, networks and KMSs (Alavi and Leidner, 2001; Cummings, 2004; Wang and Noe, 2010).

The term KS has been used interchangeably in the literature with “knowledge transfer”, “knowledge diffusion” and “knowledge exchange” (Cabrera *et al.*, 2006; Szulanski *et al.*, 2000). Wang and Noe (2010) highlight the differences between knowledge sharing, knowledge transfer and knowledge exchange. Knowledge transfer includes both KS by the source of knowledge and the recipients’ acquisition, application and use of this knowledge. Knowledge exchange involves both knowledge sharing and knowledge seeking or in other words, it includes employees providing knowledge to others and employees searching for knowledge from others. Davenport and Prusak (2000) define KS as “The process by which knowledge is transferred from one person to another, from individuals to groups, or from one group to another group”. Kulkarni *et al.* (2006) use the term KS to mean both contributing to and using available knowledge. In this study “knowledge sharing” will be used to describe the movement of knowledge between different individuals, departments, divisions, units or branches in MNCs through KMSs.

2.5.1 Reasons behind KS implementation

Knowledge creation, knowledge sharing and knowledge management are important in organisations and cannot be designed for small numbers of people; they must be accessible by each employee and department within the organisation. Chong and Chong (2009), highlight that “If you share your money with me, we each have half. If you share your knowledge with me, together we have double”.

KS between organisational units and employees can create significant learning benefits and is a powerful mechanism for improving an organisation’s productivity and increasing its survival prospects (Riege, 2007). Moreover, it enables employees to share, contribute and add value to knowledge applications and enrich the competitive advantage of the organisation (Jackson *et al.*, 2006). KS can reduce production costs, help in developing new products and projects, improve team performance and the organisation’s innovation capabilities, and increase sales and revenue (Collins and Smith, 2006; Cummings, 2004; Hansen, 2002; Lin, 2007; Mesmer-Magnus and DeChurch, 2009). Therefore, to reap the most potential benefits from KS, organisations

invest a considerable amount of money and time into the improvement and development of KMSs to facilitate the gathering, storage and sharing of knowledge (Wang and Noe, 2010).

KS, through KMSs, helps in facilitating a community of practice and making ideas, experiences, best practice and knowledge accessible and available to all employees (Cabrera and Cabrera, 2005; Wang and Noe, 2010). It does not diminish value, but instead will maximise employees' benefits and improve organisational performance (Brown and Duguid, 2002; Cabrera and Cabrera, 2005; Wang and Noe, 2010).

2.5.2 Barriers preventing effective KS in organisations

Several studies highlight the barriers that can prevent effective KS in organisations, such as: fear of loss of hegemony (Shin, 2004; Szulanski, 1996); lack of up-to-date knowledge (Shin, 2004); lack of commitment or negligence (Huber, 1991); unfriendly relationships between source and recipient (Ghoshal and Bartlett, 1994; Shin, 2004); limitations in individuals' networks of knowledge or doubt about the network (Carnabuci and Operti, 2013; Shin, 2004); cultural incompatibility (Leidner *et al.*, 2012; Lam, 1997); knowledge diversity due to lack of common experience or to the environment (Shin, 2004); immobility of knowledge (Grant, 1996); causal ambiguity (Polanyi, 1962; Szulanski, 1996); limitations in the capacity to institutionalise new knowledge application (Shin, 2004; Szulanski, 1996).

2.5.3 Implications of KS in MNCs

In the current global market, knowledge is considered a source of competitive advantage and has become a crucial factor for MNCs. Effective KS between different units overseas has been a challenge for MNCs, as there are so many unprecedented challenges facing managers outside their organisations along with environmental "forces for change", such as globalisation, emerging technologies, emerging best business practices, government regulations, politics, competitive global financial markets, limited availability of knowledge workers, and higher worker turnover rates (Cuffe, 2007). Furthermore, MNCs are searching for appropriate ways to manage and use their knowledge effectively and efficiently (Ordóñez de Pablos, 2006), and in this highly competitive global environment, are now recognising an urgent need to institutionalise KS as a means of obtaining the best value from all available knowledge assets (Goh,

2007). MNCs have different employees with different cultures and languages, and this diversity can pose challenges for KS (Ford and Chan, 2003; Minbaeva, 2007; Wang and Noe, 2010). One of the top priorities of MNCs is therefore to manage KS effectively to handle these differences appropriately (Monteiro *et al.*, 2008). Furthermore, Montazemi *et al.* (2012) emphasise that the effective sharing of organisational knowledge is particularly relevant for MNCs, as organisations' knowledge is considered a significant source of competitive advantage in their global strategy. Therefore, in order to succeed in the global information society, MNCs need to identify, evaluate, create, evolve and develop their knowledge assets since knowledge is one of their meaningful economic resources (Metaxiotis *et al.*, 2003).

The performance of MNCs depends mainly on their ability to coordinate geographically dispersed knowledge resources. Knowledge represents a strategic importance for MNCs, which should be shared effectively and efficiently throughout subsidiaries to generate improved products and better services (Montazemi *et al.*, 2012). However, MNCs face a big challenge in KS through using KMSs. One of the most important reasons for the failure of KMSs is failure to consider how the organisational and interpersonal contexts influence KS (Voelpel *et al.*, 2005; Wang and Noe, 2010).

In conclusion, KS is a significant issue in MNCs and knowledge cannot be effective unless it is shared. In MNCs, knowledge can be generated at various locations and distributed to diverse parts of an interconnected network of organisational units (Holm *et al.*, 2001). KS between MNCs units is a real priority and should therefore be the focus of far more attention than it has received to date (Monteiro *et al.*, 2008).

2.6 DECISION MAKING

Nowadays, businesses need different types of IS to support DM and work activities for various organisational levels and functions to respond to new competitive pressures (French *et al.* 2008; Turban *et al.* 2010). Early information technologies were designed to support and assist employees in their managerial and professional duties by processing and disseminating enormous amounts of information to managers (Turban *et al.*, 2010). Over several decades, systems such as Decision Support Systems (DSS) have evolved, focusing on providing tools for ad hoc decision analysis to specific decision makers, or intended to provide updated, often concurrent, significant and relevant information to senior and middle managers. These systems contribute in the

development of both individuals and organisations along with improvements in different degrees, and continue to be the most significant components of an organisation's IT investment (Alavi and Leidner, 1999). DSSs have been employed in organisations as a means of dealing with the overwhelming flow of data, information and knowledge stemming from an increasing number of internal and external sources. Several tools have emerged to support complex DM and facilitate effective analytical thinking (Marakas, 2003).

2.6.1 Decision Making Processes

In accordance with Simon's model of decision-making (1960), the rational DMP requires three steps; Identification of all the alternatives, analysis of the possible consequences resulting from alternatives, and comparison of each case. The importance of this model appears in its development and problem analysis. Once the problem is recognised, defined in terms that facilitate the creation of models, alternative solutions are shaped and created, models are then developed to analyse a variety of possible alternatives, and finally a choice is made to be implemented. Based on this concept, DMP has been designed as depicted in (Figure 2- 6)

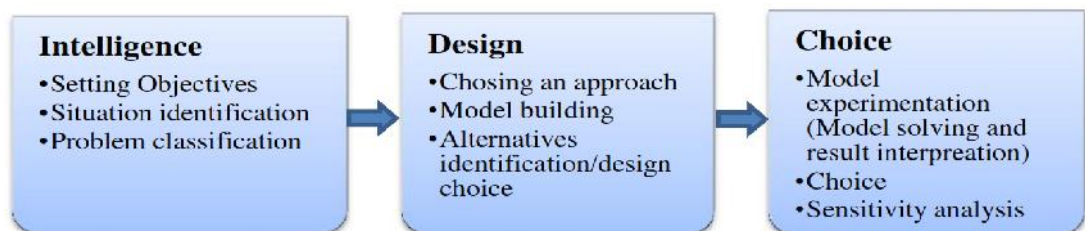


Figure 2-6: Decision Making Process (Source: Adapted from Simon, 1960)

Moreover, Nutt (1984) identified DMP within organisations as having five stages that decrease the number of alternatives that decision makers must face: formulation, concept development, detailing, evaluation and implementation. There are many DMP variables which might be affected by the use of computer-based systems (Leidner and Elam, 1993, 1995). This study chooses to examine three DMP variables used by these authors that have received considerable attention in recent development of theories on the impact of advanced information technology use on DM and are well grounded in organisational research. These variables are: Problem Identification Speed (PIS); DM Speed (DMS) and the Extent of Analysis in Decision Making (DMA).

Rapid DM has become more significant to organisations as the competitive environment has intensified and knowledge has become critical to organisational performance (Eisenhardt, 1989; Eisenhardt and Santos, 2002; Huber, 1990; Leidner and Elam, 1993, 1995). Recent changes in technology and fast communication tools have changed the amount of time required for decision makers to identify problems and to make quick decisions, as decision makers and managers are faced with situations which require them to make more decisions than ever before with faster reaction times (Eisenhardt and Santos, 2002; Leidner and Elam, 1993, 1995).

Nowadays, KMSs allow fast knowledge processing and analysis. Accordingly, their availability and use by employees may contribute to the DMP through faster identifications of problems and decision making itself. Leidner and Elam (1993, 1995) define the speed of problem identification as “the elapse in time from when a problem first arises and it is first noticed” and the speed of decision making as “the time when a decision maker recognises the need to make some decision, to the point in time when he or she renders judgment” (p. 142). Fredrickson and Mitchell (1984) express the meaning of analytic comprehensiveness as the extent of analysis in situation diagnosis, alternative generation, alternative evaluation and decision integration. Miller and Friesen (1980) define analysis as “the reflective thought and deliberation given to a problem and the array of proposed responses”. An analytic process example is “the time spent on interrelating symptoms to get at the root cause of problems and the effort spent to generate solutions” (Miller and Friesen, 1980).

According to Regan and Holtzman (1995), decision analysis can be considered as a carefully engineered consultation which starts with the definition of a decision problem at hand and ends with a commitment to a real action. The decision analysis process can be decomposed into three stages; *Formulation* of the decision model reflects the decision problem, i.e. generating alternatives and identifying evaluation criteria. *Evaluation* links computing the implications of the decision model, evaluating it using a formal decision method, and producing recommendations. *Appraisal* analyses the recommendations and presents the interpretation in a natural language form.

2.6.2 Decision-Making Processes and Knowledge Management Systems

DM is recognised as one of the most important roles of executives, and the availability of reliable knowledge sources is a key factor in the DMP. Sources of knowledge might be oral, written or computer based, such as KMSs. KMSs are designed to allow users to access knowledge relevant to job activities. The idea of using computer-based systems to support DM is not new, as the issue of how computer-based systems could be used to support DM developed under the name of DSS during the late 1970s (Leidner and Elam, 1993).

To a great extent, organisations become increasingly complex with an emphasis on decentralised DM, and this tendency leads them to use KMSs with DSSs for effective support and making successful decisions. Turban *et al.* (2010) point out that the DSS may include a knowledge component that can be used to support the DMP. Appropriate integration of DSSs and KMSs will not only support the required interaction but will also create and find new opportunities for improving the quality of support provided by each system (Bolloju *et al.*, 2002). However, Martinsons and Davison (2007) believe that the success of KMSs and IS in supporting the DMP will depend critically on how well IT applications are improved and adapted to fit the decision styles of their intended users. Thus, a global KMS and IS must have the flexibility to meet different decision styles and fit the DMP.

Bolloju *et al.* (2002), highlight some benefits of integrating both DSSs and KMSs, such as: enhancing the quality of support in real-time adaptive active decision support; supporting the acquisition, exploitation, creation and accumulation of knowledge in organisations; facilitating the discovery of patterns and trends in the accumulated knowledge; and supporting the means and tools for building up organisational memory. Turban *et al.* (2010) point out some benefits of using DSSs. They can provide support in all phases of the DMP and to all managerial levels for individuals, groups, and organisations. DSSs can improve the effectiveness of DM, decrease the need for training, improve management control, facilitate communication, save effort by the user, reduce costs, and allow for more objective DM. Moreover, DSSs can be used directly by managers, analysts or intermediaries. Bals *et al.* (2007) stress that technology merely provides the tools with which decision makers and users can leverage their knowledge in the context of their work. However, many organisations pursue KMSs initiatives with different degrees of success. Thus, how decision makers and users perceive the

technology and interact with it is assumed to play a major role in the success of KMS and DM initiatives.

2.6.3 Decision Making Processes and Knowledge Sharing

In this uncertain and vague world, the most important part of DM is to recognise and absorb the knowledge from the surrounding environments to structure and understand the unknown (Zheng *et al.*, 2010). DM is a fundamental activity for managers and as a result of the increase in its complexity, the issue of developing DM capabilities remains a challenge (Papamichail and Rajarm, 2007). In the DMP, decision makers combine different types of data, both internal and external, and different types of knowledge, tacit and explicit, which are available in a variety of forms throughout the organisation.

DMP may significantly affect an organisation's ability to create, hold, understand and utilise knowledge (Inkpen and Dinur, 1998). Bolloju *et al.* (2002) point out that KM and DMP are mutually dependent activities in many organisations. Similarly, Nemati *et al.* (2002) state that "knowledge provides the perceptual and conceptual filters which the decision maker uses to firstly select and organise data into information and then to use that information to support and inference, forecast or decision". Furthermore, Turban *et al.* (2010) believe that existing knowledge and expertise can often be used to accelerate DMP. It does not make sense to reinvent the wheel whenever a DM situation is encountered. The knowledge accumulated in organisations over time can be used efficiently to deal with similar situations or solve identical problems.

2.6.4 Implications of DMP in MNCs

The possibility of studying KS through using KMSs to support the DMP is greater in MNCs, as each MNC shares the best practice between branches all over the world and has systems that link all branches and departments to enable employees to readily share their knowledge, cases, training and enquiries. Recent trends in business such as globalisation and competition increase the need for fast and accurate DM, so the use of KMSs by MNC's employees has become a particularly important component of their DMP. Internationalisation and globalisation create a need to know how managers make decisions in different parts of the world, and how different KMSs can support the DMP (Martinsons and Davison, 2007). Bals *et al.* (2007) believe that technology merely

provides the tools which enable decision makers and users to leverage their knowledge in the context of their work. Nielsen and Michailova (2007) point out that over the past three decades, many MNCs have considered IT-based systems for the purpose of sharing, utilising and integrating knowledge; these KMSs are part of the agenda in many of today's leading MNCs. They are often attributed with increasing the flexibility of MNCs, responding faster to the current changing environment, improving DM and spurring greater innovation. Furthermore, the tendencies toward different DMPs in global organisations might hinder KS among MNC units (Martinsons and Davison, 2007). For example, managers who prefer to make decisions in dissimilar ways are unlikely to accept the best practices from others. Thus, global KMS tools must have the flexibility to accommodate different decision styles and DMP of their intended users.

2.7 ORGANISATIONAL CULTURE

KS is important in organisations and KM cannot be effective unless it is shared. As a result, there are plenty of tools available for KS, but their use requires a cultural change which some employees might be hesitant to make. Therefore, culture is an important factor and needs to be considered in KS because, although it can foster sharing and collaboration, it must be handled sensitively with respect to the natural resistance of people and the existing culture toward change inside organisations (Chong and Chong, 2009). Since the 1980s, OC has become a business phenomenon which helps organisations to adapt to the external environment and support OE (Daft, 2009; Denison 1990; Zheng *et al.*, 2010). Schein (2012) states that OC refers to shared basic assumptions, norms and values in the organisation. Moreover, it constitutes an environment where organisational activities can take place (Zheng *et al.*, 2010). Schein (1985, P.12) defines OC as “A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems”.

OC is a substantial source of competitive advantage and several empirical researchers have shown that it is a significant factor in OE (Barney, 1991; Gordon and DiTomaso, 1992; Wilkins and Ouchi, 1983; Zheng *et al.*, 2010). In particular, Denison and his colleagues identified and validated four dimensions of OC that are conducive to OE: adaptability, consistency, involvement and mission (Denison, 1990; Denison and

Mishra, 1995; Fey and Denison, 2003). The Denison model measures four critical traits of culture and each of these traits is further broken down into three indices; see (Figure 2-7).

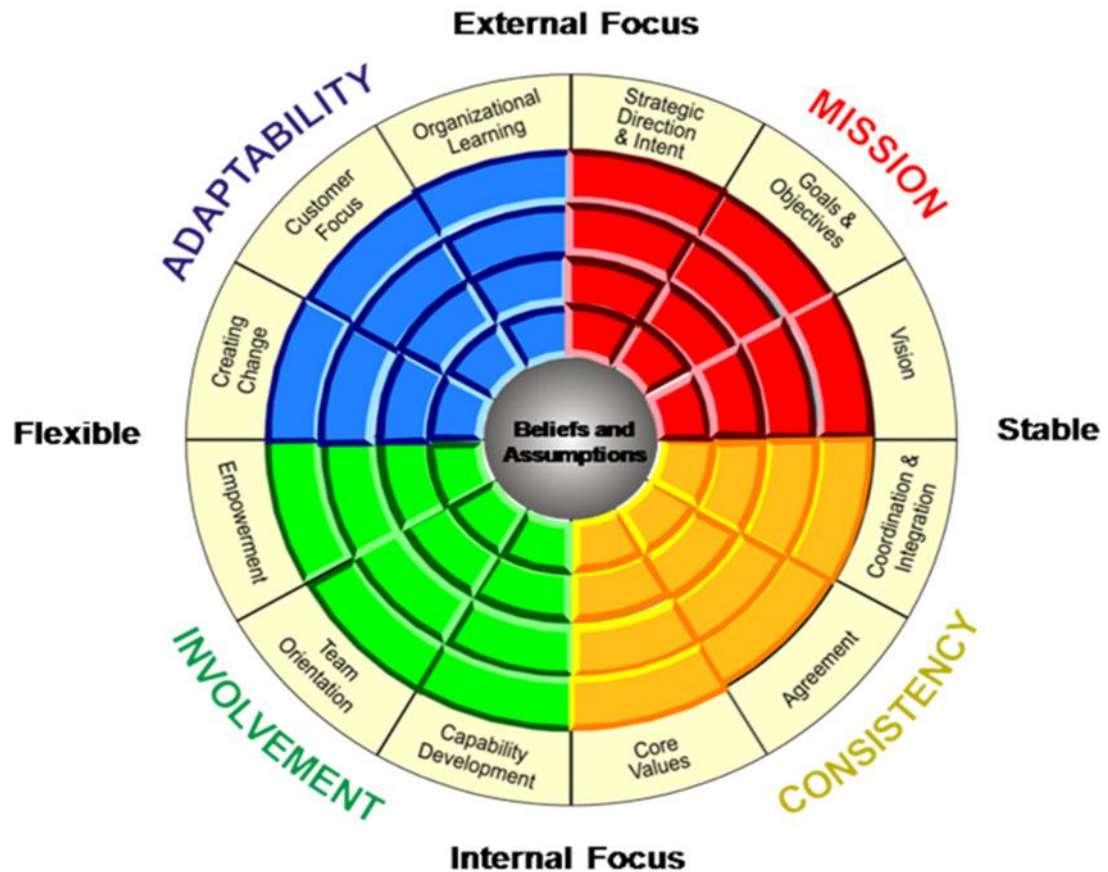


Figure 2-7: Denison Culture Model (Source: Fey and Denison, 2003)

Adaptability refers to “the degree to which an organisation has the ability to alter behaviour, structures, and systems in order to survive in the wake of environmental changes”. The indices of the adaptability trait are creating change; customer focus; and organisational learning. *Consistency* refers to “the extent to which beliefs, values, and expectations are held consistently by members”, and its indices are: coordination and integration; core values; and agreement. *Involvement* refers to “the level of participation by an organisation’s members in decision-making”; its indices are: empowerment; teamwork; and capability development. *Mission* refers to “the existence of a shared definition of the organisation’s purpose”, with indices strategic direction and intent; goals and objectives; and vision. In this research, this model of organisational culture was used to measure OC.

2.7.1 Implications on Knowledge Sharing and Knowledge Management

Systems

KM in organisations enhances communication and sharing between organisational members, and enriches the interpretation and the coordinating actions between them. Accordingly, a cooperative OC must be created in such organisations to allow effective KS and communication between employees (Courtney, 2001). OC that emphasises competition between employees may pose a barrier to KS while cooperation between teams helps in creating trust, which is an essential condition for KS (Schepers and Van den Berg, 2007; Wang, 2004; Wang and Noe, 2010; Willem and Scarbrough, 2006). OC may help enhance KS which may in turn reinforce the culture (Wang and Noe, 2010).

Nonaka *et al.* (2000) and Zheng *et al.* (2010) point out that knowledge is an outcome of OC because knowledge is created, made sense of, shared and utilised in accordance with a set of cultural values and norms embedded in structural relationships and reflected in strategic priorities. For example, KS practices are affected by cultural expectations, such as what knowledge should be shared within the organisation and what should be hoarded by individuals; by structural relationships such as how quickly the knowledge flows through formal reporting relationships; and by strategic priorities such as what knowledge is to be paid attention to and what is to be ignored (Zheng *et al.*, 2010). Moreover, Lin and Lee (2006) found that the advantages of KS for business are as mediators between OC and the organisation's intention to encourage KS. Taylor and Wright (2004) say that there is a positive relationship between the climate of an organisation that encourages new ideas and focuses on learning from failure, and effective KS. Furthermore, many researchers acknowledge the importance of OC for the long-term success of KM and KS (Bock *et al.*, 2005; Collins and Smith, 2006; Connelly and Kelloway, 2003; Wang and Noe, 2010).

Research has shown that organisations with cultures emphasising innovation are more likely to use KMSs and facilitate KS through subjective norms that encourage sharing (Bock *et al.*, 2005; McKinnon *et al.*, 2003; Ruppel and Harrington, 2001; Wang and Noe, 2010). Alavi *et al.* (2006) emphasise the importance and the influence of culture on the use of KMSs and the outcomes of such use; they examine the culture values and KM approaches by using a case study method in a large global information services company. They stress that "any differences in cultural values within firms will lead to divergent organisational and individual outcomes from KM system use". KMSs do not

solve problems, but through the structure of the OC, KMSs can be directly integrated into a firm's business processes to provide help in solving problems by applying knowledge and sharing best practices (Turban *et al.*, 2010). In turn, organisational knowledge reflects the cultural characteristics of the organisation and this knowledge is shared and utilised to enhance OE (Fey and Denison, 2003; Nonaka *et al.*, 2000; Zheng *et al.*, 2010). However, OC alone may be insufficient to facilitate KS, as it is important to design KM initiatives that link KS to organisational goals and values (McDermott and O'Dell, 2001; Wang and Noe, 2010).

2.7.2 Implications of Organisational Culture in MNCs

Culture is one of the factors that can have an impact on KS in MNCs, like the cultural distance between the headquarters' and subsidiaries' "organisational culture". In this context, Hofstede (1980) studies clearly show the influence and importance of this factor on international business. Most MNCs have different sets of practices and policies that show idiosyncratic differences in OC; these cultures are based on the beliefs, duties and assumptions that the executives have on their way of managing and dealing with their employees (Wang and Noe, 2010). Moreover, competitive advantage in MNCs depends not only on existing knowledge but also on OC, systems, policies and practices to accumulate, integrate and share organisational knowledge within the organisational boundaries (Michailova and Minbaeva, 2012; Minbaeva *et al.*, 2003). Wang and Noe (2010) suggest that MNCs need to pay close attention to cultural issues in developing organisational practices and global systems that will facilitate KS as there is no single universal set of practices that can be used to facilitate KS in global and MNCs.

2.8 ORGANISATIONAL EFFECTIVENESS

KS across organisations' units is a critical driver of a firm's performance, especially in MNCs (Ghoshal and Bartlett, 1994; Inkpen and Dinur, 1998; Prahalad and Hamel, 1990). OE is the degree to which an organisation realises its goals, as the ultimate goal of any organisation is to achieve a high level of OE (Daft, 2009; Zheng *et al.*, 2010). Argote and Ingram (2000) state "It is what the organisation comes to know that explains its performance". Zheng *et al.* (2010) highlight the importance of KM and remark that "how well knowledge is managed contributes to organisational effectiveness". Moreover, research has shown that knowledge management strategies are positively

related to an organisation's performance. For example, decisions based on KM can help organisations in reducing costs, elaborating products and services, improving team performance, encouraging innovation capabilities and increasing sales and revenue from new products and services. However, not all organisations succeed in gaining benefits from KMSs, as at least \$31.5 billion are lost per year by Fortune 500 companies as a result of failing to share knowledge (Wang and Noe, 2010). Moreover, Jennex *et al.* (2008) measure the success of KMSs as outcomes in terms of organisational performance: product and service quality, productivity, innovative ability and activity, competitive capacity and position in the market, proximity to customers and customer satisfaction, employee satisfaction, communication and KS, and knowledge transparency and retention.

Measuring OE is difficult because each organisation has various and fragmented activities that pursue multiple goals (Daft, 2009). Ellinger *et al.* (2002) have identified two different perspectives regarding OE: an objective perspective and a perceptual perspective. The *objective perspective* involves financial measures such as return on investment (ROI), return on equity (ROE) and return on assets (ROA). Banker *et al.* (2004) and Kaplan and Norton (2001) criticise using objective financial measures in assessing OE because they do not reflect the company's skills and competencies that organisations are striving to master today. The *perceptual perspective* includes employees' perceptions of how effective the organisation is compared to its most significant competitors in achieving goals such as market share, profitability, sales growth, employee satisfaction, quality of products and/or services and new product development (Deshpande *et al.*, 1993; Lee and Choi, 2003; Mcadam and Bailie, 2002).

2.8.1 Implications of Organisational Effectiveness in MNCs

MNCs have a significant advantage in having employees from different nationalities and backgrounds, who contribute to OE through their different knowledge and expertise. Mäkelä *et al.* (2012) believe that the existence of MNCs is closely related to their ability to take advantage of differences in knowledge and expertise around the world in terms of exploiting existing repositories of knowledge and combining them to create new knowledge. Furthermore, Montazemi *et al.* (2012) emphasise that the effective sharing of organisational knowledge is particularly relevant for MNCs, as organisations' knowledge is considered a significant source of competitive advantage in their global

strategy. Therefore, in order to succeed in the global information society, MNCs need to identify, evaluate, create, evolve and develop their knowledge assets since knowledge is one of their meaningful economic resources (Metaxiotis *et al.*, 2003).

The performance of MNCs depends mainly on their ability to coordinate geographically dispersed knowledge resources. Knowledge represents a strategic importance for MNCs, which should be shared effectively and efficiently throughout subsidiaries to generate improved products and better services (Montazemi *et al.*, 2012).

2.9 PRIOR RESEARCH AND KNOWLEDGE GAP

This section covers prior work in the area of this study and highlights the potential contributions of this research. Exploring and investigating “How KMSs can facilitate KS among different MNCs’ units to support the DMP” has not received significant attention in the literature and there are few empirical studies on this particular research issue.

The past decade has nevertheless shown an explosive growth in research on knowledge and knowledge management in the fields of economics, management and information systems (Alavi *et al.* 2006; Alavi and Leinder, 2001). Alavi and Leinder (2001) review the KM literature through different lines of research by shifting the centre of attention toward identifying the key areas for research; they focus on the role of IS in the process of KM in organisations. They discuss previous research and discuss the role of IS and its support for KM processes and suggest that “there is a little research regarding the analysis, integration and implementation of different types of KMSs and the potential benefits of these systems to organisations”. Moreover, Carton and Adam (2005) recommend researchers to do more on the role and impact of IT-based systems on DM. Likewise, O’Donnell and David (2000) suggest that researchers should put more effort into studying how IT-based systems influence decisions. Bolloju *et al.* (2002) draw attention to the fact that researchers in the fields of DSSs and KMSs have not effectively considered the combination of such systems and the interdependencies between knowledge creation, KS and DMP.

The KMSs knowledge sources remain the least studied in the context of DMP. Moreover, Choi *et al.* (2010) say that little is known of the precise role of KMSs on KS, which in turn influences organisational performance. Furthermore, Nag and Gioia (2012)

suggest a need to understand how key decision makers utilise knowledge in their organisations by using what they know and seeking out what they don't know to guide the creation of unique knowledge-based competencies. Monteiro *et al.* (2008), state that over the last several years there has been widespread concern among scholars regarding the importance of knowledge management in organisations and particularly in MNCs (Eisenhardt and Santos, 2002; Ghoshal and Bartlett, 1988; Gupta and Govindarajan, 2000; Schulz, 2001, 2003; Szulanski, 1996; Zander and Kogut, 1995).

On the other hand, Alavi *et al.* (2006) are more concerned about the issue of OC in knowledge management studies: “although many studies raise the issue of organisational culture's influence on knowledge management success, few investigate the way in which this influence manifests itself”. Wang and Noe (2010) state that more research is needed to understand how KS can be promoted and how such culture can affect the dynamics of KS among employees and teams.

Moreover, more studies are needed regarding how cultural differences affect KS in the emerging economies of Africa, the Middle East and South America, as the majority of studies have been carried out in Western countries; non-Western influences on KS have been conducted on the Chinese culture. Several studies have examined the effect of OC on KMSs and KS. For example, David *et al.* (2000), in their qualitative study of fifty companies, found that the benefits of a new technology infrastructure were limited if practices and long-standing organisational values were not supportive of KS across units. Moreover, OC has been linked with the implementation of KMSs, individual KS, and organisations' capability of KS and combination (Chiu *et al.*, 2006; Collins and Smith, 2006; Liao, 2006; Ruppel and Harrington, 2001; Wang and Noe, 2010; Willem and Scarbrough, 2006).

Wang and Noe (2010, p.126) point out that “Qualitative studies provide a rich and in-depth examination of the organisational context in which knowledge sharing occurs. More qualitative research that focuses on specific issues is needed to help us better design quantitative studies”. It is important also to know that most of the quantitative studies of KS suffer from significant limitations. First, the majority of studies measured KS using either willingness or intention to share knowledge. Second, most of the studies were based on questionnaires completed by a single source or country during a single time period. These limitations do not allow researchers to explore KS in different

regions and rule out possible alternative explanations for significant results. (Table 2-6) summarises a sample of studies relating to this research.

Table 2-6: Summary of Related Studies

Titles	Author(s)	Sample	Data collection method(s)	Linkages between variables					Main findings
				OC	KMSs	KS	DMP	OE	
Organisational values and knowledge sharing in multinational corporations: The Danisco case	(Michailova and Minbaeva, 2012)	219 participants	Questionnaire						KS does not occur automatically, it may require substantial organisational efforts aimed at encouraging close relationships between organisations' members
From common to uncommon knowledge: foundations of firm-specific use of knowledge as a resource	(Nag and Gioia, 2012)	53 participants	Semi-structured interviews						Knowledge is a critical resource in organisations that can transform common knowledge into uncommon knowledge through KS, which will affect organisations effectively
The impact of information technology and transactive memory systems on knowledge sharing, application, and team performance: a field study	(Choi <i>et al.</i> , 2010)	743 participants	Questionnaire						IT support has a positive impact on the development of KMSs in the organisation, and both KMSs and IT support have a positive impact on KS and knowledge applications. Furthermore, KS has a positive impact on knowledge applications, which in turn has a direct impact on organisational performance
Linking organisational culture, structure, strategy, and organisational effectiveness: Mediating role of knowledge management	(Zheng <i>et al.</i> , 2010)	384 participants	Questionnaire						Practices of KM are context specific and influence OE. OC (adaptability, consistency, mission, and involvement) relates positively with OE. Moreover, KS fully mediates the impact of OC on OE.
Motivating knowledge sharing through a knowledge management system	(King and Marks, 2008)	169 participants	Questionnaire						PRE and PRU of using KMSs have significant impact on KS more than organisational support and should be considered as important element in promoting KS through using KMSs

Titles	Author(s)	Sample	Data collection method(s)	Linkages between variables					Main findings
				OC	KMSs	KS	DMP	OE	
Knowledge Flows within Multinational Corporations: Explaining Subsidiary Isolation and its Performance Implications	(Monteiro <i>et al.</i> , 2008)	171 participants	Questionnaire						KS provides opportunities to improve MNCs performance and the improved performance provides slack resources for KS. KS between MNCs units are a real priority and should therefore be the focus of far more attention than they have received to date
Organisational culture and knowledge sharing: critical success factors	(Al-Alawi <i>et al.</i> , 2007)	231 participants	Questionnaire and interviews						The research findings indicate that trust, communication, information systems, rewards and organisation structure are positively related to KS in organisations
Strategic decision making and support systems: Comparing American, Japanese and Chinese management	(Martinsons and Davisonb, 2007)	309 participants	Questionnaire						The success of KMSs and IS in supporting DMP will depend critically on how well IT applications are improved and adapted to meet the decision styles of their users. A global KMSs and IS must have the flexibility to meet different decision styles and fit DMP
Knowledge Management Systems in Multinational Corporations: Typology and Transitional Dynamics	(Nielsen and Michailova, 2007)	180 participants	Semi-structured interviews, secondary data and questionnaire						Most MNCs adopt the same type of KMSs for relatively long periods of time. Organisational structure, KS, staffing, training and reward systems affect KMSs used in MNCs. OC and some other relevant organisational factors are influencing KMSs design and implementation as well

Titles	Author(s)	Sample	Data collection method(s)	Linkages between variables					Main findings
				OC	KMSs	KS	DMP	OE	
Actions to overcome knowledge transfer barriers in MNCs	(Riege, 2007)	60 participants	In-depth interviews						To overcome several barriers of KS in MNCs, senior and middle managers should recognise the human, organisational, and technological challenges of newly introduced actions. KS between employees as well as organisational units often form a key component of KMSs and can create significant short-term and long-term operational and learning benefits
A Knowledge Management Success Model: Theoretical Development and Empirical Validation	(Kulkarni <i>et al.</i> , 2006)	150 participants	Questionnaire						Organisation must pay careful attention to support and set goals as well as design adequate reward systems for KS in addition to KMSs quality
Measuring KMS success: A respecification of the DeLone and McLean's model	(Wu and Wang, 2006)	204 participants	Questionnaire						KMSs quality, knowledge quality and perceived benefits have a significantly positive influence on user satisfaction. In addition, user satisfaction and perceived KMSs benefits had a direct effect on KMSs use.
Contributing knowledge to electronic knowledge repositories: An empirical investigation	(Kankanhalli <i>et al.</i> , 2005)	150 participants	Questionnaire						OC supports KS by using KMSs through different rewards and incentives policies
Knowledge Management Enablers, Processes, and Organisational Performance: An Integrative View and Empirical Examination	(Lee and Choi, 2003)	426 participants	Interviews and Questionnaire						A model was developed in this study that interconnects KM factors such as: collaboration, trust, learning, centralisation, formalisation and IT support. This model reflects the importance of IT support which has a positive impact on KMSs and KS. OC is critical in improving organisational performance

Titles	Author(s)	Sample	Data collection method(s)	Linkages between variables					Main findings
				OC	KMSs	KS	DMP	OE	
Knowledge management impacts on decision making process	(Nicolas, 2004)	351 participants	Interviews						Each KMSs has impact on the DMP and its impact depends on the KMSs used. Therefore, organisations have to match the suitable KMSs with DMP
The use of computer-based information systems by German managers to support decision making	(Vlahos <i>et al.</i> , 2004)	117 participants	Questionnaire						There is a significant correlation between the frequency of using CBIS and the perceived value of the CBIS in supporting DMP
Transfer of knowledge in knowledge management systems: unexplored issues and suggested studies	(Huber, 2001)								OC affect the behaviour of knowledge workers in forming and adhering knowledge seeking, KS, and using knowledge in the context of a KMSs
Exploring Perceptions of Organisational Ownership of Information and Expertise	(Jarvenpaa and Staples, 2001)	1935 participants	Questionnaire						Technology has enabled KS to become more fluid and abundant within and outside the organisational unit. OC related to pursue shared objectives and need for achievement lead to great levels of KS

Titles	Author(s)	Sample	Data collection method(s)	Linkages between variables					Main findings
				OC	KMSs	KS	DMP	OE	
Diagnosing cultural barriers to Knowledge Management	(David <i>et al.</i> , 2000)	12 participants	Interviews						The benefits of a new technology infrastructure will be limited if practices and long standing organisational values are not supportive of KS across organisational units. The level of trust that exists between the organisation, its subunits, and its employees greatly influences the amount of knowledge that flows both between individuals and from individuals into the firm's databases, best practices archives and other records. OC that discourage open and frank exchanges between levels in the hierarchy create a context for communication that undermines effective KS.
Toward a Theory of Organisational Culture and Effectiveness	(Denison and Mishra, 1995)	764 participants	Questionnaire and Case studies						OC traits: involvement, consistency, adaptability and mission indicate that these dimensions are positively related to perceptions of OE. Moreover, OC is found to be measurable and to be related to important organisational outcomes
The Impact of Executive Information Systems on Organisational Design, Intelligence, and Decision Making	(Leidner and Elam, 1995)	91 participants	Survey questionnaire						Using EIS frequently and over time are positively related to perceived problem identification and DM speed. The frequency of using EIS is shown to be related to a perceived increase in information availability. Moreover, the use of EIS does not reduce the reliance of senior or middle managers on their subordinates to help in DM

2.9.1 Originality of Research and Contribution

This research contributes to our understanding of KS in different fields, by reviewing and integrating the literature from several different disciplines to investigate how KS with KMS supports the DMP in MNCs. Generally, based on this review, we can conclude that there is a substantial body of literature that discusses how KMSs can be used to facilitate KS (e.g: Al-Alawi *et al.*, 2007; Riege, 2007; Choi *et al.*, 2010; Huber, 2001; Kankanhalli *et al.*, 2005; Kulkarni *et al.*, 2006; Lee and Choi, 2003; Nielsen and Michailova, 2007) and DMP (e.g: Al-Alawi *et al.*, 2007; Carton and Adam, 2005; Leidner and Elam, 1995; Martinsons and Davison, 2007; Nicolas, 2004; O'Donnell and David, 2000; Vlahos *et al.*, 2004). Furthermore, relating to this area of research, the literature on MNCs has focused on those factors that influence the effectiveness of intra-MNCs KS, KMSs dynamics, and the relationship between sender and receiver (Eisenhardt and Santos, 2002; Gupta and Govindarajan, 2000; Michailova and Minbaeva, 2012; Minbaeva, 2007; Minbaeva *et al.*, 2003; Szulanski, 2000).

Moreover, there is a gap in the literature regarding the use of KMSs in supporting the DMP, especially in MNCs, that requires further research. For example, Riege (2007) argues that whilst recent research in the management domain presents an extensive overview of possible KS enablers and barriers, there is very little empirical evidence that suggests likely managerial actions or gives evidence about how to overcome KS barriers and support KS enablers. Accordingly, the area of KS among geographically distributed subsidiaries of MNCs and diversified employees through using KMSs to support DMP has not been thoroughly explored. Thus, although several studies relating to KS have been conducted in information systems, organisational science, decision making, international business and organisational effectiveness, no one study covering all these different disciplines has been conducted to date.

Consequently, there is a scarcity of empirical studies on this particular research issue and the question of “*what are the factors that affect KS by using KMSs to support DMP in MNCs*” has not received sufficient attention. Further research is required to enhance our understanding in this important area of knowledge management. This research will extend existing theoretical models used to frame and analyse the value of using KMSs and domains of KS and DMP in MNCs. Thus, this is the primary concern of this research, to expand our understanding of the role that KMSs actually play in KS to support the DMP in MNCs.

This line of research will focus on the general principles of building/creating and implementing KMSs in MNCs. The study will add to the existing literature by linking knowledge-related features to the DMP in MNCs. Specifically, it will provide a conceptual model for KS by using KMSs to support the DMP and OE in MNCs including KMS-related characteristics and the factors influencing KS in MNCs. Subsequently, through the advent of the knowledge economy and the increasing size of knowledge societies, the new conceptual model will help managers in MNCs to find new ways of leveraging and sharing knowledge to support their DMP. The beneficiaries of this research are both academics and practitioners.

2.10 CONCLUSION

The theories, literature review and prior studies presented above summarise the dominant themes in literature regarding OC, KS, KMSs, DMP and OE. Taken together, these reviews suggest the need for a more concentrated focus on the use of KMSs in KS and DMP and, specifically, a more integrated consideration of the factors affecting KS by using KMSs like OC to support DMP in MNCs. To this end, the current literature review offers only a narrow insight into the question of “what are the factors that affect KS by using KMSs to support DMP in MNCs”. In conclusion, the literature review presented in this chapter helped in refining the objectives and questions of the research, highlighting research possibilities that have been overlooked to date, discovering explicit recommendations for further research, avoiding repetition of existing work, gaining insights into aspects of the research question and objectives, and providing an insight into the research methodologies, approaches, and strategies that may be appropriate to this study. The next chapter discusses the selected methodology for this research.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter explains the selection of an appropriate methodology to answer the research question and achieve the research objectives. It outlines the research philosophy, design, strategy and methods chosen for this study along with the reasoning behind the choice. A brief overview of the methods used is presented. However, this chapter does not go into detail on the specific methods utilised, as these methods are described in full in Chapters 4, 5 and 6.

3.2 RESEARCH PHILOSOPHY

Research philosophy refers to the method of developing knowledge and the nature of that knowledge in a particular field. It makes important assumptions regarding the way in which researchers view the world. These assumptions support and guide the selection of the research strategy and the methods applied as part of that strategy (Johnson and Clark, 2006). Saunders *et al.* (2009, p.108) note that “the important issue is not so much whether our research should be philosophically informed, but it is how well we are able to reflect upon our philosophical choices and defend them in relation to the alternatives we could have adopted”.

There are different types of research philosophy: positivism, realism, interpretivism and pragmatism. This section focuses on the pragmatist’s philosophy, as other research philosophies are beyond the scope of this study. However, a brief comparison between these research philosophies is presented in (Table 3-1), based on ontology, epistemology, axiology and data collection techniques.

Table 3-1: Comparison between Research Philosophies

Research Philosophy	Ontology: the researcher's view of the nature of reality or being	Epistemology: the researcher's view regarding what constitutes acceptable knowledge	Axiology: the researcher's view of the role of values in research	Data collection techniques: most often used
Positivism	External, objective and independent of social actors	Only observable phenomena can provide credible data, facts. Focus on causality and law like generalisations, reducing phenomena to simplest elements	Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Highly structured, large samples, measurement, quantitative, but can use qualitative
Realism	Is objective. Exists independently of human thoughts and beliefs or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations which are open to misinterpretation (critical realism). Focus on explaining within a context or contexts	Research is value laden; the researcher is biased by world views, cultural experiences and upbringing. These will impact on the research	Methods chosen must fit the subject matter, quantitative or qualitative
Interpretivism	Socially constructed, subjective, may change, multiple	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective	Small samples, in-depth investigations, qualitative
Pragmatism	External, multiple, view chosen to best enable answering of research question	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data	Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view	Mixed or multiple method designs, quantitative and qualitative

(Source: Adapted from Saunders *et al.*, 2009)

Pragmatism is “a position that argues that the most important determinant of the research philosophy adopted is the research question, arguing that it is possible to work within both positivist and interpretivist positions. It applies a practical approach, integrating different perspectives to help collect and interpret data” (Saunders *et al.*, 2009, p.598). Such work can help develop rich insights into various phenomena of interest that cannot be totally understood using only a qualitative or a quantitative method. Pragmatism considers real effects and practical consequences to be vital components of meaning and truth (Venkatesh *et al.*, 2013).

Although a qualitative approach is mainly based on induction and a quantitative approach on deduction, a pragmatic paradigm is based on abductive reasoning that combines both induction and deduction, supporting the use of both qualitative and quantitative methods in the same study (Creswell, 2009; Howe, 1988; Maxcy, 2003; Tashakkori and Teddli, 2002). Qualitative research is a means for exploring and understanding the meaning individuals or groups experience via social or human problems. The process of research involves emerging questions and procedures, data typically collected in the participant’s setting, data analysis inductively built from particulars to general themes, and the researcher making interpretations of the meaning of data (Creswell, 2009). This method is often associated with inductive reasoning. On the other hand, quantitative research is a means for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured typically on instruments, so that the numbered data can be analysed using statistical procedures (Creswell, 2009). This method is often associated with deductive reasoning. Maxcy (2003) stated that the mixed-methods movement has obvious pragmatist roots. The pragmatist approach can present a practical and applied research philosophy (Venkatesh *et al.*, 2013), and pragmatism is the best paradigm for justifying the use of mixed-methods research (Datta, 1994; Howe, 1988; Teddlie and Tashakkori, 2008). Thus, it can be argued that the pragmatism can be adopted for this study, which is consistent with using a mix-methods approach of both qualitative and quantitative research.

3.3 RESEARCH DESIGN

Cooper and Schindler (2003) define the research design as “a plan of the research project to investigate and obtain answers to research questions”. The research design helps to clarify the boundaries of the study, which consists of defining the setting of the study, type of investigations to be used, the unit of analysis and further issues related to the research. The diversity of research methods employed in information systems (IS) studies can be considered as a major strength; they can be broadly categorised into two: *quantitative and qualitative* (Lee and Hubona, 2009; Myers and Avison, 2002; Sidorova *et al.*, 2008). Mingers (2001) stated that a limited amount of IS research has employed methodological pluralism. Venkatesh *et al.* (2013, p.22) confirmed that “although the current state of methodological diversity in IS research is encouraging, there is a dearth of research in IS that employs a mixed-methods approach (i.e., use of both qualitative and quantitative methods in a single research inquiry) that builds on a common scientific basis essential to advance and sustain the tradition of methodological diversity in IS research and to create a cumulative body of knowledge”. However, the decision to conduct mixed-methods research should hinge on the research question, purpose and context (Creswell, 2009; Myers and Klein, 2011; Venkatesh *et al.*, 2013). Tashakkori and Teddlie (2002) describe mixed-methods research as a design that uses multiple methods in a research inquiry. It can involve more than one research method or more than one world view (i.e. qualitative or quantitative approaches). Creswell (2009) defines mixed-methods research as “an approach to inquiry that combines or associates both qualitative and quantitative forms. It involves philosophical assumptions, the use of qualitative and quantitative approaches, and the mixing of both approaches in a study”.

Mixed-methods research has been termed as the third methodological paradigm, with quantitative and qualitative methods which represent the first and second paradigms respectively (Teddlie and Tashakkori, 2008). Tashakkori and Creswell (2008) suggest the use of the mixed-methods approach if it will help in finding theoretically plausible answers to the research question and assist in overcoming the cognitive and practical barriers associated with conducting this type of research. Venkatesh *et al.* (2013) recommended researchers to use mixed methods when: it is appropriate for the study; the researcher can discover and develop integrative findings from it; and the researcher is able to validate it. Moreover, researchers have to handle substantial cultural, cognitive,

physical and paradigmatic challenges to be able to employ mixed-methods research properly (Mingers, 2001).

Creswell and Clark (2007) suggested four main types of mixed-method design: *triangulation* (through merging qualitative and quantitative data to understand a research problem); *embedded* (through using either quantitative or qualitative data to answer a research question within a largely qualitative or quantitative study); *explanatory* (through using qualitative data to explain quantitative results); and *exploratory* (through collecting quantitative data to test and explain a relationship found in qualitative data).

Venkatesh *et al.* (2013) summarised seven reasons for mixed-methods research that were adapted from prior research (Creswell, 2009; Greene *et al.*, 1989; Tashakkori and Teddlie, 2008). These are: complementarity, completeness, development, expansion, corroboration/confirmation, compensation, and diversity (see Table 3-2).

Table 3-2: Purposes of Mixed-Methods Research

Purpose	Description
Complementarity	Mixed-methods are used in order to gain complementary views about the same phenomena or relationships.
Completeness	Mixed-methods designs are used to make sure a complete picture of a phenomenon is obtained.
Developmental	Questions for one strand emerge from the inferences of a previous one (sequential mixed-methods), or one strand provides hypotheses to be tested in the next one.
Expansion	Mixed-methods are used in order to explain or expand upon the understanding obtained in a previous strand of a study.
Corroboration/Confirmation	Mixed-methods are used in order to assess the credibility of inferences obtained from one approach (strand).
Compensation	Mixed-methods enable compensating for the weaknesses of one approach by using the other.
Diversity	Mixed-methods are used with the hope of obtaining divergent views of the same phenomenon.

(Source: Adapted from Venkatesh *et al.*, 2013)

Furthermore, different reasons for conducting mixed-methods research are suggested in the IS literature. First, it can address exploratory and confirmatory research simultaneously (Teddlie and Tashakkori, 2008). For example, Walsham (2006) highlighted that qualitative methods have been employed in IS research and other social sciences for exploratory research with the aim of understanding a phenomenon and/or

generating new theoretical insights inductively. Venkatesh *et al.* (2013) also stated that quantitative methods have typically been used in theory-testing rather than in IS for confirmatory studies.

Second, mixed-methods research offers stronger inferences than a single method (Teddlie and Tashakkori, 2008). For example, Greene and Caracelli (1997) suggested that it can offset the weaknesses that a certain single method has by considering and combining inferences from both quantitative and qualitative studies together. Johnson and Turner (2003) stressed that mixed-methods research can leverage the strengths of both quantitative and qualitative methods, and provide greater insights into a phenomenon than each method can provide individually.

Third, mixed-methods research offers an opportunity for accommodating a greater assortment of contradictory and/or complementary findings (Teddlie and Tashakkori, 2008). Venkatesh *et al.* (2013) explained that contradictory findings not only enhance our understanding of a phenomenon but also help us assess its limitations or interrelations among its components, opening new opportunities for future investigations. Complementary findings are equally valuable in providing a holistic view of a phenomenon and supplementary insight into relationships among its components.

Additionally, Bryman (2006) presented the motivations for using a mixed-methods research approach (see Table 3-3).

Table 3- 3: Motivations for Using Mixed-Method Designs

Reason	Explanation
Triangulation	Use of two or more independent sources of data or data collection methods to corroborate research findings within a study
Facilitation	Use of one data collection method or research strategy to aid research using another data collection method or research strategy within a study
Complementarity	Use of two or more research strategies in order that different aspects of an investigation can be dovetailed
Generality	Use of independent source of data to contextualise main study or use quantitative analysis to provide sense of relative importance
Aid interpretation	Use of qualitative data to help explain relationships between quantitative variables
Study different aspects	Quantitative to look at macro aspects and qualitative to look at micro aspects
Solving a puzzle	Use of an alternative data collection method when the initial method reveals unexplainable results or insufficient data

(Source: Adapted from Bryman, 2006)

Building on the above discussion, pragmatism is the most suitable research paradigm for this study, because it can help in developing rich insights into various phenomena of interest that cannot be totally understood using only a qualitative or a quantitative method, as both points of view are needed: subjective (identify the factors that affect KS by using KMSs to support the DMP) and objective (examine the influence and the impact of these factors). Moreover, the pragmatist approach can present a practical and applied research philosophy that can integrate different perspectives to help collect data (by semi-structured interviews and questionnaire) and interpret it (by thematic analysis and structural equation modelling). The mixed-methods approach is used in this study because it can help in finding theoretically plausible answers to the research question and assist in overcoming the cognitive and practical barriers associated with conducting this type of research (especially in MNC units which have different language, cultures, KMSs, etc). Abductive reasoning that combines both induction and deduction is needed in this study. The mixed-methods approach enables the researcher to discover and develop integrative findings which can be validated.

The reasons for conducting mixed-methods research in this study are therefore *developmental*, and a *sequential exploratory mixed-methods strategy* is suitable, as it can address exploratory (qualitative) and confirmatory (quantitative) research sequentially. It can leverage the strengths of both quantitative and qualitative methods, and offset the weaknesses of a single method (semi-structured interviews or survey).

3.4 RESEARCH STRATEGY

Mixed-methods research associated with the pragmatic paradigm can use both quantitative and qualitative research methods either independent of each other (concurrently), or where the findings from one approach inform the other (sequentially) to understand a phenomenon of interest in a manner that best addresses the research question (Creswell, 2009). Similarly, Venkatesh *et al.* (2013) maintain that, regardless of the type of research design used, the key characteristic of mixed-methods research is the concurrent or sequential combination of qualitative and quantitative methods within a single research inquiry. Denzin and Lincoln (2005) suggested that questions regarding research methods are of secondary priority to the questions regarding which paradigm is applicable to the study. Guba and Lincoln (1994) also noted that “both qualitative and quantitative methods may be used appropriately with any research paradigm. Questions

of method are secondary to questions of paradigm, which we define as the basic belief system or world view that guides the investigation, not only in choices of method but in ontologically and epistemologically fundamental ways”.

Therefore, understanding the purposes for which mixed methods are deemed appropriate is important for three reasons, as highlighted by Venkatesh *et al.* (2013). *First*, unlike qualitative and quantitative approaches, a mixed-methods approach is typically not a natural methodological choice in social and behavioural sciences. *Second*, an explicit delineation and/or recognition of these purposes by researchers employing a mixed-methods approach may help the reader better understand the goals and outcomes of the study. *Third*, an unambiguous understanding of mixed-methods research purposes will help researchers make informed decisions about the design and analysis aspects of a mixed-methods inquiry.

3.5 RESEARCH METHODOLOGY

The research methodology refers to the systematic, focused and orderly collection of data in order to meet the objectives of the research (Gronhaug and Ghauri, 2002).

In order to answer the research question and to achieve the research objectives, both inductive and deductive reasoning were combined in this study. Also, because of the absence of theory and the fragmented empirical knowledge on the research subject, the study began with inductive reasoning, followed by deductive reasoning. As described by Creswell (2009), a sequential exploratory mixed-methods strategy was used in this study, which involved a first phase of qualitative data collection (semi-structured interviews) and analysis, followed by a second phase of quantitative data collection (survey) and analysis that builds on the results of the first phase. Regarding the time horizons of the study, this research can be considered as a cross-sectional study, as it was conducted to investigate a particular phenomenon at a particular time. Building on the above discussion, Figure 3-1 summarises the research methodology of this study.

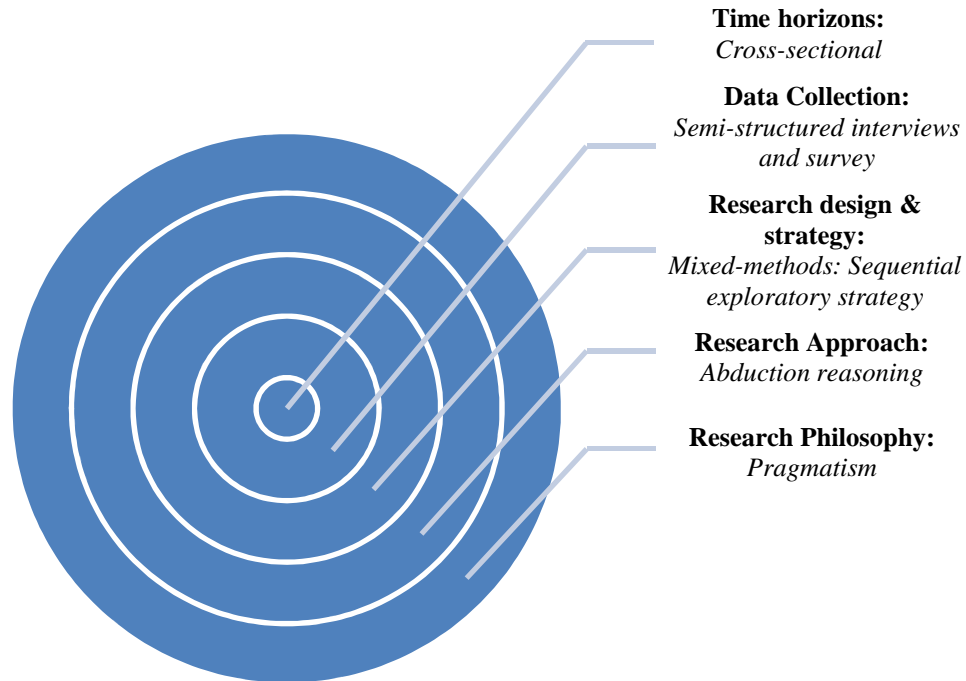


Figure 3-1: The Research Methodology

As a result, Creswell and Clark (2007) identify three types of research design: exploratory, descriptive and causal or explanatory design. In the first stage of this research, the exploratory research was conducted to identify and understand related information regarding the research objectives, and to develop hypotheses. The final constructs and hypotheses were based on the literature review and the qualitative study, as reported in Chapter 5.

3.6 CONCLUSION

In order to investigate the research question and achieve the research objectives, the pragmatist research philosophy was adopted, using an exploratory approach with mixed methods. In the first stage of data collection, an inductive approach was adopted to explore and understand the research area, using semi-structured interviews; this was followed by a deductive approach to test the conceptual model through a survey. A full explanation and breakdown of the semi-structured interviews and questionnaire design will be provided in the respective chapters. The research strategy, data collection process and procedures for data analysis for both qualitative and quantitative stages are presented in chapter four and chapter six respectively.

CHAPTER FOUR: DATA COLLECTION AND QUALITATIVE ANALYSIS

4.1 INTRODUCTION

This chapter describes the exploratory research and the qualitative part of this study; its purpose is to provide readers with a rich overview of the procedures carried out during this stage of data collection and analysis. The chapter begins with a brief summary about exploratory research, followed by the semi-structured interview process for data collection along with a general description of the sample, followed by the interview process. A detailed discussion regarding the thematic analysis follows, outlining the steps in analysing the data. The conceptual framework is presented and each theme is thoroughly explained, followed by the results, reliability, validity, and ending with conclusions.

4.2 EXPLORATORY RESEARCH

This qualitative study complements the quantitative part in the next chapter. The qualitative analysis presented here is used as exploratory research and as a tool for data triangulation purposes. It supports the exploration and interpretation of the study. Exploratory research is one of several methods of conducting qualitative research. Its purpose here is to seek new insights into phenomena, to ask questions, to assess the phenomena in a new light through interviewing experts in the subject and to identify further issues related to the topic (Robson, 2002). Saunders *et al.* (2009), state that exploratory research is particularly useful when researchers wish to clarify their understanding of the topic or the problem. It can be conducted through a search of the literature, interviewing experts in the subject and focus-group interviews. Its great advantage is its flexibility and adaptability to change, as it enables researchers to change direction as a result of any new data that might appear or new insights that might occur to them (Saunders *et al.*, 2009). The next sections will fully describe the exploratory research as it relates to this study.

4.3 SEMI-STRUCTURED INTERVIEWS

This section covers the justification for selecting semi-structured interviews as the research method for this exploratory study.

Different types of interview are used in qualitative research (King and Horrocks, 2010), but there are many reasons for adopting semi-structured interviews (Cassell and Symon, 2004) for this study. Firstly, the researcher had a list of themes and questions to be explored and covered. Secondly, the order of questions in this study varied from one interview to another depending on the flow of the conversation. Thirdly, some additional questions were required to explore the research question and objectives. Lastly, semi-structured interviews provide the researcher with the opportunity to probe, discuss answers in detail and build on the interviewee's responses. The researcher followed a semi-structured interview protocol that began with general questions about participants and their experience in the organisation. The design of the semi-structured interviews enabled the researcher to ask open-ended questions that outline the themes to be covered.

Semi-structured interviews are a valuable data collection method and serve the purpose of this study, as in this stage the researcher is adopting an interpretivist epistemology to understand the meanings that participants ascribe to various phenomena. The method is appropriate to explore and understand knowledge sharing through using KMS to support DMP in MNCs, deriving information from participants working intimately with knowledge sharing in different sectors of different MNCs and in different countries. The key point in choosing semi-structured interviews for this exploratory research is the consistency between the research question and objectives, the research strategy and the methods of data collection and their fitness for purpose (Saunders *et al.*, 2009).

4.4 SAMPLING TECHNIQUE

This section describes the sampling method used in this study for selecting participants, and the process of interviewing.

4.4.1 Non-probability Sampling Techniques

Sampling techniques can be divided into two types: probability or representative sampling and non-probability or judgemental sampling, used to answer different forms

of research question. Non-probability or non-random sampling offers a variety of techniques which enable researchers to select their samples based on their subjective judgement (Saunders *et al.*, 2009). Quantitative sampling tends to select randomly from the study population, but qualitative sample seeks to select a specific sample of participants that will assist in getting in-depth information to help in answering the research question(s) (Miles and Huberman, 1994). Oates (2006) states that qualitative research aims to explore issues in depth rather than generalising results, so using a random sampling technique in qualitative research would be inappropriate.

In the exploratory stages of research, a non-probability sample is the most practical technique. The choice of sampling technique depends mainly on the research questions(s), objective(s) and choice of relevant research strategy, as the sample should provide researchers with an information-rich study that can enable them to explore research question(s) and gain theoretical insights (Saunders *et al.*, 2009). For non-probability sampling techniques, the issue of sample size is vague; unlike probability sampling, there are no rules. Instead, the logical relationship between the sample selection technique and the purpose, objective and focus of research is important. Accordingly, sample size depends on research question(s) and objectives, specifically, what is useful for the research, what will have credibility, what can be done with the available resources, the degree of confidence in the findings, the accuracy required and the likely categories for analysis will all affect the sampling size (Patton, 2005).

There is no specific guide regarding the number of respondents needed in the sample. Yin (2008), states that researchers usually reach saturation after interviewing eight participants. However, Guest *et al.* (2006) state that “for research where your aim is to understand commonalities within a fairly homogenous group, 12 in-depth interviews should suffice”, although they also note that “12 interviews are unlikely to be sufficient where the sample is drawn from a heterogeneous population or the focus of the research question is wide ranging”. Creswell (2009) suggests that “for a general study, you should expect to undertake between 25 and 30 interviews”. Saunders *et al.* (2009, p.235) in addressing this issue, advise that “many research text books simply recommend continuing to collect qualitative data, such as by conducting additional interviews, until data saturation is reached: in other words until the additional data collected provides few, if any, new insights”. Fossey *et al.* (2002, p.726) note that “sampling in qualitative

research continues until themes emerging from the research are fully developed, in the sense that diverse instances have been explored, and further sampling is redundant. In other words, patterns are recurring or no new information emerges; a situation sometimes referred to as saturation”. Luborsky and Rubinstein (1995) state that in qualitative study it is unnecessary to determine the sampling size and techniques in advance, as they are to be discovered throughout conducting the fieldwork.

In this study, the researcher carried out 42 semi-structured interviews, concluding that data saturation was reached after interviewing 32 participants, although interviewing was continued until the adequacy of the information gained was assured.

4.4.2 Self-selection Sampling Technique

Self-selection sampling occurs “when you allow each case, usually individuals, to identify their desire to take part in the research” (Saunders *et al.*, 2009). In this case, the researcher started by contacting and asking relevant participants through appropriate media to take part in the study, then collecting data from those who responded. The chart shown in Figure 4-1 was followed in selecting a non-probability sampling technique (Saunders *et al.*, 2009).

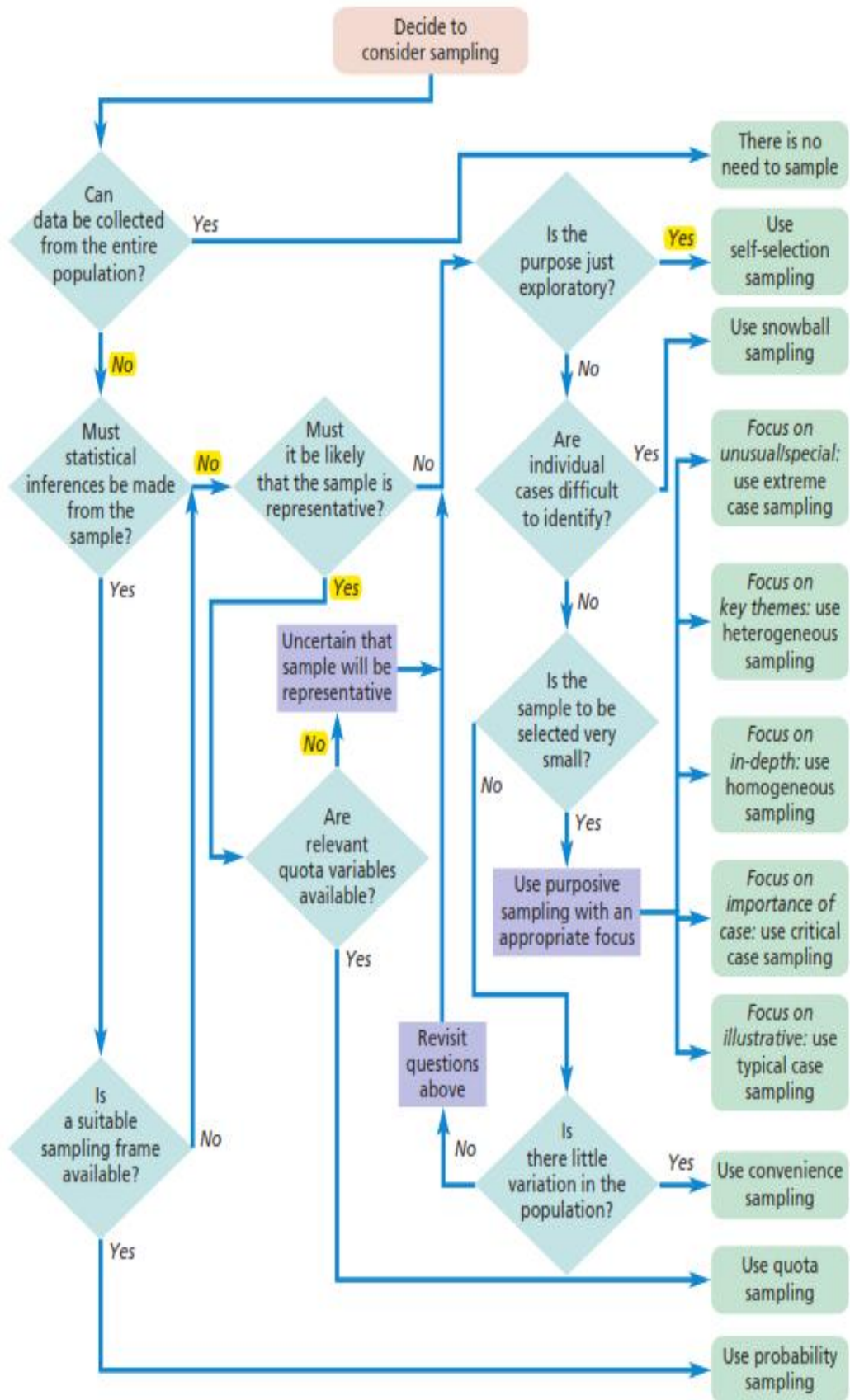


Figure 4-1: Selecting a Non-Probability Sampling Technique (Source: Saunders *et al.*, 2009, p.234)

Kervin (1999) and Patton (2005) underline some factors affecting the choice of non-probability sampling techniques (See Table 4-1).

Table 4- 1: Impact of Various Factors on Choice of Non-Probability Sampling Techniques

Sample type	Likelihood of sample being representative	Types of research in which useful	Relative costs	Control over sample contents
Quota	Reasonable to high, although dependent on selection of quota variables	Where costs constrained or data needed very quickly so an alternative to probability sampling needed	Moderately high to reasonable	Relatively high
Purposive	Low, although dependent on researcher's choices: extreme case heterogeneous homogeneous critical case typical case	Where working with very small samples focus: unusual or special focus: key themes focus: in-depth focus: importance of case focus: illustrative	Reasonable	Reasonable
Snowball	Low, but cases will have characteristics desired	Where difficulties in identifying cases	Reasonable	Quite low
Self-selection	Low, but cases self-selected	Where exploratory research needed	Low	Low
Convenience	Very low	Where very little variation in population	Low	Low

(Source: Saunders *et al.*, 2009, p.236)

The choice of sampling technique depends on the feasibility and sensibility of collecting data to answer research question(s) and to address research objectives, along with the researcher's ability to gain access to the organisation. In short, the researcher must understand what is practically possible.

The selection of participants for this study started by looking at different sources, including the S&P Global 100 index, MBA students at Manchester Business School and personal contacts. Consistent with the interpretive research approach, the researcher relied on how knowledgeable MNC participants are, how they share knowledge, the factors affecting knowledge sharing through using KMS and how this knowledge can support DMP. Before conducting the interviews, various MNCs were contacted and an invitation was sent by e-mail to prospective participants with an information sheet presenting the goal, the requirements of the study, and the benefits to participants, with contact details of the researcher for any further enquiries or information regarding the study (see Appendix A). Prospective participants were identified from firms that view knowledge sharing as important to their continued success, and are currently involved in inter-unit and international knowledge sharing. This stage resulted in 42 participants from 32 different MNCs. Of these 32 MNCs, 18 are operating in the Middle-East and 14 in the European Union. Data were collected from 12 countries, 7 from the Middle-East and 5 from Europe. 22 individual participants were from the Middle-East and 20 from the European Union. 9 interviews were conducted on-site, 12 via Skype and 21 by telephone. Each interview lasted 40-60 minutes (the average duration was 50 minutes). Table 4-2 shows the interviewees' positions, country, industry and the interview mode.

Table 4-2: Participants

Firms	Number of Participants	Positions	Countries	Mode	Industry
1.	1	Professor, Head of Department	UK	Phone	Research
2.	1	Professor, Team Leader	Holland	Phone	Research
3.	2	Professors	UK	Site	Research
4.	1	Accounting Manager	Egypt	Phone	Biotech & Pharmaceuticals
5.	2	Service Delivery Manager ; Senior Service Delivery Engineer	UK	Skpe & Site	IT Services & Consulting
6.	1	Accounting Manager	Saudi Arabia	Phone	Energy & Utilities
7.	1	Assistance Station Manager	Jordan	Phone	Airline & Cargo Services
8.	3	Laundry & Home Care Corporate Director; Products Development Manager; Products Development Manager Laundry Care Middle East	Germany & Egypt	Phone	Personal Care
9.	2	Credit &Investment Supervisor; Operation Management Supervisor	UK & Egypt	Site & Phone	Banking
10.	3	Purchasing Manager; Safety Manager; Quality assurance supervisor	Egypt & UK & Syria	Phone & Skype	Oil & Gas
11.	2	Senior Auditor; Associate Financial Services Advisory	Qatar & UK	Phone & Site	Accounting & Professional Services
12.	1	Senior Network Administrator Engineering consultancy IT Global support	United Arab Of Emirates	Skype	Multidisciplinary consultancy
13.	1	Technical Analyst	UK	Skype	IT Services & Consulting
14.	1	Chief Information Consultant	Kuwait	Phone	Multidisciplinary consultancy
15.	1	Senior Cargo Assistant	United Arab Of Emirates	Phone	Airline & Cargo Services
16.	1	Growth & Business Development Director	Saudi Arabia	Skype	Manufacturing
17.	1	IT Consultant	UK	Phone	Financial services
18.	1	Senior Auditor	Egypt	Skype	Accounting & Professional Services
19.	1	KM Consultant	Switzerland	Skype	Building & Constructions
20.	1	Consultant and Doctorate Researcher Lecturer	UK	Skype	Research
21.	1	Knowledge Manager	UK	Site	Business processing
22.	1	HR Manager	Egypt	Phone	Hospitality & Tourism
23.	3	General Manager; KM Manager; Accounting Manager	Saudi Arabia	Phone	Automotive
24.	1	Sales Manager	Egypt	Site	Technology Development
25.	1	Zone Credit Manager	UK	Skype	Financial services
26.	1	Financial Analyst	Saudi Arabia	Phone	Biotech & Pharmaceuticals
27.	1	IT Consultant	UK	Site	IT Services & Consulting
28.	1	IT Advisory	UK	Site	Accounting & Professional Services
29.	1	ERP principle Consultant and financial track leader	United Arab Of Emirates	Phone	IT Services & Consulting
30.	1	Project Management & delivery management & IT services	Germany	Skype	Telecommunications
31.	1	Payable Manager Automation&Drive	Egypt	Skype	Telecommunications
32.	1	Software Engineer	UK	Phone	IT Services & Consulting
Total	42		12		13

4.5 INTERVIEW PROCESS

The literature review helped in forming the construction of the interview guide. A set of questions was designed and developed to help in providing the structure for the semi-structured interviews through generating initial discussion points. The format of semi-structured interviews is neither structured nor completely unstructured, as it is better to let the participants tell their own story (Flick, 2009). Silverman (2011) believes that using the same format of semi-structured interview across all participants helps in ensuring that discussions cover all areas. The interview guide is used as a starting point rather than an exhaustive list of topics in strict sequential order (King and Horrocks, 2010).

The 42 interviews were conducted over a period of nine months (May 2010 – January 2011). The interview protocol included 12 questions and, as suggested by Silverman (2011), questions were reviewed by three academics from three different universities with backgrounds in knowledge management, knowledge sharing, knowledge management systems, decision making and decision support systems. Questions were pilot tested with two executives from two MNCs. Suggestions were incorporated into a second version which was piloted by another two executives from another two MNCs. Finally, questions were again modified as recommended, to simplify the wording and to make it easy for participants to answer the questions without any misunderstanding or confusion (see Appendix B). Although the supporting literature is essential in determining guidance and the context of the interview, the researcher stayed away from direct reference to the pre-existing literature so as to allow the interviewees to lead the discussion, reducing any bias that might take place and avoiding any pre-conditioning answers. To be sure that the questions were clear and unbiased, they were refined several times and designed in a coherent and logical order.

The researcher asked for written permission from the participants to use the tape recorder, and all gave it. Tape recording is very useful to researchers as it provides a full and detailed description of what participants said during the interview (Walsham, 2006). All interviews were conducted in Arabic or English, although English terminology was widely used in the Arabic interviews. Recorded interviews were transcribed and annotated by the researcher. The transcriptions in Arabic were translated into English by the researcher. The researcher checked and reviewed these translations with a researcher,

who is bilingual and has studied, worked and lived in the UK for several years, asking her to provide constructive feedback if any modifications or clarifications were needed. This helped in reducing bias and increased the reliability and validity of the research. The privacy and confidentiality of participants were assured. The researcher used different ways to arrange the interviews, relying on phone calls to set them up for and e-mailing subjects to get their agreement to take part in the study. It was the participants who chose the time and method of contact, to suit their convenience. Each interview continued until the researcher had gained sufficient information, ending when repetition and redundancy in the information provided by participants became evident.

At the end of each interview, the researcher showed appreciation and thanked the participants for their time, asking if he could contact them in the future for further enquiries regarding the study. The researcher also offered to send a copy of the results and conclusions to the participants after completion of the study.

Prior to the conduct of this study, an ethics application was submitted to Manchester Business School Postgraduate Research Ethics Committee (Ref No: MBSPGR/N401). The ethical principles regarding consent forms, privacy, confidentiality and anonymity suggested by Longhurst (2009) and Boeije (2010) were all followed (See Appendix C).

During the data collection, participants were encouraged to provide real examples or practices to support the credibility of their information. Following the 24-hour rule (Eisenhardt, 1989; Miles and Huberman, 1994), the researcher wrote up the full case notes within 24 hours of each interview. As data were collected, the researcher started to analyse them; the following section highlights the thematic-analysis process and the procedures undertaken during the analysis.

4.6 THEMATIC ANALYSIS

Extracting compelling conclusions from the semi-structured interviews can be considered as the hardest and least codified part of the process (Eisenhardt, 1989; Yin, 2008). After the data collection, the researcher faced the decision of how to analyse the data. Thematic analysis is one of approaches to analysing qualitative data; it concentrates on the themes or subjects and patterns, emphasising, pinpointing, examining, and recording patterns within the data (Braun and Clarke, 2006).

Interviews were conducted, audiotape-recorded, important notes were transcribed and the transcripts were analysed. Thematic analysis is normally concerned with experience-focused methodologies. Throughout the analysis, the researcher identified a number of themes by considering the following three stages highlighted by King and Horrocks (2010):

1. *Descriptive coding (First-order Categories)*: the researcher identifies those parts of the transcript data that address the research question and allocates descriptive codes throughout the whole transcript.
2. *Interpretative coding (Second-order Themes)*: the researcher groups together descriptive codes that seem to share some common meaning, and create an interpretative code that captures this.
3. *Defining overarching themes (Aggregate Dimensions)*: the researcher identifies a number of overarching themes that characterise key concepts in the analysis.

Souitaris *et al.* (2012) also suggest that data exploration involves three steps based on established techniques, illustrated by Pratt (2000, 2008) and Pratt *et al.* (2006). In the first step of data exploration, the researcher began with open coding to better understand the subjects. First-order concepts were identified, and then the data were reviewed again to see which segments fit each category. In the second step, categories were consolidated, becoming more theoretical and more abstract. In the third step, dimensions underlying the theoretical categories were identified.

Based on the categorisation and theme analysis techniques suggested by Miles and Huberman (1994), the researcher read each interview several times and coded each one separately on the basis of terms or phrases used by the participants.

In the analysis, codes that are similar were discerned and collated into first-order categories, employing the language used by the participants whenever possible. The process of coding interviews was continued in this manner to achieve theoretical saturation; saturation exists when the researcher cannot ascertain any more distinct or shared patterns (Glaser and Strauss, 1967). Concurrently with the development of the first-order categories, the researcher started discerning linkages among the categories that could lead to the development of second-order themes. The second-order themes

were then assembled into aggregate dimensions, which enabled development of a grounded conceptual framework that linked the various concepts that emerged from the data (Nag and Gioia, 2012). The main outcome of the analysis was a conceptual framework that explains phenomena and extends existing knowledge, within the limits of the critical bounding assumptions.

As interview data were collected, the researcher started to analyse them, adhering to guidelines specified for thematic analysis (King and Harrocks, 2010). Data were coded according to common themes see Figures (4-2 to 4-5), and another outside coder with considerable qualitative research experience was involved to assess the reliability of the coding. The few disagreements were resolved through extensive discussions between researcher and the outside coder.

The most common way of writing up the thematic analysis is to describe and discuss each overarching theme in turn, stating examples from the data and using quotes to facilitate theme characterisation. King and Harrocks (2010, p.165) state that “It is not necessary to refer to every constituent code within each theme- especially the descriptive codes. Rather, you should focus on those that most strongly illustrate what the theme is covering, and which most effectively address your research question”. Braun and Clarke (2006) argue that the aim of compiling the thematic analysis is not merely a descriptive summary of the content of the theme, but rather building a narrative that informs the reader how research findings have cast light upon the issue on hand. Furthermore, Symon and Cassell (2012, p.446) highlight that “Whatever approach is taken, the use of direct quotes from the participants is essential. These should normally include both short quotes to aid the understanding of specific points of interpretation and more extensive passages, giving readers a flavour of the original texts”.

The 42 interviews offered insightful descriptions of the main themes that determine the factors that affect KS by using KMSs to support DMP in MNCs. The following sections explain the four main dimensions that constitute the core of the current study’s conceptual framework.

4.6.1 Knowledge Management Systems

In this dimension, three themes were identified: Technology Acceptance, Communication Tools and KMSs Usage. See Figure 4-2

4.6.1.1 Technology Acceptance

A number of factors influence the participants' decisions regarding how and when they will use the KMS, including how they perceive the usefulness and the ease of use of KMSs to enhance their job performance and at no extra effort. Executives in some MNCs want KMS to be easy to use, like the social networking tools that they are use in their daily life (e.g. Twitter, Facebook, YouTube, Wikipedia, smart phones and Google):

“No one teaches us how to use Google, Facebook, YouTube, so we want KMS to be easy like these tools”.

Participants want KMSs in their organisations with advanced and smart searching tools that can enable them to search and find knowledge quickly by codes, abbreviations, product, country, branch, region, etc. They believe that KMSs can enhance their job performance by combining search engines with artificial intelligence tools that can recognise the users and their search histories and link them together; thus, knowledge can be offered, matched, shared and sent automatically without any attempt for searching:

“I want KMS to be like a Google search; when you search for something, it keeps and saves it in your history and links it to your next or future search”.

“Sometimes, I feel KMS are complicated and I want an easy system to be used, like Wikipedia, Facebook, Google, mobile applications, which I can use easily without having any training”.

Participants highlight the importance of having a speedy KMS that can be accessible from anywhere at any time, and is easy to use and customise. They also want to combine KMS with feedback tools regarding any knowledge they share, to know how important it is, how many employees used it and where:

“We have an intranet linking all branches together through VPN (Virtual Private Networking), which keeps all employees updated with all best practices, events, training, problems, meetings, etc.; it links all branches together”.

“Through KMS we get new ideas, create discussions, answer questions, solve problems, and clarify how to do work and why”.

4.6.1.2 Communication Tools

Participants want KMSs to have a variety of tools that can create and share usable knowledge with an interactive, consolidated and user-centred design to allow all users to find, share, interact and collaborate with each other in a simple way. They want to have KMS applications on their mobiles that can enable them to share knowledge and documents with their colleagues easily at anytime from anywhere. Moreover, some participants have internal media broadcasting like TV and radio inside their organisations, which updates them with the latest news regarding their work:

“Through KMS we can get reports, documents, and figures easily and quickly. They also help you to find people and enable you to contact them directly”.

“We have internal TV and radio channels that spread the news of our bank and good practices between all branches in the world”.

“The organisation gives us BlackBerry Mobile Phones to be used in our work, facilitating access to our e-mail to reply quickly for any enquiry, but I think it will be better if they have apps for knowledge sharing”.

Participants from different MNCs stated that they have shared drives in their organisations which are reachable by all employees, although with different levels of accessibility, according to position, location and authority. They also want KMSs to be unified at all branches and to have one system that can be operational everywhere and for everyone. They emphasise that knowledge must be centralised, through having a committee or team to check and review any knowledge uploaded before sharing it to avoid any bad decisions or mistakes that might occur because of inaccurate knowledge uploaded on the system:

“On my laptop I have four drives; one of them is open to all to share general knowledge about our work, the second one is accessible only to our department, the third one is only between managers to share reports and confidential knowledge, and the last one is a global drive to be accessed by the head office only”.

“We want to have one system that can control, manage and update the knowledge shared between all departments and branches to avoid any problems”.

4.6.1.3 KMSs usage

Most of the participants have more than five years' experiences in using KMSs; they use them daily and consider them as a part of their work. There is a wide variety of KMS tools used in sharing knowledge in MNCs, and most participants are using different systems to share knowledge, depending on what they are sharing:

"I've used KMSs in my organisation for more than five years and I use them to support around 60-65% of my work".

"We have different KMSs for knowledge sharing, but we select and use the system based on what we want to share: for example, we have a Wikipedia system for scientific and chemistry issues, Cases Systems for Marketing ... It depends on what you share, your target and your department as well".

Not all participants liked KMSs; some of the executives working in the Middle-East and over 50 years old prefer traditional ways of sharing knowledge like phone, fax, face-to-face. If they need to use the KMS, they ask their subordinates to do it:

"If I have to share knowledge by using KMS, I just ask one of my subordinates to do it, because I have forgotten how to use it".

Data Structure

First-Order Categories

Second-Order Themes

Aggregate Dimensions

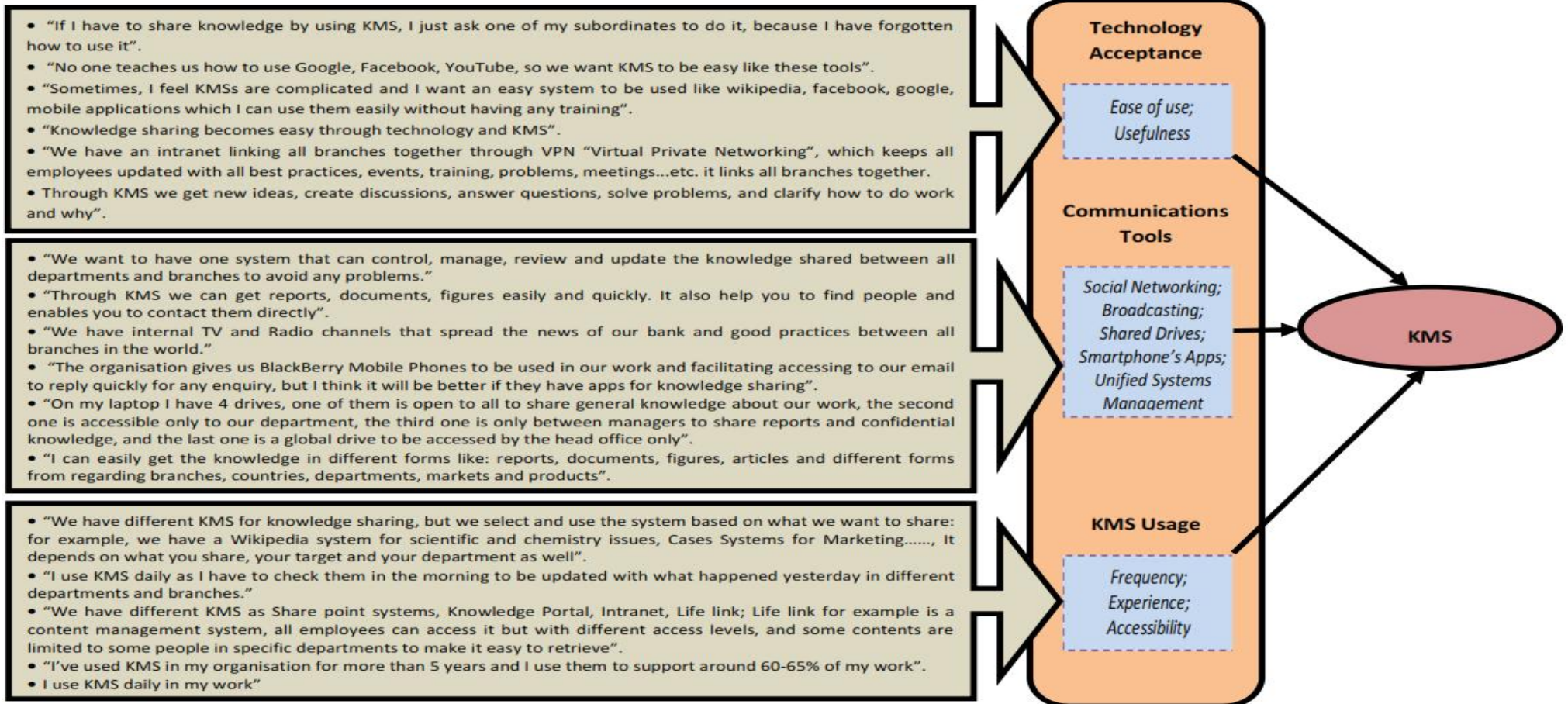


Figure 4-2: KMS- Data Structure

4.6.2 Knowledge Sharing Practice

In this dimension, three themes were identified: Content, Willingness to Share and External Factors. See Figure 4-3

4.6.2.1 Content

The participants emphasise the importance of the content of KMS. They perceive that the content of any system must be precise, secure and updated from time to time to ensure that all knowledge is correct and accurate:

“We have different KMSs inside our organisation, but I usually use our company’s intranet as it is always updated and through it we can find the best practices of the organisations globally, as all knowledge is shared between different branches in the organisation”.

“Occasionally, I have to check the accuracy of knowledge myself as I don’t trust all the knowledge available on the KMS”.

Participants also want KMS to be controlled by the top management to assure that knowledge is revised and accepted by them, and to avoid any problems in the future. The quality of the knowledge on the KMS is vital, as they want to be sure that it is precise, relevant to their current topic, easy to understand, accurate, complete, reliable and timely:

“I always assume that all knowledge shared on KMS is reviewed and accepted by the organisation”.

“I just use the KMS when the knowledge is relevant to the topic, reliable, accurate and easy to understand”.

Knowing the source of knowledge encourages participants to use it, as they become confident and trust it. The process of codification is also important for participants, as they want to be assured that the process of standardising and developing a norm for a language is common and known by all branches of the organisation:

“Sometimes, we share knowledge in abbreviations to save time in writing, but we are all familiar with these abbreviations in the organisation”.

“Knowing the source of the knowledge is really quite important, as anyone can share anything, but if you know the source, you feel confident with the knowledge that you have”.

“Sometimes, I can’t share the knowledge that I have with other colleagues, even if they ask me about it, as I am not sure whether it is true or not... and I don’t want to take any responsibility for the knowledge I share with others”.

4.6.2.2 Willingness to Share

Knowledge sharing is not possible without willingness between both senders and receivers to share. Some of the participants mentioned that they are not confident in the knowledge they have, and accordingly they believe that their willingness to share it decreases:

“KMSs do not store or create knowledge. They store information, and it becomes knowledge when it is interacted with and by a human being. Knowledge is either created in a dynamic way between human interactions or is something which resides in somebody. By knowledge sharing, you add value and take action; if you don’t use this knowledge, it is not knowledge sharing”.

On the other hand, some participants view knowledge as power, which will qualify them as knowledgeable and experts in their organisation, and this power will enable them to acquire powerful positions. Therefore, they want to be recognised and known in their organisations as knowledgeable people:

“In my organisation, some of my colleagues who are knowledgeable and have knowledge tend to be secretive and keep their knowledge to have more power and to be promoted faster than others in the organisation”.

“Some people believe that knowledge is power and valuable to the company and this knowledge will lead them to a powerful position in the company, so they do not share knowledge, to get more benefits for themselves”.

Employees may not have enough time to share knowledge, as their working hours are hardly enough to serve customers and to complete their work; they feel that no one will have time to read what they share, as they assume that all employees are too busy. They not only consider KS as time consuming but may also not trust the source of the shared knowledge, preferring to share the knowledge only with someone they know and trust:

“I prefer to share knowledge with someone I know rather than with someone I do not know, even if she or he is in another branch or country, as I need to be sure who I am sharing with and trust what we share together. I believe that conference meetings, face-to-face communication and telephone calls break the ice between people and create trust between us”.

4.6.2.3 External Factors

Participants of some MNCs indicate that politics plays a major role in KS, especially in the Middle-East, where employees feel that their organisations have a hidden agenda, affected by politics. Moreover, participants claim that sometimes their organisation misguides employees through the KMS to avoid specific decisions or to prevent future problems, and they claim that they are doing this as a kind of security to save their work and their privacy:

“If you are working in a MNC in the Middle-East, you can feel that there is something between the lines when we share knowledge; for example, we are not allowed to share all knowledge in the system, and most of the time I have to ask the top-level management face-to-face directly to get some knowledge or more details about something. Also, each organisation shares only the knowledge that will lead to the decision they like...”

“We can share knowledge with branches all over the world, but I can’t share it with Syria and Sudan, as they are excluded because they are sanctioned countries, so employees in Syria and Sudan are blocked from using the KMS”.

Some branches falsify documents, are engaged in corruption and pay bribes; all of these activities are known and accepted by their headquarters:

“We cannot share everything in KMS, as for example we pay bribes and the headquarters know it because they know that this falsification and corruption will bring benefit to the company and this is the only way to handle our operations in specific countries in the Middle-East and Africa. We know that technology is managed by human beings, and our organisation has a hidden agenda, so our organisation can support or fail any system easily”.

ICT infrastructures are considered as threats by MNCs in specific areas. They have network problems in some countries in the developing world, and systems in these branches might go down unexpectedly; there are also problems regarding the internet’s speed and connection:

“Personally, I prefer to use the KMS, but the problem is I am travelling a lot from one country to another. Some countries in Africa don’t have internet connection and if they have the speed is too slow, and I can’t access the KMS easily as it takes a long time to download, and sometimes downloads failed to complete”.

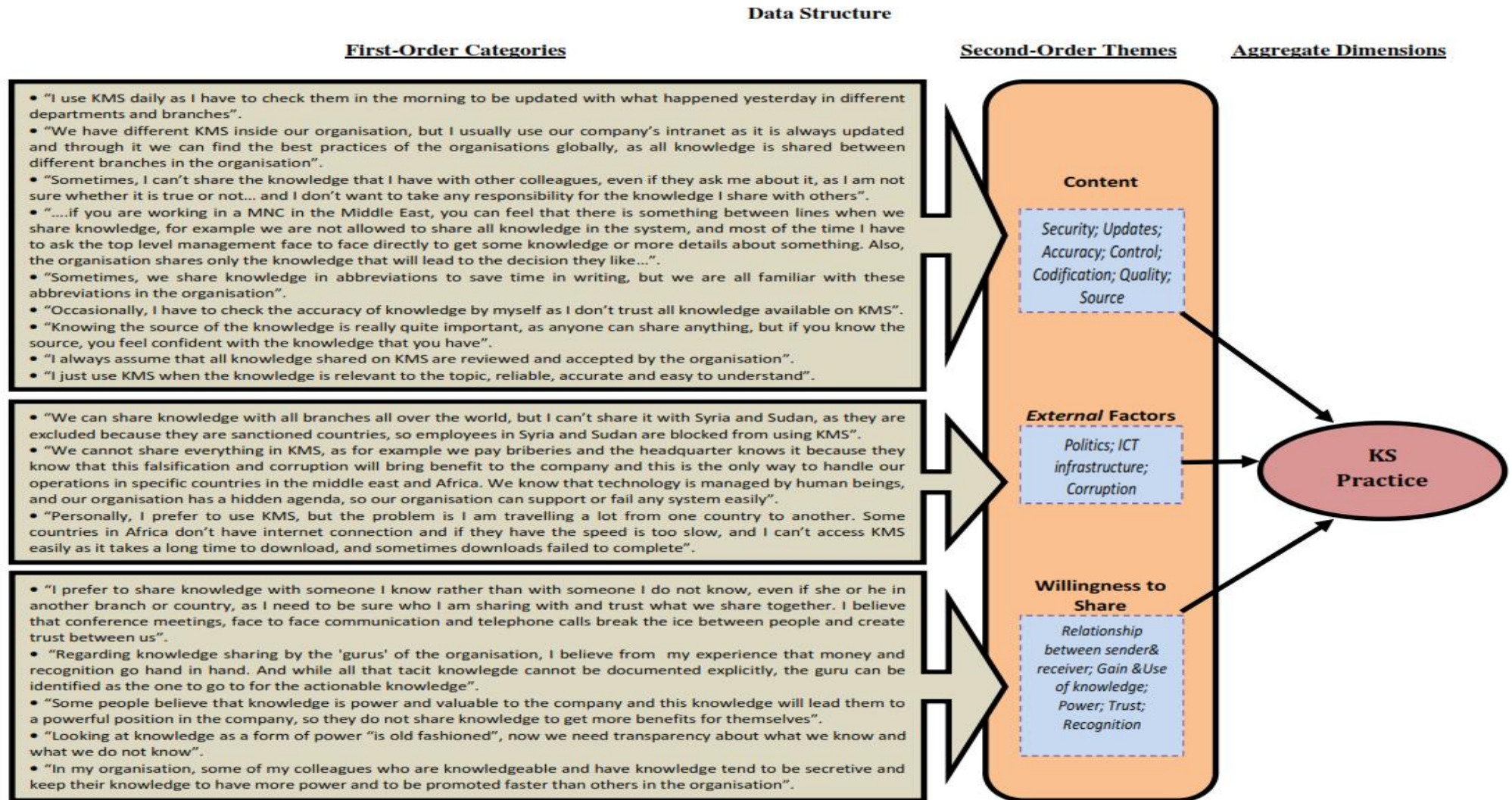


Figure 4-3: KS Practice- Data Structure

4.6.3 Culture

In this dimension, three different themes were identified: Organisational Culture, National Culture and Information Technology Culture. See Figure 4-4

4.6.3.1 Organisational Culture

Organisational culture includes values, visions, missions, norms, incentives, consistency, working language, systems, symbols, involvement, beliefs and habits. It affects the way individuals and groups interact with managers, customers and stakeholders. One of the respondents emphasised the importance of organisational culture in MNCs:

“In our organisation, the vast majority are German, but we have a rule in our organisation, that all employees must speak with each other in English, and if any employee sees others speaking in another language rather than English during the work, we have to report it and make a complaint. I really feel this is fair to avoid any misunderstandings and show respect to others”.

Training and organisational learning affect KS as well, as there is a lot of knowledge to be shared during training, as its whole purpose is to learn something new; the environment and atmosphere during training encourage and enable individuals to work as a team, share knowledge, collaborate and learn new issues:

“I feel I can easily share knowledge when I do training, as I meet with different people from different branches and departments and the environment itself is suitable for asking questions and sharing knowledge immediately at the same time and if anyone has comments, he will say it immediately during the discussion”.

“My organisation asks me and other managers to go to the desert for a week without any communication tools, only food and drink, and there in the desert we have to discuss our plans and think about our organisation’s strategy and this is really to encourage collaboration and cooperation between us as managers. I believe that the success of sharing knowledge is not only for the organisation or individual, but it is for all as we are a collaborative team in this organisation”.

Most of the participants in MNCs consider organisational culture as one of the key factors affecting organisational effectiveness and success. Most stressed that organisational culture is the dominant culture in the company, regardless of employees’ national culture. Some organisations encourage employees to share knowledge by moving them from one place to another, and they do not allow them to spend more than two years in any one place; this rotation enables employees to reap the benefits of

sharing the knowledge they have, and opens them to new experiences. Participants also draw attention to Human Resources Management (HRM) inside their organisation, as they see this as the most important department in any MNC; KS must start from HR as they recruit people, encourage them to develop their careers, and motivate them with incentives to share knowledge all the time:

“Regarding the rules of sharing knowledge, our company has specific rules to be followed in knowledge sharing and there is a compulsory course to be attended by employees; we believe that an organisation without cultures and rules is an organisation without future”.

“My organisation encourages knowledge sharing and the one who shares the most valuable knowledge that benefits the organisation gets a prize called “The Champion of the Year” which encourages creativity and innovation in our organisation”.

“I think to encourage people to share their knowledge inside the organisation, it will be good if our company allows part of the organisation to be owned by employees by giving them shares, which will encourage them to share knowledge; and also if the HR department put the sharing of knowledge as a part of each employee’s appraisal and gave employees a guide regarding how to share knowledge as a part of their job description”.

4.6.3.2 National Culture

Cultural distance affects KS as there are many nationalities, languages, norms and customs in MNC. For example participants usually use two different languages in KS, English and their national language. If employees cannot speak English, so they need a translator or dictionary to be available in the KMS to facilitate reading and writing knowledge in a different language. Most participants, in the Middle-East and Arab countries use at least two languages in KS, English and the their national language (Arabic, Hindi-Urdu, Bengali, etc.), but in MNCs in Europe, most of participants share knowledge in English only. Participants believe also that informal meetings can break the ice between employees and reduce any cultural distance that might be an obstacle to KS:

“...I believe that once you work in a MNC and all employees use one language like English, so there will be no cultural differences at all”.

“...I believe also that informal meetings, like having a dinner, is a good way to solve any cultural problems; it makes us know each other and makes us meet frequently from time to time not once a year, and by this we can avoid any misunderstandings in sharing knowledge”.

Most of the participants underline that there is a big advantage in working and sharing knowledge with different cultures and nationalities in MNCs, because they can take these differences into account when serving different customers from different cultures:

“...I believe that working in a MNC gives me good experience regarding different cultures, as I am Greek and working in a British company in London and my colleagues are from different nationalities... Indian, British, Arab. I have learned some of their cultures, and there are some differences between my culture and their cultures, so I take these differences into consideration when I am dealing with customers as we have customers from different nationalities as well”.

4.6.3.3 Information Technology Culture

The vast majority of senior managers in MNC, especially in the Middle-East, prefer traditional ways of KS, because they claim that they travel a lot, so they forget how to use KMS tools if they have not used them for a while:

“Nowadays there are a lot of social networks that connect people together, but I personally prefer to use telephone in knowledge sharing, as through the telephone I know the person I am talking with and I can easily enquire and understand everything in detail”.

“I don’t believe in Systems, as you need to maintain, update and change them all the time and this is a problem”.

Participants also draw attention to who should control IT in MNC units; should they be centralised or decentralised? IT skills are required of employees and IT expenditure is another consideration.

“The KMS is controlled by headquarters and we cannot change or edit it in our branches”.

“Although our company spends a lot of money on building KMSs, we do not have the IT skills and background required to deal with these systems”.

Participants also draw attention to the importance of unifying the words and terminology used in sharing knowledge, because sometimes you cannot identify available knowledge if it is offered in different words; people may use different words for the same meaning:

“Some employees say systems and other say servers and they mean the same thing”.

Data Structure

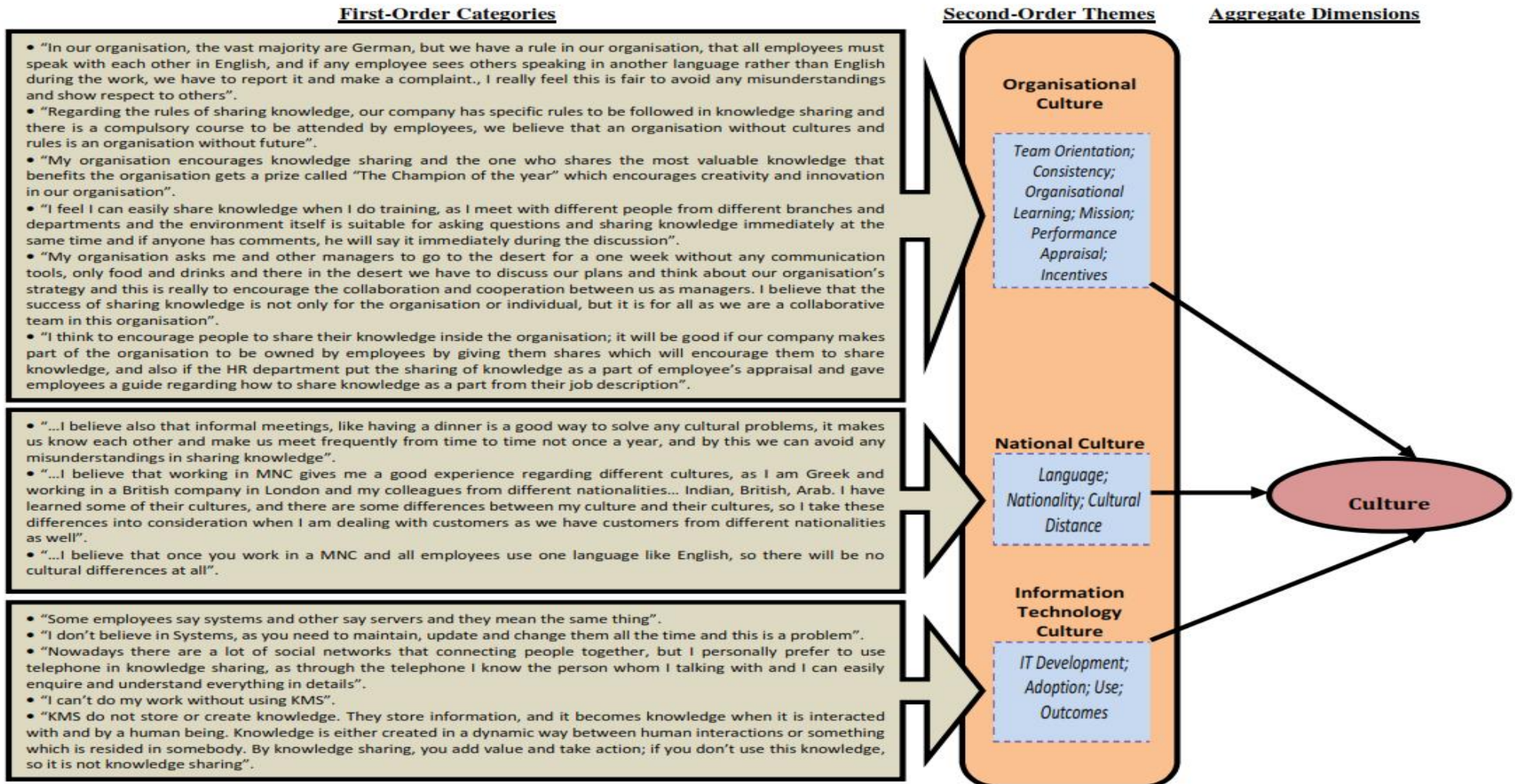


Figure 4-4: Culture- Data Structure

4.6.4 Decision-Making Support

In this dimension, two different themes were identified: Extent of Analysis and Speed of Decision Making. See Figure 4-5

4.6.4.1 Extent of analysis

Regarding DM support, participants emphasise that KMSs cannot make decisions, but can offer knowledge that can help people in DMP. They consider that the KMS is important in the first stages of DMP, as it can help them in finding the source of knowledge and giving them facts regarding the current issue or problem. KMSs facilitate the analysis of DM as they believe that all data, information, knowledge, best practices, cases and documents are available through KMS:

“It is not what knowledge gives to you, but what you do with it”.

“Knowledge is a general set, but when we use them in decision making, we use them to know what we need to know to make the decision, and also we use KMS to interpret any information or knowledge we have”.

“Sometimes, before making decisions we analyse and check lessons learned from other projects, problems or decisions that have been taken before through using KMS, so we can decide what is acceptable and what is not acceptable in MNC based on other experiences and past evidence through KMS, and this is because we do not want to take any risk of taking wrong decisions”.

“We use the KMS to support decision making, but we use different KMSs in in each stage of the decision-making processes because the purpose is different in each stage and in each stage we look for specific knowledge to help us in making decisions properly”.

“You must be well prepared before making decisions and the KMS make you well prepared and ready before making decisions”.

“Relying on the KMS alone is not enough, as we need to have meetings to evaluate alternatives and agree about the final decision”.

Participants agree that KMSs can be used in the formulation, evaluation and appraisal phases of the DM process, but they emphasise that they are more helpful in the formulation stage. They believe that KMSs provide them with many possible alternatives and through the KMS they can prove and clarify why they have selected a specific alternative and ignored others. They emphasise that no decisions are taken by individuals, but are always based on a group and must be supported by insights or evidence to enable them to verify their decisions under any circumstances. They also

emphasise that KMSs can help them in identifying experts who should be contacted and who have experience and knowledge in specific issues:

“We cannot take the risk of the decision on our own, so we save our back by depending on KMS to support DMP and having evidence from the KMS to verify our decisions. We use KMS as a source of input in the DM processes”.

“Decisions are not only made on an intellectual basis, but reasonable background knowledge is required in everything to make good decisions; generally the KMS gives you different alternatives and makes you quite sure and happy about your decisions”.

On the other hand, some respondents prefer not to use KMS because they feel that their decisions will be based on what is available instead of thinking up new solutions or alternatives that do not exist in these systems, so they believe that KMSs do not encourage innovation and creativity in their MNC:

“I feel that depending on the KMS only in DM can limit our decisions to the available knowledge and does not encourage thinking about new solutions and innovation”.

4.6.4.2 Speed

Some participants mentioned that they prefer to use the fastest tool to share knowledge in supporting the DMP and finish their work quickly; in this situation it does not matter which tool they use, e.g. phone, e-mail, face-to-face or chat; they use any means that enables them to make their decision easily and quickly:

“The target of sharing knowledge is about finishing the task, not using a tool or technology, as at the end we will be asked about our progress, achievements and decisions not about using KMS or something else, so I use the tool that can enable me to make a decision properly and finish my task precisely and quickly”.

Other participants consider this as time consuming; they cannot explain to their managers how long it takes to find the required knowledge:

“It takes a long time to find knowledge because I spend time in searching, and I cannot measure or define this time as productive time to my managers. The KMS makes it quicker in searching and finding knowledge”.

Generally, they believe that KMSs save time in searching, finding people and getting supporting documents:

“The KMS saves our time in discussing and making decisions, as through these systems we can get reports, documents, and figures easily and quickly. It also helps us to find people and enables you to contact them quickly and make decisions quicker”.

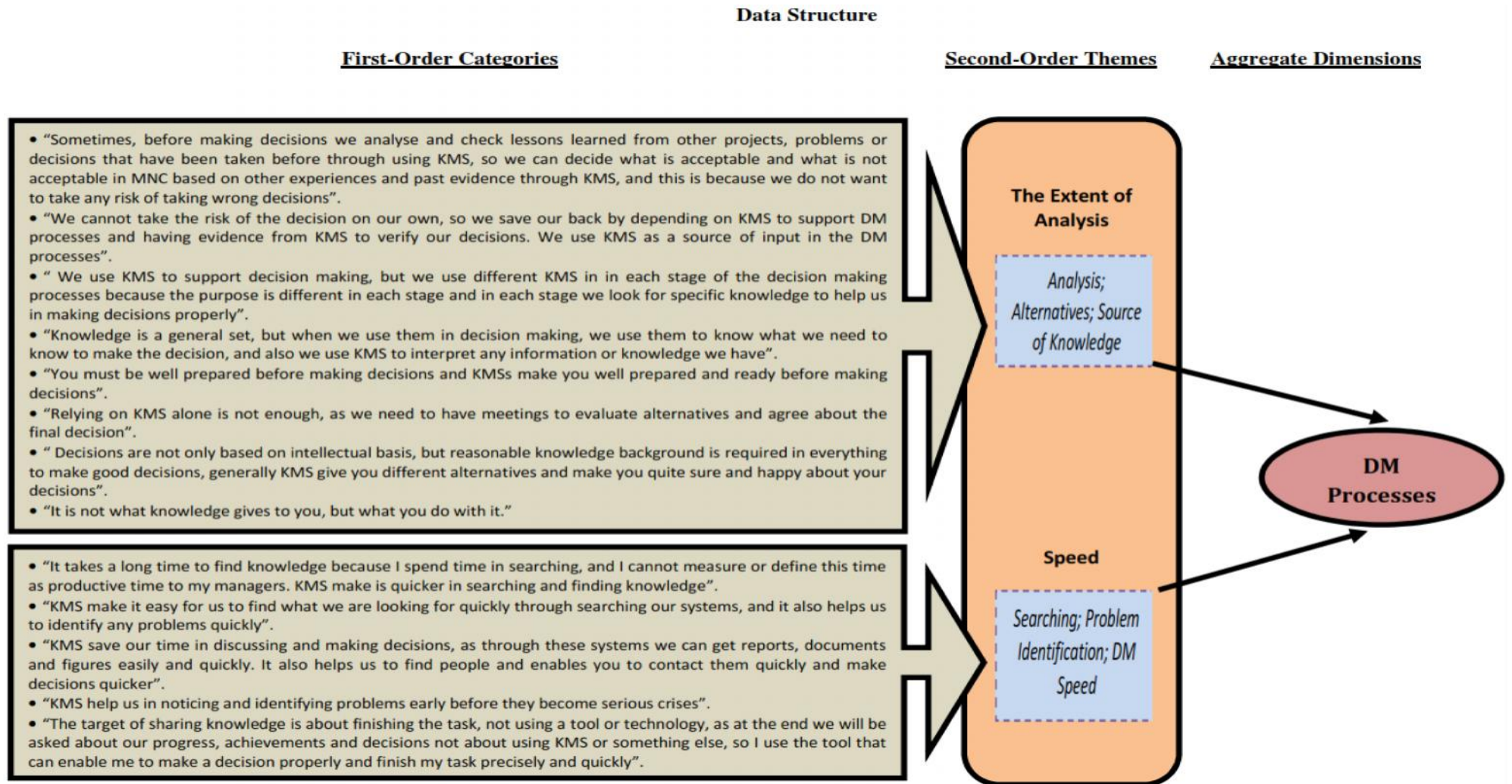


Figure 4-5: DM Processes- Data Structure

4.7 CONCEPTUAL FRAMEWORK

The thematic analysis highlights the factors that affect knowledge sharing and indicates how participants in MNCs share knowledge through KMSs to support DMP. Based on the semi-structured interviews, the emergent conceptual framework (see Figure 4-6) comprises four core themes: *Knowledge Management Systems* (Technology Acceptance, Communication Tools and KMS usage), *Knowledge Sharing Practice* (Content, External Factors and Willingness to Share), *Culture* (National Culture, Organisational Culture and IT Culture) and *Decision Making Processes* (Extent of Analysis and Speed).

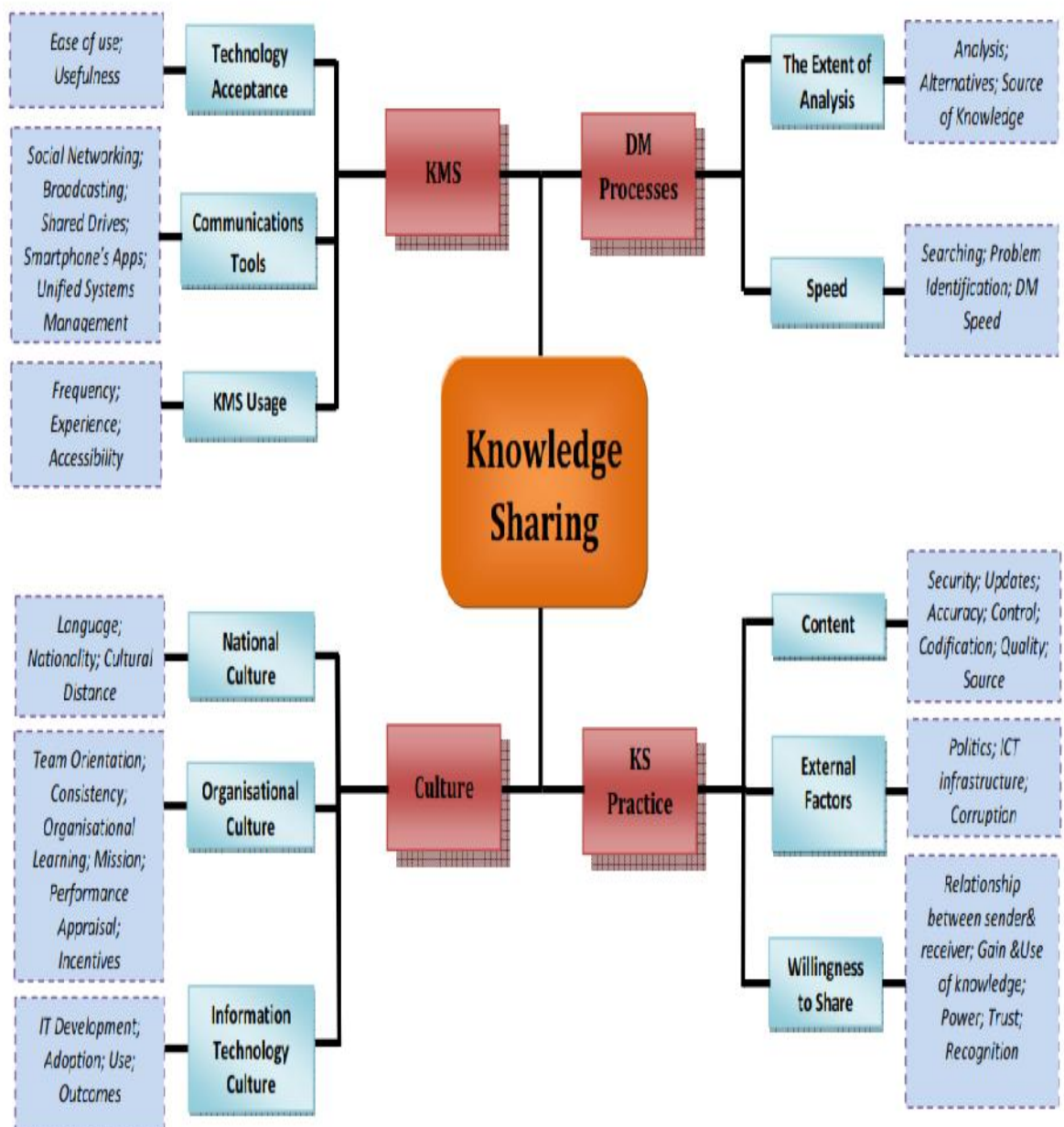


Figure 4-6: Conceptual Framework

The first dimension is the KMS; participants discussed the importance of its ease of use and usefulness. They highlighted the importance of the communication tools in KMSs, like social networking, broadcasting, shared drives, smartphone applications and unified system management. They remarked on the importance of KMSs usage by highlighting their usage, experience and the accessibility of the KMSs. The second dimension is KS practice, a key theme in sharing knowledge, as the participants highlighted the necessity of securing, coding, updating, controlling, checking the accuracy, quality and source of the knowledge shared. They also discussed their willingness to share knowledge, as they believe that the relationship between senders and receivers, gaining and using knowledge, perception of knowledge as power, trust, and recognition inside the organisation are important factors that affect KS. Some participants, especially in the Middle-East, highlighted other external factors such as politics, ICT infrastructure and corruption. The third dimension is culture, which plays a crucial role in MNCs as it cannot be isolated; culture was mentioned by participants in different forms: National, Organisational and IT. Cultural distance between employees, different languages and different nationalities affect KS. Organisation culture plays an essential role in encouraging KS through organisational learning, team orientation, mission, consistency, incentives and performance appraisals. Recent developments in the IT environment in organisations has introduced unique requirements and changed the way of doing work. The fourth dimension is DM processes; participants remarked on the role of using KMSs in KS to support their DMP through focusing on the extent of analysis, offering more alternatives and different sources of knowledge. The speed of DMP was also essential, as participants highlighted the importance of having fast systems that enable them to search, identify problems and make decisions quickly.

4.8 QUALITY CHECKS: RELIABILITY AND VALIDITY

In quantitative research, there are generally recognised criteria for assessing the quality of the analysis in any research. Thus, “*reliability* is concerned with how accurately any variable is measured, while *validity* is concerned with determining a particular form of measurement actually measures the variable it claim to” (King and Horrocks, 2010). Unlike quantitative research, qualitative research does not have generally accepted guidelines or evaluation criteria for reliability and validity (Lee and Hubona, 2009). Some researchers have even suggested that reliability and validity should not even be

considered a criterion for evaluating qualitative research (Maxwell, 1992; Stenbacka, 2001). Other researchers have suggested that validation in qualitative research should be called something else other than validity and reliability to differentiate it from what is done in quantitative research (Lincoln *et al.*, 2011; Patton, 2005). However, regardless the different views of validation in qualitative research; Maxwell (1992), states that “there is some agreement that validation is essential in qualitative research to reduce misunderstanding of qualitative research and to develop a common scientific body of knowledge”.

There is ambiguous and contentious regarding the validity in qualitative research (Ridenour *et al.*, 2008). Validity, in the context of a qualitative study, is defined as “the extent to which data are plausible, credible, and trustworthy, and thus can be defended when challenged” (Venkatesh *et al.*, 2013). Lincoln *et al.*, (2011) argued that because reliability is a necessary condition for validity, proving validity in qualitative research is enough to establish reliability. Maxwell (1992) suggested three types of validity in qualitative research:

- *Descriptive validity*, the accuracy of what is reported (e.g., events, objects, behaviours, and settings) by the researcher.
- *Interpretive validity*, the accuracy of interpreting what is going on in the minds of the participants and the degree to which the participants’ views, thoughts, feelings, intentions, and experiences are accurately understood by the researcher.
- *Theoretical validity*, the extent to which the theoretical explanation developed fits the data and, therefore, is credible and defensible.

Furthermore, Ridenour *et al.*, (2008) discussed two types of validation issues in qualitative research: design validity, analytical validity, and inferential validity. Design validity refers to how well a qualitative study was designed and executed so that the findings are credible and transferable. Analytical validity refers to how well qualitative data were collected and analysed so that the findings are dependable, consistent, and plausible. Finally, inferential validity refers to the quality of interpretation that reflects how well the findings can be confirmed or corroborated by others.

Accordingly, reliability and validity were strengthened in this phase of research through the following ways:

- The interview protocol was pretested as suggested by Silverman (2011). Questions were reviewed by three academics from three different universities with relevant backgrounds regarding the study. Moreover, questions were pilot tested with two executives from two MNCs. Suggestions were considered and pretested again with another two executives from another two MNCs. Finally, questions were again modified as recommended, to simplify the wording and to make it easy for participants to answer the questions without any misunderstanding or confusion.
- Parikh (2002) asserts that the quality of data collection is heavily dependent on the researcher's ability to maintain focus, and this was borne in mind when any irrelevant issues came into the discussion. This helped to increase the reliability and validity of the research, in addition to reducing data bias.
- Following the 24-hour rule suggested by (Eisenhardt, 1989; Miles and Huberman, 1994), the researcher listened several times to the recordings and wrote up the full case notes within 24 hours of each interview to judge and improve the performance. Moreover, during and following each interview the researcher's feelings about each interview in general and the interviewee in particular were recorded in a memo. These reflexive approaches were recommended by King and Horrocks (2010) to increase the reliability and validity of the qualitative research.
- To check the quality of analysis as suggested by King and Horrocks (2010); Maxwell (1992); Ridenour *et al.* (2008); the analytical decisions were defended to a constructively critical expert panel through presenting the findings in a conference. At the 71st Academy Of Management meeting (AOM) 2011, San Antonio, Texas, USA, a paper titled "Using Knowledge Management Systems to Support Knowledge Sharing in MNCs: a Comparative Study" was presented at OCIS International Paper Development Workshop, and little arguments were raised by the expert panel who attended the workshop which implied that no much modification was required to the final framework. They suggested dropping some themes (like national cultures) from the conceptual model in the next phase of the research, because of the time constraints of the research, and

difficulties of measuring all themes in one study. This part discussed in details in the next chapter.

4.10 CONCLUSION

The purpose of this chapter was to explore the main dimensions that affect knowledge sharing by using KMSs to support DMP in MNCs. Through using the exploratory research approach and qualitative analysis, the findings of the 42 semi-structured interviews with interviewees from the Middle-East and European Union were subjected to thematic analysis. These findings produced insightful descriptions of strong overarching factors: Knowledge Management Systems, Knowledge-Sharing Practice, Culture, and Decision-Making Processes. The next chapter will discuss the findings and the results of the qualitative study and the model development process.

CHAPTER FIVE: CONCEPTUAL MODEL AND HYPOTHESES

5.1 INTRODUCTION

Drawing on the findings of the qualitative analysis and the conceptual framework presented in chapter four, a focused literature review was conducted to discuss the findings of the exploratory stage. This chapter summarises, interprets and discusses the findings of chapter four in relation to the research question and objectives presented in chapter one, and prior research and theories presented in chapter two. The first part of this chapter discusses the findings of the semi-structured interview analysis. The second part describes the model development and research hypotheses, then the operationalisation of the variables used in the hypothesised model.

5.2 FACTORS AFFECTING KS IN USING KMSs to SUPPORT DMP in MNCs

In this study, 42 semi-structured interviews were conducted and a set of strong overarching themes concerning the factors affecting KS were identified based on analysis of the interviews. The participants in this study all use KMSs to support the DMP, most on a daily basis. Most respondents have more than five years' experience of using KMSs. The findings presented in chapter four indicated that participants in MNCs tend to use KMSs regularly to share best practice and knowledge with other branches all over the world, which is unsurprising as knowledge is the core of their business and the reason for their existence and survival. Without KMSs they cannot share knowledge appropriately. The thematic analysis used in this study highlighted the factors that affect KS in using KMSs to support the DMP in MNCs, and these are summarised in a conceptual framework (Figure 4-6) which comprises four core dimensions: Knowledge Management Systems, Knowledge Sharing Practice, Culture, and Decision-Making Processes. Findings are discussed in relation to literature in the following sections.

5.2.1 Knowledge Management Systems

In this dimension, three different themes were identified: Technology Acceptance, Communication Tools, and KMS Usage.

Technology acceptance affects the participant's decisions regarding using KMSs. In this study, technology acceptance depends on employees' perceptions regarding the usefulness and the ease of use of KMSs in supporting their job performance without extra effort. Interviewees stressed that employees in MNCs want KMSs to be easy to use, like the social networking tools that they use in their daily life (e.g. Twitter, Facebook, YouTube, Wikipedia, some applications on smart phones, Google, etc). They also want advanced and smart searching tools to be available in KMSs to enable them to search and find knowledge quickly and easily by codes, abbreviations, product, country, branch, region, keywords, etc. This finding is in line with some studies which show that the links between employees within social networks can facilitate KS and enhance the quality of knowledge shared (Coakes *et al.*, 2008; Cross and Cummings, 2004; Hansen *et al.*, 2005; Reagans and McEvily, 2003; Wang and Noe, 2010). Coakes *et al.* (2008) pointed out that "social networks hold those colleagues who are most trusted in central positions within the knowledge sharing activities". Similarly, Wang and Noe (2010) point out that KS may be embedded in broader organisational social networks such as communities of practice. Davis (1989) and Venkatesh *et al.* (2003) claimed that employees' expectations and attitudes are heavily grounded in the technology acceptance model, which describes how individual behaviours are influenced by beliefs and attitudes.

The participants believe that KMSs with artificial intelligence tools can support KS by automatically providing them with any knowledge related to their work, based on their search histories. Furthermore, participants highlight their need for speedy KMSs that are accessible anywhere at any time and are both easy to use and customise. This finding is consistent with some studies which showed that employees' perceptions regarding ease of use and usefulness of technology affect KS in organisations (Bock *et al.*, 2005; DeVries *et al.*, 2006; Lin, 2007; Wang and Noe, 2010).

Communication tools: participants prefer KMSs that have a variety of tools to help them in creating and sharing usable knowledge through an interactive, consolidated and user-centred design; they want KMSs to help them in finding, sharing, interacting and collaborating with each other in simple way. Recent technologies have also affected employees' behaviour, as the participants noted that they want to have KMS applications on their mobiles to enable them to share knowledge and documents with their colleagues easily at any time and from anywhere. Additionally, some participants have internal multi-media communication tools in their MNCs (i.e. intranet, TV channels, radio stations, magazines) which keep employees updated with the latest news regarding their work, best practice, markets and customers. However, MNCs use shared drives which allow employees to access different knowledge-bases but with different degrees of accessibility, according to their position, location and level of authority. As a result, participants point out the importance of having unified KMSs in all other branches to avoid any differences that might prevent them from sharing knowledge.

Overall, communication tools, social networks and the existence of networking connections can facilitate KS in MNCs. This importance was highlighted in the literature. For example, Michailova and Minbaeva (2012) state that KS does not occur automatically, but requires substantial organisational efforts aimed at encouraging close relationships between organisations' members. Similarly, Minbaeva *et al.*, (2003) maintain that organisations should invest in systems symbolised by continuous social interaction, communication of ideas, sharing of knowledge, and other acts associated with the social character of learning. Nonaka (1994), in his SECI model, pointed out that combination requires active use of organisational media, computerised networks, employee suggestion systems and organisational routines to capture knowledge. Chen (2007), Reagans and McEvily (2003) and Wang and Noe (2010) agreed that social networks and relationships between employees are positively related to the ease of KS as perceived by the knowledge sender, suggesting that networks and connections with knowledge receivers will motivate employees to share knowledge.

In most of the interviews, participants highlighted the importance of having tools in KMSs that enable them to get *feedback* on knowledge they shared; was this knowledge significant for others, how many employees used and shared it, and where? They believe that feedback will encourage employees to be involved in KS inside the organisation.

Wang and Noe (2010) commented that receiving feedback regarding the knowledge shared, how it is recognised by others, and how it has helped co-workers, will help the organisation to create competency, credibility, confidence and KS self efficacy which will increase the likelihood of KS between employees.

KMSs usage was highlighted in this study as an important theme that affects KS in MNCs; as already noted, most of the interviewees study have more than five years' experience in using KMSs, use them on a daily basis and consider them as a crucial part of their daily work. Participants also described the wide variety of KMS tools they use in KS and the DMP; tool selection depends on what they want to share or what they want to decide. Nicolas (2004) highlighted this point in his study and revealed that each KMS has an impact on the DMP, this impact depending on the KMS used; it is therefore recommended that organisations match the right KMS with their DM situations. Minbaeva (2007) emphasised the importance of involving MNC units in using KMSs with other branches, and stated that "the higher the degree of involvement of the focal subsidiary in network relations with other MNCs units, the higher the degree of KS". On the other hand, not all participants prefer to use KMSs for KS. For example, some of the executives over 50 years old in the Middle East prefer to use traditional ways of KS (i.e. telephone, fax, face-to-face, etc.); if they are required to use KMSs in their work, they just ask the people who work for them. Szulanski (2000) highlighted this point and mentioned that in spite of the increasing use of technology to facilitate KS within organisations, face-to-face communication and interaction is still an indispensable mechanism for KS, especially when more tacit knowledge is involved. Similarly, Wang and Noe (2010) pointed out that employees' personal characteristics and motivations may influence the extent to which they share knowledge using KMSs; for example, new employees might use KMSs because they are motivated to impress their supervisors.

5.2.2 Knowledge Sharing Practices

In this dimension, three different themes were identified: Content, Willingness to Share, and External Factors.

The Content of KMSs is perceived to be an important factor in KS to support DMPs in MNCs. The participants underlined the importance of reviewing all knowledge shared

between MNC units through a committee or knowledge-team to check the veracity and accuracy of knowledge uploaded on KMSs and to avoid any incorrect decisions or errors based on this knowledge. Additionally, interviewees remarked on the importance of keeping the content of KMSs secure and regularly updated to ensure that all knowledge is correct and accurate. The quality of the knowledge available in KMSs is essential; participants stressed that it must be precise, relevant to the topic in hand, easy to understand, accurate, complete, reliable and timely. The participants also highlighted that knowing the source of knowledge increases confidence and encourages employees to share and use it. Knowledge codification is also important for the interviewees, who noted that the process of standardising and developing a norm for a language in KMSs must be known and applicable to the knowledge shared between all branches of MNCs.

These findings are consistent with the literature. For example, Shin (2004) said that lack of up-to-date knowledge can hinder KS. Bordia *et al.* (2006) stated that employees' apprehension about KS may result from their perception that the shared knowledge might be inaccurate and likely to result in unfavourable criticism from others. Nemati *et al.* (2002) state that KM initiatives can facilitate capturing, coding and KS within organisations, which is expected to result in well informed decision processes. Furthermore, employees' doubts or mistrust about the knowledge and the networks that contain this knowledge might prevent KS in these organisations (Carnabuci and Operti, 2013). Several studies have shown that employees who are more confident in their ability to share knowledge are more likely to express their intention to do so, and report higher levels of engagement in KS (Cabrera *et al.*, 2006; Lin, 2007; Wang and Noe, 2010). Additionally, employees who believe that the contents of KMSs are useful see this as an incentive to share and use knowledge (Cabrera *et al.*, 2006; Kulkarni *et al.*, 2006; Wang and Noe, 2010).

Willingness to share: KS obviously cannot occur unless there is a willingness to share between senders and receivers. Some participants highlighted that they do not trust the knowledge that they have, so they are less willing to share it. Similarly, some respondents do not trust the knowledge shared through KMSs when they do not know the source; equally, they prefer to share knowledge with someone they know. Thus, most participants are willing to share knowledge with someone they know and trust rather than someone they do not know. These findings are consistent with a body of research

that demonstrates the relationships between these factors and KS. For example, Wu *et al.* (2007) pointed out that KS involves providing knowledge to another person or a team or community of practice with expectations of reciprocity. Ghoshal and Bartlett (1994) stated that unfriendly relationships between source and recipient might be a barrier to KS in organisations. Minbaeva (2007) developed and tested a model of KS in MNCs through analysing the relationships between knowledge senders and receivers. She found that, for receivers, “the higher the ability and motivation of the subsidiary’s employees to absorb knowledge (absorptive capacity), the higher the degree of KS”; and for senders, that “the higher the ability and motivation of the knowledge senders to share knowledge (disseminative capacity), the higher the degree of KS”. From this study, we can see that the success of KS among MNC units is not only a function of the characteristics of that knowledge but that it is also essential to take into consideration the characteristics of both sender and receiver in the KS process, as well as the context in which KS takes place. Similarly, Connelly and Kelloway (2003) and Lin (2007) highlighted that the willingness of experts and employees to help others is positively associated with their willingness to share knowledge.

Relationships between employees also affect knowledge utilisation and KS in MNCs. Inkpen and Dinur (1998) highlighted that organisations with open and informal power relationships between members will be more effective in KS, through better communication. On the other hand, organisations with formal and mechanistic structures may lose or misunderstand the knowledge shared between different managerial levels. Other research has shown that personal relationships and trust between employees are positively associated with the perceived helpfulness and the quantity of knowledge shared (Chiu *et al.*, 2006; Wang and Noe, 2010; Wasko and Faraj, 2005). Similarly, Politis (2003) highlighted that interpersonal trust between employees can facilitate KS, open communication, understanding of work-related problems and encourage organisational members to gather new knowledge that supports their decisions in solving problems. David *et al.* (2000) pointed out that the level of trust that exists between the organisation, its sub-units and its employees greatly influences the amount of knowledge shared between employees and entered into the firm’s databases, best practice archives and other records.

On the other hand, some participants consider knowledge as power, which will make them appear knowledgeable and experts in their organisations; this power will lead to promotion and powerful positions in the organisation. Consequently, they are willing to share knowledge only if they will be recognised as knowledgeable people in their organisations. Wang and Noe (2010) stated that employees have different concerns regarding losing or gaining power through KMSs. Losing power might occur because knowledge becomes widely available and might be seen by other employees who have not contributed to it. Gaining power may occur because KMSs make knowledge more accessible and easier to reach a wider audience, and therefore increase the possibility of receiving personal recognition. Different research highlighted that when knowledge is considered as a source of superiority and power, it will obstruct KS (Gupta and Govindarajan, 2000; ChanKim and Mauborgne, 1998; Szulanski, 1996). Considering knowledge as power might discourage KS between employees, as they might consider it as a source of distinction especially when organisations assess employees' knowledge in performance appraisals and link it to promotion, cash bonuses or downsizing (Bordia *et al.*, 2006; Foss *et al.*, 2010). Thomas-Hunt *et al.* (2003) maintain that acknowledging employees' expertise and the knowledge they share helps to increase KS within the organisation.

External factors: participants pointed out several external effects of KMSs. Politics plays a major role in KS, especially in the Middle East, and participants believed that their MNCs have hidden agendas which are influenced by politics. They also claimed that sometimes their organisations control the DMP through KMSs by providing or precluding specific knowledge to avoid or support specific decisions. They also noted that some branches cannot always access all knowledge in specific countries like Syria, for political reasons. Secondly, some participants said that MNC units operating in some African and Middle East countries are involved in fabrications and falsification practices, in corruption and in bribery. All of these practices are known to employees and accepted by their headquarters and managers, as they believe that this is how work is done in these countries. However, they cannot share this type of knowledge on KMSs. Mellahi *et al.*, (2011, p.2) pointed out that “substantial economic and political changes have been underway in most Middle Eastern countries which prompt the need for a closer look at emerging business opportunities and challenges for MNCs operating or considering entering the region”. Thirdly, the ICT infrastructure is itself considered as an

obstacle in specific countries, as MNCs experience network connections problems, especially in developing countries; thus KMSs in these branches might be down or slow because of the speed of the Internet or other connection problems.

5.2.3 Culture

In this dimension, three different themes were identified: National Culture, Organisational Culture, and Information Technology Culture.

Different national cultures or culture distance between employees in MNCs also affect KS and KMS use, as there are many employees working in MNCs with different nationalities, languages, norms and customs. Participants pointed out that some employees regularly use two different languages in KS (English and their national language), as not all employees speak English. Especially in the Middle East, participants use at least two languages in KS, English and, for example, Arabic, Hindi-Urdu, or Bengali. In other regions, for example Europe, knowledge is shared in English irrespective of nationality or mother tongue. Some participants would therefore prefer to have a translator or dictionary in the KMS to facilitate reading, writing, and sharing knowledge in any language. They also believe that informal meetings can break the ice between employees and lessen any cultural distance that might be a barrier to KS. Although cultural distance represents a big challenge to MNCs in KS, some participants suggest that working and sharing knowledge with employees from different cultures and nationalities is an advantage, because these differences will be shared and understood between employees, who will gain experience of other cultures.

These findings are consistent with the body of research that investigates the relationships between national culture and KS and the challenges to MNCs (Ford and Chan, 2003; Minbaeva, 2007; Wang and Noe, 2010). One of the top priorities of MNCs is to manage KS effectively to handle these differences (Monteiro *et al.*, 2008). Kostova *et al.* (2008, p.997) point out that “MNCs have complex internal environments, with spatial, cultural, and organisational distance, language barriers, inter-unit power struggles and possible inconsistencies and conflict among the interests, values, practices, and routines used in the various parts of the organisation”. Therefore, KS between MNC units requires

particular coordination mechanisms and tools in this complex environment (Ghoshal and Bartlett, 1995; Gupta and Govindarajan, 2000; Sia *et al.*, 2010).

David *et al.* (2000) stated that culture can shape assumptions about which knowledge is important, given that subcultures often lead their members to define important knowledge differently from other groups in the organisation. They also said that cultures with norms and practices that discourage open and honest exchanges between levels in the hierarchy create a context for communication that undermines effective KS. Other research also shows that minority and diverse employees affect KS; for example, Wang and Noe (2010) believe that employees who consider themselves as a minority in an organisation are less likely to be involved in KS with other employees. On the other hand, Sawng *et al.* (2006) pointed out that large organisations with a diversity of employees based on gender, education or nationalities are more likely to engage in KS.

Organisational culture includes values, visions, missions, incentives, consistency, and involvement. Participants pointed out that OC affects the way individuals and groups interact to share knowledge with managers, employees, customers and stakeholders to achieve the organisation's objectives and mission. Participants highlighted the importance of training and organisational learning in KS, as they believe that much knowledge can be shared during the training time, because the purpose of attending any training is to learn something new. The environment and the atmosphere of the training encourage employees and enable them to work as a team, share knowledge, collaborate with each other, and learn new issues. Most of the participants in this study consider OC as one of the key factors affecting organisational effectiveness and success through management support, consistency and involvement, and stressed that it is the dominant culture in a company regardless of employees' national cultures. They also said that their organisations encourage them to share knowledge through job rotation. For example, one respondent stated that in his organisation, no employee is allowed to spend more than two years in any one place. Some MNCs rotate their employees to spread the benefits of KS and their experience. Participants also drew attention to Human Resources Management (HRM) inside their organisations, as they consider this to be the most important department in any MNC; HRM can consider KS within the OC in recruitment, team orientation, training, promotion, motivation, and career development.

These findings are consistent with the research that has found a positive contribution of OC in supporting KS. For example, Grover and Davenport (2001) and Zheng *et al.* (2010) suggested that in order to have long-term and complete success in using knowledge for business advantage, some changes need to take place, mainly in core aspects of the business such as culture. Moreover, David *et al.* (2000) emphasised that the benefits of a new technology infrastructure will be limited if practices and long-standing organisational values are not supportive of KS across units. Management support is critical for the success of KS. For example, the support of top management, supervisors and co-workers affects the quality of KS through influencing employees' commitment to knowledge management, and increasing employees' KS and their perception of the usefulness of KS (Cabrera *et al.*, 2006; Kulkarni *et al.*, 2006; Lee *et al.*, 2006). Similarly, Wang and Noe (2010) recommended managers to provide the support necessary for encouraging KS among employees.

Other research has highlighted the importance of incentives in supporting KS in organisations. For example, Hansen *et al.* (2005) and Liebowitz and Megbolugbe (2003) identified incentives like recognition and rewards in facilitating KS and building a supportive culture. Shin (2004) pointed out that OC can facilitate knowledge creation and sharing by developing a positive work environment and effective reward systems. Voelpel *et al.* (2005) assert the need for MNCs to make adjustments to the motivations and incentives provided to employees to fit different cultural contexts, while Yao *et al.* (2007) confirmed the lack of incentives as a major barrier to KS across cultures. Kankanhalli *et al.* (2005) pointed out that other incentives, such as bonuses, promotion, and high salaries are positively related to the frequency of KS through KMSs. Similarly, Liao (2008) found that rewards and incentives are positively related to employees' KS. On the other hand, some authors revealed that rewards and motivations have a negative effect on attitudes toward KS (Bock and Kim, 2002; Bock *et al.*, 2005), and that an OC that emphasises competition between employees may pose a barrier to KS; cooperation between teams, however, helps to create trust, an essential condition for KS (Schepers and VandenBerg, 2007; Willem and Scarbrough, 2006). However, several studies have revealed that there is no relationship between rewards, incentives and KS among the members of an organisation (Kwok and Gao, 2005; Lin, 2007; Chang *et al.*, 2007). Brockman and Morgan (2003) and Huber (1991) also pointed out that consistency inside

an organisation helps in interpreting new knowledge across units and in achieving a high degree of efficiency in applying knowledge.

Thus, the importance of OC lies in its ability to have a direct effect on employees' KS behaviour as well as an indirect effect through influencing managers' attitudes (Wang and Noe, 2010). Therefore, organisations can support KS through creating opportunities for employees to interact, and encouraging communications between departments (Liebowitz and Megbolugbe, 2003; Yang and Chen, 2007).

Information Technology culture was highlighted as a theme in this study, although the participants perceived IT's pros and cons differently. They also drew attention to who should control IT in MNC units, the IT skills required from employees, and IT expenditure. Although little research has been done in analysing IT culture and its effect on KS, some assumptions that affect IT cultural patterns were highlighted by Leidner and Kayworth (2006): the fearful IT, the controlled IT, the revered IT, the demystified IT, and the integrated IT. These assumptions relate to IT control, IT's relation with strategy, IT skills, justification for IT expenditure, and who benefits (or loses) from IT.

5.2.4 Decision Making Processes

In this dimension, two themes were identified: the Extent of Analysis and the Speed of Decision Making.

The extent of analysis is seen as important in the DMP, as participants pointed out that KMSs cannot make decisions, but can offer knowledge and analysis that can help them in the DMP. They stress that KMSs are important in the early stages of DM, as they can identify sources of knowledge and establish what the decision makers need to know with regard to the issue or problem. For example, participants remarked that KMSs can help them in identifying experts who should be contacted, and who have experience and knowledge of specific issues. They also stated that KMSs can facilitate the analysis of DM as they believe that all data, information, knowledge, best practice, cases and documents are available and can be analysed easily through KMSs. They agreed that KMSs can be used in the formulation, evaluation and appraisal phases of DM, but they underlined that KMSs are more helpful in the formulation stage than the evaluation and

appraisal stages. They added that KMSs can provide them with many possible alternatives and can help them in verifying and clarifying why they should select a specific alternative and ignore others. The interviewees also confirmed that DM in MNCs is not based on individuals, but on a group which must be supported by insights or evidence to enable them to justify their decisions if asked to do so. However, some participants prefer not to use KMSs in DM, because they feel that their decisions will be based on what is available rather than on thinking about new solutions or alternatives that may not be available in these systems. In short, they believe that KMSs will discourage innovation and creativity in their MNCs.

This finding is consistent with research that highlighted the importance of technology and the DMP. For example, technology plays a vital role in businesses, as it helps employees in accessing the knowledge they need when they need it and provides the tools with which decision makers and users can leverage their knowledge in the context of their work (Chong and Chong, 2009; Bals *et al.*, 2007). Several tools have emerged to support complex DMPs and facilitate effective analytical thinking (Marakas, 2003). To a great extent, as organisations become complex there is an emphasis on decentralised DM. This tendency leads organisations to use KMSs with Decision Support Systems (DSS) to make effective and successful decisions. Appropriate integration of DSSs and KMSs will not only support the required interaction but will also create and find new opportunities for improving the quality of support provided by each system (Bolloju *et al.*, 2002). However, Turban *et al.* (2010) maintain that KMSs do not solve problems, but they can be integrated into a firm's business processes to provide help in solving problems by applying knowledge and sharing best practices.

The time and the speed of KMSs are essential characteristics for employees in MNCs; the interviewees preferred to use quick tools in KS in order to support DM and finish their work quickly. They use any tools that will enable them to accomplish their work quickly and effectively, and it does not matter which tool they use (e.g. phone, email, KMSs, face-to-face or chat). However, other participants consider the use of KMSs as time consuming, as they cannot explain to their managers the time they spend in finding the answers they were looking for. Overall, the vast majority of participants perceive that KMSs save time in searching, finding people, getting support documents, and finishing a task.

Leidner and Elam (1995) posited that using technological systems frequently and over time will be positively related to perceived problem identification and decision making speed for senior and middle managers. However, Szulanski (1996) stated that employees may feel that the time consumed in KS will deplete the time and effort available for their work activities; accordingly they will be less likely to share knowledge. Moreover, sometimes employees do not use KMSs in KS because of lack of time, unfamiliarity with the issue and the effort needed to codify and share knowledge, especially when there is weak trust between the employees who are contributing to or reusing the knowledge (Hew and Hara's 2007; Kankanhalli *et al.*, 2005; Wang and Noe, 2010).

5.3 RESULTS BASED ON QUALITATIVE ANALYSIS

Given the advent of the knowledge economy and the increasing magnitude of the knowledge society, this study highlights the factors that affect KS by using KMSs to support DMP in MNCs; these factors have four dimensions: Knowledge Management Systems, Knowledge Sharing Practice, Culture, and Decision-Making Processes.

Regarding Knowledge Management Systems, it is recommended that MNCs acknowledge evolution in the KMS tools that they use to share knowledge, by meeting employees' wants and needs and incorporating the latest common technologies, such as the social networking tools that they use in their daily lives (e.g. Google, Wikipedia, Twitter, Facebook, Skype, MSN, Smartphones, radio, TV channels for work, ... etc). This will make it easier and more comfortable for them to share their knowledge, by using tools similar to those in their personal lives. Taking into consideration preferences regarding ease of use and the usefulness of KMSs will enable employees to work and collaborate, and to be updated with news and practices from their MNC locally and in other branches all over the world.

Knowledge Sharing Practice is important, and employees care about the content and other issues when they share knowledge. The accuracy and quality of knowledge shared inside the MNC must be reviewed, secured, updated and controlled. Employees' willingness to share is also important, as it is an essential part of sending and receiving knowledge. It includes trust between employees. There are also some pragmatic issues

like corruption, ICT infrastructure and politics, mainly dependent on the countries in which the organisation is operating.

Cultural differences in MNCs cannot be ignored. Cultural distance between employees, organisational culture and IT culture must all be considered. Employees working in MNCs inevitably have different cultures, some of which prefer not to share knowledge which they see as a source of power and advantage over their colleagues; some employees will only share knowledge with people of their own nationality and in their own language. Others experience difficulty in contacting other employees in languages other than their own. Management support is therefore important to encourage employees to share their knowledge with employees in other departments and branches overseas. Organisation culture can facilitate KS inside an organisation by having a shared mission, consistency, incentives and rules to be followed to overcome any challenges. Incentives play a major role in encouraging employees to share knowledge, but in this study the incentives that were highlighted by respondents were not financial; they want to be recognised as knowledgeable persons inside their organisation, promoted, and spread their knowledge under their own names. Recent developments in the IT environment have introduced new requirements and changed the way of doing work, which is reflected in an organisation's results.

Knowledge sharing helps decision-making processes, and participants agree that KMSs can be used in the formulation, evaluation and appraisal phases of DMP, and especially the first stage. Using KMSs in KS will help decision makers in searching, identifying problems and making decisions quickly, increasing the extent of analysis, offering more alternatives and supplying different sources of knowledge.

5.4 MODEL DEVELOPMENT AND RESEARCH HYPOTHESES

As mentioned in chapter one, the aim of the study is to explore the factors that affect knowledge sharing by using KMSs to support decision-making processes in MNCs. A set of strong overarching themes concerning these factors were identified based on the qualitative analysis. However, based on the discussion and the literature review, this study focuses on seven themes of these variables that are central to this research study: organisational culture, perceived ease of use, perceived usefulness, KMS usage,

knowledge sharing, decision-making processes, and organisational effectiveness. The concepts and definitions of these variables were reviewed and summarised in chapters one and two. Other themes were excluded from the proposed model, because they are beyond the scope of this study, although they can be considered in future research. Also, due to the time constraints and the suggestions of the expert panel in AOM 2011. The third stage of the research process started with the focused literature review. In this stage of the research, literature was used deductively based on the findings of the qualitative study as a basis for formulating the hypotheses. This section now presents the twelve hypotheses that were proposed to be tested and analysed.

5.4.1 Knowledge Management Systems Usage

KMSs enhance the quality of KM by supplying tools for effective storage and sharing of knowledge, and through facilitating knowledge creation and KS (Shin, 2004). Bolloju *et al.* (2002) stressed that in order to assist the creation of new knowledge effectively, KMSs must support not only the creation, but also the gathering, organisation and sharing of existing knowledge. Furthermore, Holm *et al.* (2001) pointed out that in MNCs, knowledge can be generated in various parts and shared with diverse parts of an interconnected network of organisational units. Dennis and Vessey (2005) state that KMSs succeed in playing a vital and dynamic role in enabling employees in MNCs easily to find expertise residing in the organisation and to support interactions toward KS. Therefore, it is hypothesised that:

H1a: There is a positive and significant relationship between Knowledge Management System usage and Knowledge Sharing in MNCs.

Technology helps employees in accessing the knowledge they need when they need it, and provides the tools with which decision makers and users can leverage their knowledge in the context of their work (Chong and Chong, 2009). Moreover, Nielsen and Michailova (2007) point out that over the past three decades, many MNCs have considered KMSs for the purpose of sharing, utilising and integrating knowledge. They are often attributed with increasing the flexibility of MNCs, responding faster to the

current changing environment, improving DM and spurring greater innovation. Maier (2010) highlights different kinds of KMS that can be used to support DM in several ways. Nemati *et al.* (2002) state that KM initiatives can facilitate capturing, coding and KS within organisations, which is expected to result in well-informed decision processes. Therefore, it is hypothesised that:

H1b: There is a positive and significant relationship between Knowledge Management System usage and Decision-Making Processes in MNCs.

5.4.2 Technology Acceptance (Perceived Ease of Use and Perceived Usefulness)

Employees' expectations and attitudes are heavily grounded in the technology acceptance model, which describes how individual behaviours are influenced by beliefs and attitudes (Davis, 1989). Lin (2007) showed that job satisfaction, performance appraisals, organisational commitment, and employees' perceptions regarding ease of use and usefulness of technology can affect KS. Perceived usefulness is also seen as being directly impacted by perceived ease of use (Davis, 1989, 1993; Venkatesh *et al.*, 2003). Therefore, it is hypothesised that:

H2a: Perceived Ease of Use will have a positive and significant effect on users' Perceived Usefulness of KMSs in MNCs.

Davis (1989, 1993) and Venkatesh *et al.* (2003) explain through the technology acceptance model the impact of individuals' perceptions regarding their perceived ease of use towards a particular technological system that determines the actual use of this technology; it uses the individual's behavioural intention to use a system as a mediator. In the technology acceptance model, perceived ease of use was significantly correlated with intended use and actual system usage. Therefore, it is hypothesised that:

H2b: Perceived Ease of Use will have a positive and significant effect on Knowledge Management System usage in MNCs.

The technology acceptance model also demonstrated that it is individuals' perceptions based on their perceived usefulness towards a particular technological system that determine the actual use of this technology. In this model, perceived usefulness was significantly correlated with intended use and actual system usage (Davis, 1989, 1993; Venkatesh *et al.*, 2003). Therefore, it is hypothesised that:

H3a: Perceived Usefulness will have a positive and significant effect on Knowledge Management System usage in MNCs.

Furthermore, Lesser *et al.* (2001) showed how the usefulness of communities of practice like IT activities in MNCs can add value to the organisation by: creation of higher-quality knowledge, fewer surprises and planned revisions, greater capacity in dealing with unstructured problems, more effective KS among business and corporate staff units, improved likelihood of implementing joint goals, and improved employee skills and learning. Jennex *et al.* (2008) linked the usefulness of KMS usage and OE by suggesting measuring the success of KMSs in terms of organisational performance: product and service quality, productivity, innovative ability and activity, competitive capacity and position in the market, proximity to customers and customer satisfaction, employee satisfaction, communication and KS, and knowledge transparency and retention. Therefore, it is hypothesised that:

H3b: Perceived Usefulness will have a positive and significant effect on Organisational Effectiveness in MNCs.

5.4.3 Knowledge Sharing

Organisations are always seeking new ways of leveraging and sharing knowledge to support their decision-making processes, and that knowledge enables them to achieve their objectives through increasing their capacity for DM (DeTienne and Jackson, 2001; David *et al.*, 2000). Zhang and Lu (2007) suggested that in order to assist knowledge workers to make decisions efficiently and effectively, organisations should incorporate a

KM paradigm into the enterprise's business processes so that knowledge workers can share knowledge and use it effectively and efficiently in their daily work. Therefore, it is hypothesised that:

H4: There is a positive and significant relationship between Knowledge Sharing and Decision-Making Processes in MNCs.

5.4.4 Organisational Culture

Organisational culture affects the behaviour of knowledge workers in forming and adhering to KS, and using the knowledge in the context of KMSs (Huber, 2001). Alavi *et al.* (2006) emphasise the importance and influence of organisational culture on the use of KMSs and the outcomes of such use, stressing that “any differences in cultural values within firms will lead to divergent organisational and individual outcomes from KMSs use”. Kankanhalli *et al.* (2005) believe that organisational culture supports KS by using KMSs through different reward and incentive policies. Research has also shown that organisations with cultures emphasising innovation are more likely to use KMSs and facilitate KS through subjective norms that encourage sharing (Bock *et al.*, 2005; Ruppel and Harrington, 2001). Therefore, it is hypothesised that:

H5a: There is a positive and significant relationship between Organisational Culture and Knowledge Management System usage in MNCs.

Organisational culture determines “the basic beliefs, values, and norms regarding the why and how of knowledge generation, sharing, and utilisation in an organisation” (Rašula *et al.*, 2012). Organisational culture can facilitate knowledge sharing by developing a positive work environment and effective reward systems (Shin, 2004). Michailova and Minbaeva (2012) point out that knowledge is embedded and carried through organisational culture, policies, practices, systems and employees. Several studies imply a positive relationship between organisational culture and knowledge sharing (Huber, 1991; Young *et al.*, 2012). Therefore, it is hypothesised that:

H5b: There is a positive and significant relationship between Organisational Culture and Knowledge Sharing in MNCs.

Furthermore, organisational culture can facilitate KS, open communication, develop an understanding of work-related problems, and encourage organisational members to gather new knowledge in order to develop useful decisions (Politis, 2003). Therefore, it is hypothesised that:

H5c: There is a positive and significant relationship between Organisational Culture and Decision-Making Processes in MNCs.

Organisational culture is a source of competitive advantage, and several empirical researchers have shown that it is a significant factor in organisational effectiveness (Barney, 1991; Gordon and DiTomaso, 1992; Wilkins and Ouchi, 1983). Organisational culture is a key organisational asset and is associated with organisational effectiveness (Zheng *et al.*, 2010). Denison and Mishra (1995) and Fey and Denison (2003) agree that organisational culture encompasses the social and technical systems of organisations and also affects organisational effectiveness. Several studies imply a positive relationship between organisational culture and organisational effectiveness (Brockman and Morgan, 2003; Zheng *et al.*, 2010). Therefore, it is hypothesised that:

H5d: There is a positive and significant relationship between Organisational Culture and Organisational Effectiveness in MNCs.

5.4.5 Decision Making Processes

Decision-making processes significantly affect an organisation's ability to create, hold, understand and utilise knowledge (Inkpen and Dinur, 1998). Efficiency in DM has become more significant to organisations as the competitive environmental situations have increased and knowledge has become critical to organisational performance (Eisenhardt and Santos, 2002; Huber, 1990; Leidner and Elam, 1995). Wang and Noe (2010) say that decisions based on KM can help organisations in reducing costs, elaborating products and services, improving team performance, encouraging a firm's innovation capabilities and increasing sales and revenue from new products and services. Therefore, it is hypothesised that:

H6: There is a positive and significant relationship between Decision-Making Processes and Organisational Effectiveness in MNCs.

The twelve hypotheses are summarised in Figure 5-1. In this figure each path represents a hypothesised relationship.

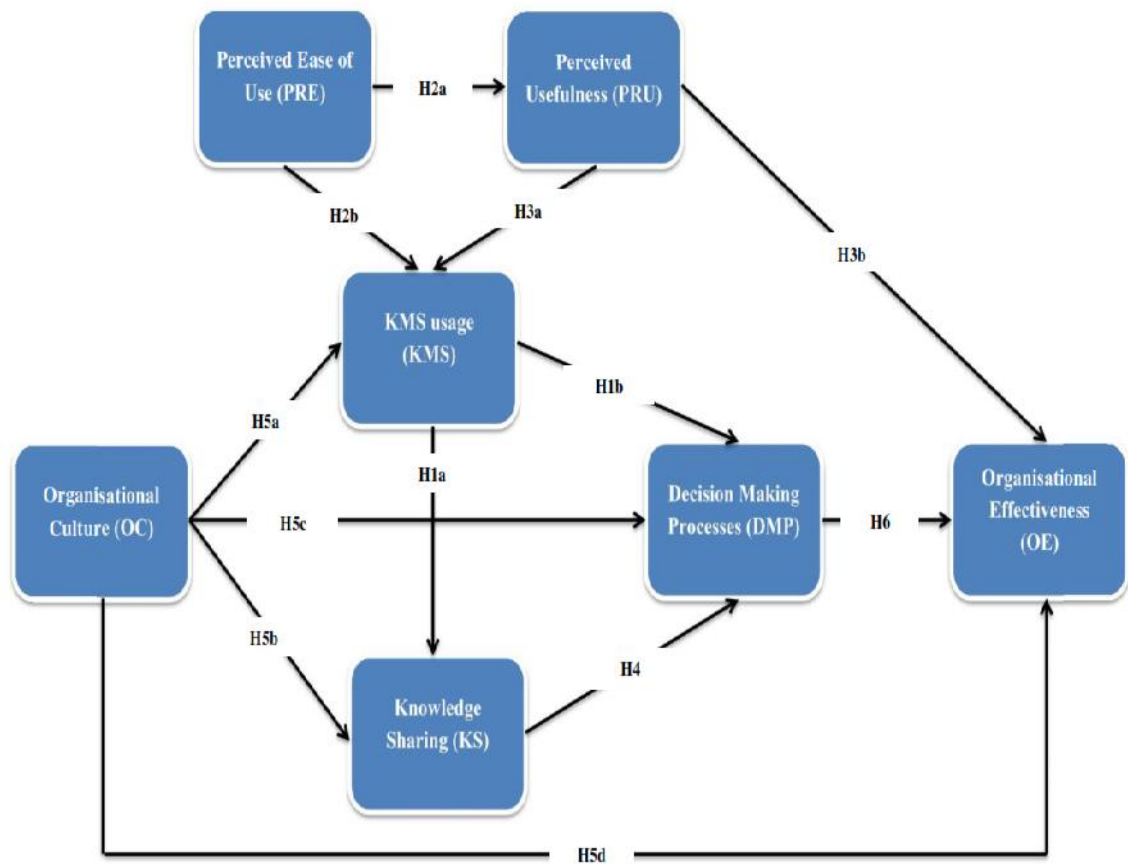


Figure 5- 1: Hypothesised Model

5.5 OPERATIONALISATION OF VARIABLES

In order to test the model and build upon previous research, a review of instruments used in other studies regarding the model variables was undertaken. Based on this review, survey items were derived. The following sections briefly discuss the instrument employed in the study; the design of the quantitative study is described in detail in chapter 6.

A self-administered survey was used to collect data on the seven constructs that were defined in the hypothesised model. Survey items were adapted from existing instruments used in previous research. The measurement item scales used in the survey questionnaire for all constructs showed high reliability and demonstrated convergent and discriminant validity in previous studies. All measures and scales are summarised in Table 5-1.

Table 5-1: Constructs and Measurement Items

Constructs	Measures	Items	Scales	Sources
Knowledge Management Systems usage (KMS)	The frequency of using KMS	<ul style="list-style-type: none"> • KMS1: With what frequency do you personally use Knowledge Management Systems (KMSs) in your organisation? • KMS2: With what frequency do you personally use Knowledge Management Systems (KMSs) for knowledge sharing in your organisation? 	7-point Likert Scale: From (1) Infrequently to (7) Daily	(Davis, 1993; He <i>et al.</i> , 2009; Leidner and Elam, 1993, 1995)
Perceived Ease of Use (PRE)	The ease of using KMS	<p><i>Using your own opinion and judgement, please state to what extent you agree or disagree with the following:</i></p> <ul style="list-style-type: none"> • PRE1: Learning to operate KMS is easy for me • PRE2: I find it easy to get KMS to do what I want it to do • PRE3: My interaction with KMS is clear and understandable • PRE4: I find KMSs are flexible to interact with • PRE5: It is easy for me to become skilful at using KMS • PRE6: I find KMS to be easy to use 	7-point Likert Scale: From (1) Strongly Disagree to (7) Strongly Agree	(Adams <i>et al.</i> , 1992; Davis, 1989; 1993)
Perceived Usefulness (PRU)	The usefulness of using KMS	<p><i>Using your own opinion and judgement, please state to what extent you agree or disagree with the following:</i></p> <ul style="list-style-type: none"> • PRU1: Using KMS in my job enables me to accomplish tasks more quickly • PRU2: Using KMS improves my job performance • PRU3: Using KMS in my job increases my productivity • PRU4: Using KMS enhances my effectiveness in my job • PRU5: Using KMS makes it easier to do my job • PRU6: I find KMS to be useful in my job 	7-point Likert Scale: From (1) Strongly Disagree to (7) Strongly Agree	(Adams <i>et al.</i> , 1992; Davis, 1989; 1993)
Knowledge Sharing (KS)	The extent to which respondents have gained and used knowledge from colleagues in their own departments, as well as from colleagues in other departments	<p><i>Using your own opinion and judgement, please indicate to what extent you:</i></p> <ul style="list-style-type: none"> • KS1: Gain knowledge from colleagues in your own department • KS2: Use knowledge from colleagues in your own department • KS3: Gain knowledge from colleagues in other departments • KS4: Use knowledge from colleagues in other departments 	7-point Likert Scale: From (1) Not at all to (7) Completely	(Michailova and Minbaeva, 2012; (Minbaeva <i>et al.</i> , 2003)

Organisational Culture (OC)	Involvement; Consistency; Adaptability and Mission	<p><i>Using your own opinion and judgement, please state to what extent you agree or disagree with the following: In my organisation.....</i></p> <p><u>Involvement (INV):</u></p> <ul style="list-style-type: none"> • INV1: Decisions are usually made at the level where the best knowledge is available • INV2: Knowledge is widely shared so that everyone can get the knowledge he or she needs when it's needed • INV3: Everyone believes that he or she can have a positive impact • INV4: Working in this organisation is like being part of a team • INV5: This organisation relies on horizontal control and coordination to get work done, rather than hierarchy • INV6: Teams are the primary building blocks of this organisation • INV7: Compared with our competitors, this organisation is constantly improving in many dimensions • INV8: This organisation is continuously investing in the skills of employees • INV9: The capability of people in this organisation is viewed as an important source of competitive advantage <p><u>Consistency (CON):</u></p> <ul style="list-style-type: none"> • CON1: The leaders and managers follow the guidelines that they set for the rest of the organisation • CON2: There is a clear and consistent set of values in this organisation that governs the way we do business • CON3: This organisation has an ethical code that guides our behaviour and tells us right from wrong • CON4: When disagreements occur, we work hard to achieve solutions that benefit both parties in the disagreement • CON5: It is easy to reach consensus, even on difficult issues • CON6: We often have trouble reaching agreement on key issues • CON7: People from different organisational units still share a common perspective 	7-point Likert Scale: From (1) Strongly Disagree to (7) Strongly Agree	(Denison, 1990; Denison and Mishra, 1995; Denison <i>et al.</i> 2006; Fey and Denison, 2003)
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		<ul style="list-style-type: none"> • CON8: It is easy to coordinate projects across functional units in this organisation • CON9: There is good alignment of goals across levels of this organisation <p><u>Adaptability (ADP):</u></p> <ul style="list-style-type: none"> • ADP1: This organisation is very responsive and changes easily • ADP2: This organisation responds well to competitors and other changes in the business environment • ADP3: This organisation continually adopts new and improved ways to do work • ADP4: Customer comments and recommendations often lead to changes in this organisation • ADP5: Customer input directly influences our decisions • ADP6: The interests of the final customer often get ignored in our decisions • ADP7: We view failure as an opportunity for learning and improvement • ADP8: This organisation encourages and rewards those who take risk • ADP9: We make certain that we coordinate our actions and efforts between different units in this organisation <p><u>Mission (MIS):</u></p> <ul style="list-style-type: none"> • MIS1: This organisation has long-term purpose and direction • MIS2: This organisation has a clear mission that gives meaning and direction to our work • MIS3: This organisation has a clear strategy for the future • MIS4: There is widespread agreement about the goals of this organisation • MIS5: Leaders of this organisation set goals that are ambitious, but realistic • MIS6: The leadership has clearly stated the objectives we are trying to meet • MIS7: We have a shared vision of what this organisation will be like in the future • MIS8: Leaders of this organisation have a long-term orientation • MIS9: Our vision creates excitement and motivation for our employees 		
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Decision-Making Processes (DMP)	Problem Identification Speed; DM Speed and the Extent of Analysis in DM	<p><i>Using your own opinion and judgement, please indicate to what extent you:</i></p> <p><u>Problem Identification Speed (PIS):</u></p> <ul style="list-style-type: none"> • PIS1: Identify potential problems faster • PIS2: Sense the key factors impacting your area of responsibility • PIS3: Notice potential problems before they become serious crises <p><u>DM Speed (DMS):</u></p> <ul style="list-style-type: none"> • DMS1: Make decisions quicker • DMS2: Shorten the time frame for making decisions • DMS3: Spend less time in meetings <p><u>The Extent of Analysis in DM (DMA):</u></p> <ul style="list-style-type: none"> • DMA1: Spend significantly more time analysing data before making a decision • DMA2: Examine more alternatives in decision making • DMA3: Use more sources of information in decision making • DMA4: Engage in more in-depth analysis 	7-point Likert Scale: From (1) Not at all to (7) Completely	(Leidner and Elam, 1993; Leidner and Elam, 1995)
Organisational Effectiveness (OE)	Comparing the overall performance of the organisation with key competitors	<p><i>How do you compare the overall performance of your organisation with the key competitors':</i></p> <ul style="list-style-type: none"> • OE1: Market share • OE2: Sales growth • OE3: Profitability • OE4: Employee satisfaction • OE5: Quality of products and/or services • OE6: New product development 	7-point Likert Scale: From (1) Extremely Poor to (7) Excellent	(Denison and Mishra, 1995; Denison <i>et al.</i> 2006; Fey and Denison, 2003)

5.5.1 Measuring Organisational Culture

Items measuring organisational culture were adapted from Denison and his colleagues: Denison (1990), Denison and Mishra (1995), and Fey and Denison (2003); they included four dimensions: adaptability, consistency, involvement and mission. The scale measures to what extent an organisation is perceived to display the four dimensions of characteristics. Organisational culture was measured by using thirty six statements, with nine questions for each dimension.

5.5.2 Measuring Perceived Ease of Use and Usefulness

The technology acceptance model was used in this study to measure perceived ease of use and perceived usefulness; the measures were adapted from Adams *et al.* (1992) and Davis (1989; 1993). The model comprises twelve statements, six statements assessing the perceived ease of use, and six the perceived usefulness of the KMS usage in the organisation.

5.5.3 Measuring Knowledge Management System Usage

Measures assessing KMS usage were adapted from Davis (1993), He *et al.* (2009) and Leidner and Elam (1993, 1995). KMS usage was measured according to its frequency of use by the respondent; it comprises two questions focused on the frequency of using KMSs in the organisation and in knowledge sharing.

5.5.4 Measuring Knowledge Sharing

In line with Michailova and Minbaeva (2012) and Minbaeva *et al.* (2003), knowledge sharing was measured through four questions on the extent to which the respondent acquires potentially useful knowledge and utilises this knowledge in his/her own operations. In other words, respondents were asked to indicate the extent to which they have gained and used knowledge from colleagues in their own departments, as well as from colleagues in other departments.

5.5.5 Measuring Decision-Making Processes

There are many decision-making process variables which might be affected by the use of computer-based systems. Specific items were adapted from Leidner and Elam (1993; 1995), who have received considerable attention for their recent theory on the impact of advanced information technology use on decision making in organisations and are well

grounded in organisational research. Decision-making process variables used in this study involve three dimensions: problem-identification speed, decision-making speed, and the extent of analysis in decision making. Decision-making processes were measured by responses to ten statements: three questions for each of the first two dimensions, and four questions for the third.

5.5.6 Measuring Organisational Effectiveness

Measuring organisational effectiveness is difficult because each organisation has various and fragmented activities that pursue multiple goals (Daft, 2009). Ellinger *et al.* (2002) have identified two different perspectives regarding organisational effectiveness: objective and perceptual. The objective perspective involves financial measures such as return on investment (ROI), return on equity (ROE) and return on assets (ROA). Banker *et al.* (2004) and Kaplan and Norton (2001) criticise the use of objective financial measures in assessing organisational effectiveness because they do not reflect the company's skills and the competencies that organisations are striving to master today. The perceptual perspective includes employees' perceptions of how effective the organisation is compared to its most significant competitors in achieving goals such as market share, profitability, sales growth, employee satisfaction, quality of products and/or services and new product development (Deshpande *et al.*, 1993; Lee and Choi, 2003; Mcadam and Bailie, 2002).

Perceptual measures were used in this study to measure organisational effectiveness. Measures were adapted from Denison (1990), Denison and Mishra (1995), and Fey and Denison (2003) to measure organisational members' perceptions of the degree of market share, sales growth, profitability, employee satisfaction, quality of products and/or services and new product development of the organisation in comparison with key competitors. Six statements were used to measure organisational effectiveness. While some scholars have criticised the use of subjective measures of effectiveness, Denison and Mishra (1995), Fey and Denison (2003) and Zheng *et al.* (2010) found them useful for several reasons. First, MNCs' accounting standards are different from one country to another and it is difficult in practice to obtain financial data of MNCs. Second, MNCs have such diverse goals because they are operating in different sectors and in different countries, so measuring their financial performance makes little sense. Third, practically no centrally collected financial information is available. Finally, MNCs in some regions

like the Middle-East are often secretive and unwilling to share their financial information. Thus, the benefits of using subjective measures far outweigh the drawbacks. Furthermore, there is good precedent for using perceptual measures (Delaney and Huselid 1996; Denison and Mishra 1995; Fey and Denison, 2003).

5.6 CONCLUSION

This chapter summarised the conceptual model used in this study. The systems relationships in the model were identified and the twelve research hypotheses were defined. The chapter also identified the measurements that were adapted from previously validated instruments to form a survey. The next chapter will discuss the quantitative part of this research study in detail.

CHAPTER SIX: QUANTITATIVE ANALYSIS

6.1 INTRODUCTION

This chapter outlines the data collection and quantitative analysis used in this study. A survey approach was used to collect data and the questionnaire was based on validated, reliable scales and survey instruments used in previous studies. Descriptive statistics in the Statistical Package for the Social Sciences (SPSS) were used to describe the constructs, sample and characteristics of the respondents. Quantitative analysis was conducted by applying Structured Equation Modelling (SEM) through the Analysis of Mean and Covariance Structures (AMOS) software to model and assess the relationships between constructs in the hypothesised model. Results of this study are the findings of confirmatory factor analysis, the structural model and examination of the hypothesised model.

6.2 QUESTIONNAIRE DESIGN

At this stage of the research, a quantitative data collection method and survey approach was conducted to obtain data regarding the usage of KMSs in KS to support DMP in MNCs. A cross-sectional study was used in the data collection, employing a survey method. This section illustrates the questionnaire design in details.

A survey design provides a quantitative or numeric research description of trends, attitudes, or opinions of a population by studying a sample of that population (Creswell, 2009). Tashakkori and Teddlie (2002) highlighted the strengths of using questionnaire as follows: appropriate for measuring attitudes and electing other content from research participants, inexpensive, has perceived anonymity by respondents, has a moderately high measurements validity and reliability for a well-constructed and validated questionnaire, and ease of data analysis. Saunders *et al.*, (2009) state that questionnaire can collect data through asking people to respond to exactly the same set of questions, and data collected can be coded and analysed by computer. In designing the questionnaire, researchers should be clear about the data they wish to collect, enabling the researcher to obtain accurate data regarding (Foddy, 1994). Questionnaire design affects the response rate, reliability and validity of the collected data. DeVaus (2002)

stresses that response rate, validity and reliability can be maximised through careful design, a clear and pleasant layout, lucid explanation of the purpose, pilot testing, and carefully planned and executed administration of the questionnaire.

The data collection for this study was based on the beliefs and opinions of the respondents. McDaniel and Gates (2001) state that designing a questionnaire involves a logical series of steps which may vary slightly from researcher to researcher, but still tend to follow the same general sequence. Consequently, the steps shown in Figure 6-1 were followed in designing and implementing the questionnaire. The following sections provide more details regarding the questionnaire design and the development process of the survey.

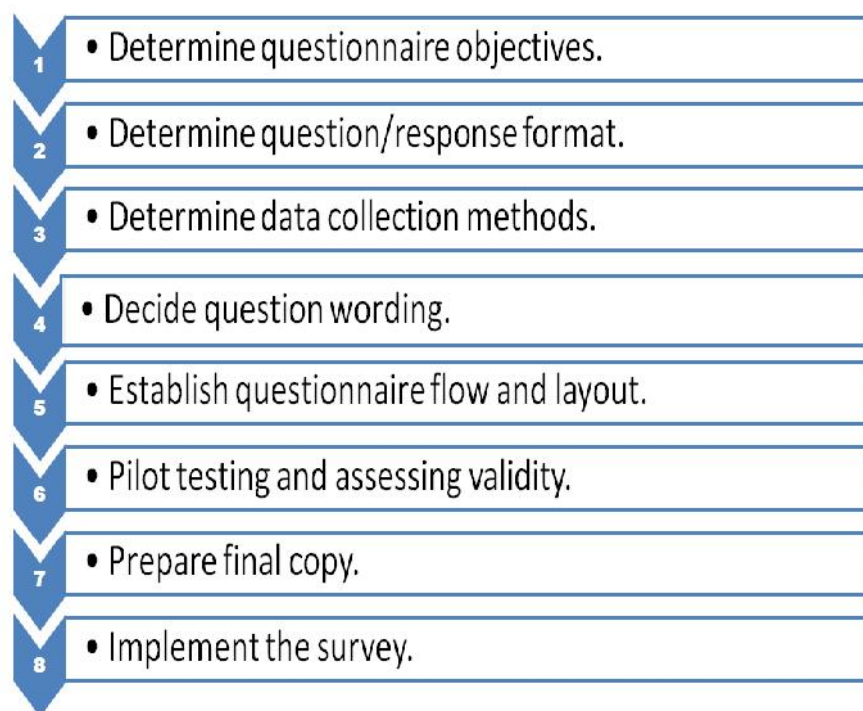


Figure 6- 1: Steps of Designing Questionnaire

1- Determine questionnaire's objectives:

The purpose of designing this questionnaire is to test the research model devised in this study by developing questions derived from the literature review to find the relationships between variables that affect KS by using KMS to support DMP in MNCs.

2- Determine question/response format:

Questions are arranged based on the literature review and the new conceptual framework derived from the semi-structured interviews and the qualitative analysis of this study. In this study, both nominal and ordinal scales were used. Nominal scales were used in questions about participants' demographic characteristics and organisational profiles. Ordinal scales (seven-point Likert scales) were used to investigate participants' beliefs and opinions regarding the research constructs and to test the relationships between these constructs in the research model. The questionnaire consists of 91 questions, one open ended and the remainder closed, and including rating on a Likert scale, list questions, category questions, multiple choices, multiple answers and fill-in, the entire survey is included in *Appendix D*.

Table 6-1 summarises the relationships between the questionnaire's objectives, constructs, hypotheses, scales and questions. The constructs were operationalised and adapted from validated items based on prior relevant research as illustrated in section 5.5

Table 6- 1: Objectives, Hypotheses, Variables, Hypothesised Relationships, Scales, and Questions

Objectives	Constructs	Hypothesis	Hypothesis Relationships	Scales	Questions Numbers
Identify participant’s demographic characteristics, profiles and KMS usage experience		-----	-----	Nominal	1-19
Investigate the influence of Knowledge Management Systems (KMS) usage on Knowledge Sharing (KS) and Decision Making Processes (DMP)	KMS usage (KMS)	H1a: There is a positive and significant relationship between Knowledge Management Systems usage and Knowledge Sharing in MNCs. H1b: There is a positive and significant relationship between Knowledge Management Systems usage and Decision Making Processes in MNCs.	KMS KS KMS DMP	7 points Likert Scale	20 and 33
Investigate the influence of participant’s Perceived Ease of Use (PRE) on Knowledge Management Systems (KMS) usage and Perceived Usefulness (PRU)	Perceived Ease of Use (PRE)	H2a: Perceived Ease of Use will have a positive and significant effect on user’s Perceived Usefulness of KMS in MNCs. H2b: Perceived Ease of Use will have a positive and significant effect on Knowledge Management Systems usage in MNCs.	PRE PRU PRE KMS	7 points Likert Scale	21-26
Investigate the influence of participant’s Perceived Usefulness (PRU) on Knowledge Management Systems (KMS) usage and Organisational Effectiveness (OE)	Perceived Usefulness (PRU)	H3a: Perceived Usefulness will have a positive and significant effect on Knowledge Management Systems usage in MNCs. H3b: Perceived Usefulness will have a positive and significant effect on Organisational Effectiveness in MNCs.	PRU KMS PRU OE	7 points Likert Scale	27-32
Investigate the influence of Knowledge Sharing (KS) on Decision Making Processes (DMP)	Knowledge Sharing (KS)	H4: There is a positive and significant relationship between Knowledge Sharing and Decision Making Processes in MNCs.	KS DMP	7 points Likert Scale	34-37

Investigate the influence of Organisational Culture (OC) on Knowledge Management Systems (KMS) usage, Decision Making Processes (DMP), Knowledge Sharing (KS) and Organisational Effectiveness (OE)	Organisational Culture (OC)	<p>H5a: There is a positive and significant relationship between Organisational Culture and Knowledge Management Systems usage in MNCs.</p> <p>H5b: There is a positive and significant relationship between Organisational Culture and Knowledge Sharing in MNCs.</p> <p>H5c: There is a positive and significant relationship between Organisational Culture and Decision Making Processes in MNCs.</p> <p>H5d: There is a positive and significant relationship between Organisational Culture and Organisational Effectiveness in MNCs.</p>	<p>OC KMS</p> <p>OC KS</p> <p>OC DMP</p> <p>OC OE</p>	7 points Likert Scale	38-73
Investigate the influence of Decision Making Processes (DMP) on Organisational Effectiveness (OE)	Decision Making Processes (DMP)	H6: There is a positive and significant relationship between Decision Making Processes and Organisational Effectiveness in MNCs.	DMP OE	7 points Likert Scale	74-83
Examining the Organisational Effectiveness (OE) by comparing the organisation's performance with the performance of similar organisations	Organisational Effectiveness (OE)	-----	-----	7 points Likert Scale	84-89

For ease of use, the questions were divided into five groups and used only five screen pages to make it simple and less time consuming. All participants were allowed to navigate forward and backwards through the survey pages and change answers as they saw fit.

- *Part One:* Demographics and professional information regarding the respondents and their organisations
- *Part Two:* Knowledge Management Systems, Perceived Ease of Use, Perceived Usefulness and Knowledge Sharing
- *Part Three:* Organisational Culture
- *Part Four:* Decision-Making Processes and Organisational Effectiveness
- *Part Five:* Participants' comments

Part one of the questionnaire involved seventeen questions covering the demographic characteristics of the respondents and their professional details, such as gender, age, nationality, country of residence, work experience, job title, department, managerial level and their experience in using KMSs. Part one also included questions about their organisational profile: industry type, business activities, number of employees and location of headquarters. Questions 15 and 16 were used to test the qualifications of the respondents to participate in this research: respectively, whether their organisations are MNCs and whether they are using KMSs in their organisations. If both answers were YES, the online questionnaire continued and moved to part two, but if the answer to question 15 was NO, the questionnaire terminated automatically with a message of thanks for their willingness to participate in the survey. If the answer to question 16 was NO, participants were moved to another screen and asked to identify reasons for their not using a KMS, after which the questionnaire ended as before.

Parts two, three and four of the questionnaire involved 72 closed questions regarding the variables of the new model, derived from the literature review.

Part two contained a series of questions relating specifically to KMS usage, the participant's perceptions regarding KMS ease of use and usefulness, and knowledge sharing. Questions 18 and 19 identified types of KMS that participants might use in their organisations, and asked how many years' experience they have in using KMSs. Questions 20 and 33 focused on the frequency of using KMS in their organisation and the frequency of using KMS in knowledge sharing. Questions 21 to 26 measured the

participant's perceptions regarding KMS ease of use, while 27-32 measured the perceptions regarding KMS usefulness. Knowledge sharing was measured by questions 34-37.

Part three covered 36 questions measuring the organisational culture: questions 38-46 measured involvement, 47-55 consistency, 56-64 adaptability, and 65-73 the organisation's mission.

Part four measured decision-making processes and organisational effectiveness. Decision making was measured by ten questions: 74-76 covered the speed of problem identification, 77-79 the decision-making speed, and 80-83 the extent of analysis in decision making. Organisational effectiveness was measured by questions 84-89.

In the final part, the open-ended question asked participants to comment on or make suggestions about KMS, KS and DM in MNCs, based on their own experience. Finally, they had the opportunity to give their email address if they were interested in receiving an electronic copy of the final research findings. They were then thanked for their time and contribution to the research.

3- Determine data collection methods:

The purpose of the data collection process is to gather information and opinions about the research question or the research topic from the target participants (Churchill, 2005). Receiving a high response rate from the participants depends on designing the questionnaire to be clearly worded and well laid out. Cooper and Schindler (2003), Saunders *et al.* (2009), Sekaran (2000) and Zikmund (2012) highlight different techniques for collecting primary data using a questionnaire, such as postal, telephone, internet and intranet-mediated and delivery and collection questionnaires, meeting face-to-face with participants, and a combination of these techniques. The data for this study was collected by using an internet and intranet-mediated questionnaire. The subjects of the study were contacted in two different ways. First, the interviewees who participated in the exploratory research were contacted to fill in the questionnaire and were asked to forward it within their organisation to colleagues in different branches through intranet and e-mail. Second, the ORBIS database was used to find the contact details of MNC

directors in Europe and the Middle-East. Accordingly, the method chosen for data collection in this research was a self-administered, internet-mediated questionnaire or “online-questionnaire”.

4- Decide the wording of questions:

The wording of each question needs careful consideration to make sure that the responses are valid and measure what they are intended to measure (Cooper and Schindler, 2001; Frazer and Lawley, 2000; Saunders *et al.*, 2009). The wording for all questions was kept brief and simple to avoid ambiguity and leading questions. To ensure that adequate responses were provided and participant’s biases and measurement errors were minimised, both the literature review and discussions with practitioners and experts helped in improving the question wording.

5- Establish questionnaire flow and layout:

In organising the flow of the questions in the questionnaire, qualifying questions were located to screen out unqualified respondents, following warm-up questions to catch the respondent’s interest. Answers requiring some work and concentration were located in the middle half of the second third of the questionnaire, and the word “Finally” on page five was written as a prompt at a strategic point; the open-ended question was located at the end of the questionnaire to prevent respondents from feeling bored.

6- Pilot testing:

After sufficient review and revision of the electronic questionnaire, a pilot study was performed, to assist in fine-tuning the survey and in identifying and eliminating potential problems before deploying the questionnaire to the intended participants. The pilot survey was online, sent by e-mail to 40 participants for evaluating its validity, readability, accuracy and usability. Trial-run participants were asked to provide feedback on these criteria, in addition to a mean estimate of the time required to complete the survey, on this link: http://mbs.qualtrics.com/SE/?SID=SV_9Yct4PXcRPgELLC

The sample used in the pre-test stage comprised 15 potential respondents, 15 MBA students and ten researchers who are knowledgeable about the subject. The duration of the pilot study was two weeks from 2nd to 14th December 2011. In total, thirty-five questionnaires were returned, a response rate of 87.5%. The feedback from the practitioners and researchers was beneficial in determining the validity, duration, clarity,

language and where the answering process was becoming boring in the questionnaire. These 35 participants were not included in the final data collection. The reliability of the measures used in the questionnaire was tested using the internal consistency test “Cronbach’s alpha” to know whether these questions measure a specific criterion or not and to test the reliability of each variable. Pallant (2010) states that the scale is considered reliable and acceptable if the value of alpha is above 0.7, while a reliability score of 0.6 is also considered acceptable (Nunnally, 1978).

In this study Cronbach’s alpha coefficient was calculated for each variable in the questionnaire. Table 6-2 presents the internal consistency and reliability of the constructs using Cronbach’s alpha coefficients:

Table 6- 2: Reliability and Internal Consistency

Constructs	Items	Cronbach’s Alpha
Organisational Culture: Involvement (INV)	9	0.812
Organisational Culture: Consistency (CON)	9	0.881
Organisational Culture: Adaptability (ADP)	9	0.936
Organisational Culture: Mission (MIS)	9	0.947
<i>All items of Organisational Culture (OC)</i>	<i>36</i>	<i>0.960</i>
Perceived Ease of Use (PRE)	6	0.955
Perceived Usefulness (PRU)	6	0.945
Knowledge Management Systems Usage (KMS)	2	0.855
Knowledge Sharing (KS)	4	0.870
Decision Making Processes: Problem Identification Speed (PIS)	3	0.932
Decision Making Processes: Decision Making Speed (DMS)	3	0.944
Decision Making Processes: The extent of Analysis in Decision Making (DMA)	4	0.920
<i>All items of Decision Making Processes (DMP)</i>	<i>10</i>	<i>0.955</i>
Organisational Effectiveness (OE)	6	0.864

Every variable’s reliability score exceeded 0.8, ranging from 0.812 to 0.960. Thus, although the items were largely derived from previous studies, the high alphas indicate that the variables are reliable.

7- Prepare final copy:

Revisions were made according to the input from the pilot survey participants, and an information sheet and covering letter were prepared for the deployment of the final survey; an introductory page was sent by e-mail to provide basic information about

survey content, instructions, assurance of anonymity and by holding responses in strict confidence. Additionally, a brief definition of some terminology used in the questionnaire was given, and respondents were given the option to receive the eventual research findings.

8- *Spreading the survey:*

After an acceptable sequence of questions was established, the survey was constructed using a web-based survey engine “Qualtrics” provided by Manchester Business School, and the instruments were designed and built using its online tools and posted on the following website: http://mbs.qualtrics.com/SE/?SID=SV_bQ6Nj5xmeuAJCol. Questionnaires were distributed over a three-month period from 19th December 2011 to the middle of March 2012. The electronic survey was deployed and potential participants were contacted via e-mail. E-mail correspondence and telephone contacts were used to follow up with the respondents. Reminder e-mails were also sent to the participants, approximately ten days after the initial contact. Invitations with a link to the questionnaire were sent by e-mail with a consent form, and the information sheet explaining the purpose of the research and ensuring the confidentiality of the data gathered. Example copies of contact correspondence and the entire survey are included in *Appendix D*. The questionnaire had been developed with appropriate wording and response structure in order to make it easy for participants to go through it, encourage them to respond, and facilitate data analysis; its design was based on the research question, hypotheses and previous studies, along with the recommendations and guidelines for better response outcomes.

6.2 SAMPLING TECHNIQUES

Sampling techniques provide a range of methods that enable researchers to reduce the amount of data they need to collect by considering only data from a sub-group rather than all possible cases or elements (Saunders *et al.*, 2009). The research is aimed at a target population of decision makers who share knowledge via KMSs in MNCs. No reliable data on this topic was available, so a non-probability sampling technique was used and the sample was selected in a non-random manner. It is also imperative to note that it is difficult and usually impossible to reach and collect data from the entire population owing to restrictions of time, money and often access. The sampling techniques used in this study are self-selection sampling and snowball sampling. *Self-*

selection sampling is “a non-probability sampling technique in which the participants are allowed to identify their desire to be part of the sample and take part in the research” (Bradley, 1999). It can be used with other sampling techniques, like snowball or convenience sampling, which will help the researcher in identifying appropriate participants who can richly inform the research and also provide adequate data sources (Fossey *et al.*, 2002; Oates, 2006; Saunders *et al.*, 2009). Accordingly, the snowball sampling technique was also used. *Snowball sampling* is a non-probability sampling technique in which subsequent respondents are obtained from information provided by initial respondents (Oates, 2006). It is commonly used when it is difficult to identify members of the desired population. Thus, this study used an online questionnaire and was more concerned about the decision-making users of KMS in MNCs, so an invitation asking for participants to fill in a questionnaire was sent through various means such as the ORBIS database. ORBIS is a global company database containing information, names of directors and contact details for the top 215,000 global MNCs; it is accessible via the University of Manchester Library. The respondents who participated in the interviews and the self-selection sample were asked to fill in the questionnaire and identify more people who are qualified to participate and are interested in the research area.

6.2.1 Sample Size

Factors affecting the size of the sample that needs to be collected include the availability of resources, accuracy, the confidence that is needed in the findings, time and likely categories for analysis (Baruch, 1999; Bradley, 1999; DeVaus, 2002; Luck and Rubin, 1987; Saunders *et al.*, 2009). Consequently, the decision regarding the sample size in this study was based on the factors mentioned above and on the selected statistical analysis method, Structural Equation Modelling (SEM). Like other statistical techniques, SEM requires an appropriate sample size in order to obtain reliable estimates (Hair *et al.*, 2010), and not less than 200 is recommended to be appropriate by different authors to guarantee robust SEM and to provide parameter estimates with any degree of confidence (Boomsma, 1985; Boomsma and Hoogland, 2001; Byrne, 2010; Gerbing and Anderson, 1993; Hair *et al.*, 2010; Harris and Schaubroeck, 1990; Kline, 2005). ORBIS identified 1209 MNCs in Europe and the Middle-East region (EME), 589 of them with valid e-mail and contact details. The determination of sample size was also influenced by population characteristics. Considering the busy schedules of the population under study

and the deadline for submitting the thesis, 631 questionnaires were distributed (589 identified by ORBIS + the 42 subjects who had participated in the semi-structured interview) in order to get the required sample size and to ensure a satisfactory return rate.

6.3 DATA COLLECTION AND ANALYSIS

This section illustrates the analysis of the data collected through the questionnaire using SPSS version 20.0 and AMOS version 20. SPSS was used to analyse the preliminary data, and AMOS for Structural Equation Modelling (SEM) for the measurement model analysis and structural model to test the proposed hypothesised model. Selected statistical methods were employed to analyse data and achieve the research objectives. In data analysis, first the response rate achieved is reported, followed by the demographic characteristics and respondents' profiles, and then descriptive statistics and normality tests regarding the items of measured constructs.

6.3.1 Response Rate

241 completed questionnaires were returned out of 631, a response rate of 38.2%. However, 20 responses were discarded because 13 of them are not operating in the EME region, and 7 respondents had given the same answers to all the Likert scale items. Thus, Figure 6-2 illustrates that 221 questionnaires were used for further data analysis, with a response rate of 35%.

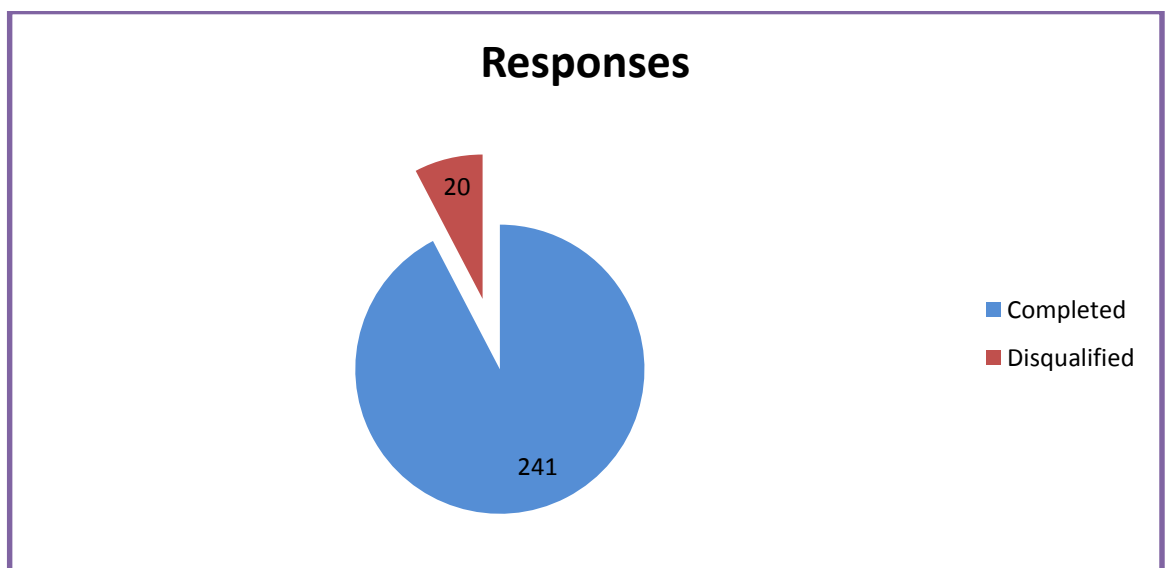


Figure 6- 2: Total Responses of the Questionnaire

6.3.2 Respondents' Demographic Characteristics and Profiles

The professional profiles of participants and their MNCs provide valuable information about the context in which the research findings are applicable. The 221 participants represent a diverse cross-section of businesses and different managerial levels in different countries. The survey questionnaire was targeted at KMS professionals, users, practitioners, decision makers and managers working in MNCs in the EME region and using KMSs in knowledge sharing and DMP. These profiles were analysed with the objective of determining the demographic characteristics of the respondents and the organisations they represent. The following survey questions were used to create the profiles.

Gender:

Most of the respondents were male (77%). See Figure 6-3.

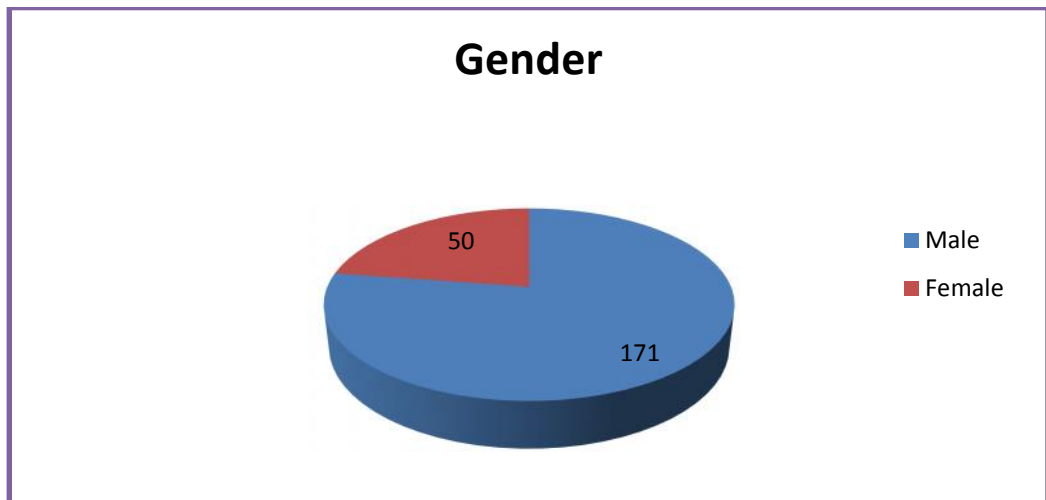


Figure 6- 31: Gender

Age:

The majority of participants (67%) were aged 25-35, and the second highest group (16%) were 36-45. See Figure 6-4.

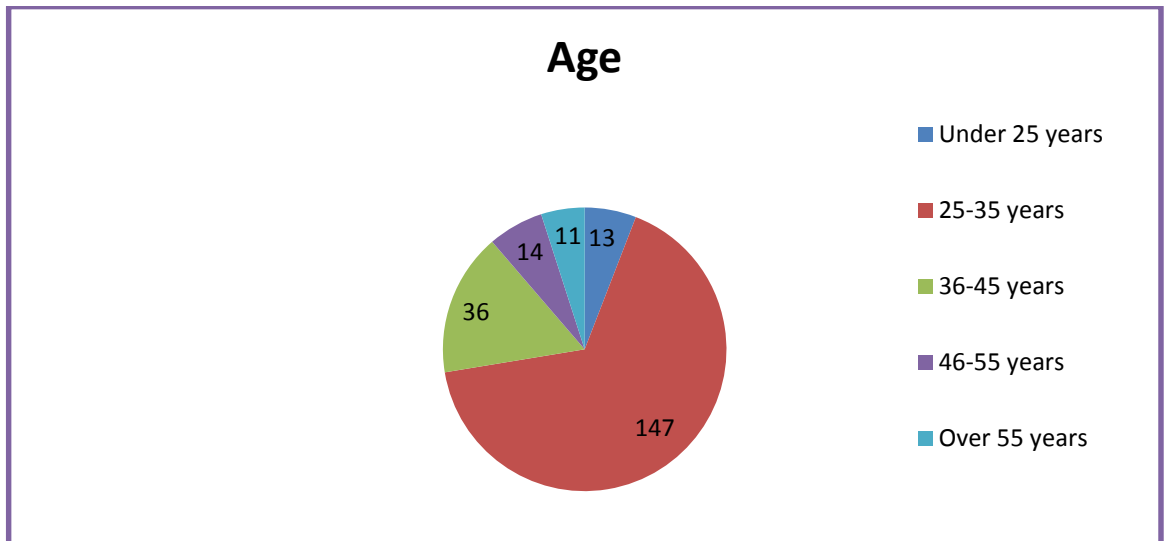


Figure 6- 4: Age

Country of Nationality:

Since we are living in the era of globalisation and the knowledge economy, it was important to identify the nationality of the respondents. 41 different nationalities were identified in the study, summarised and grouped according to region (Europe – Middle-East – Other regions) in Figure 6-5.

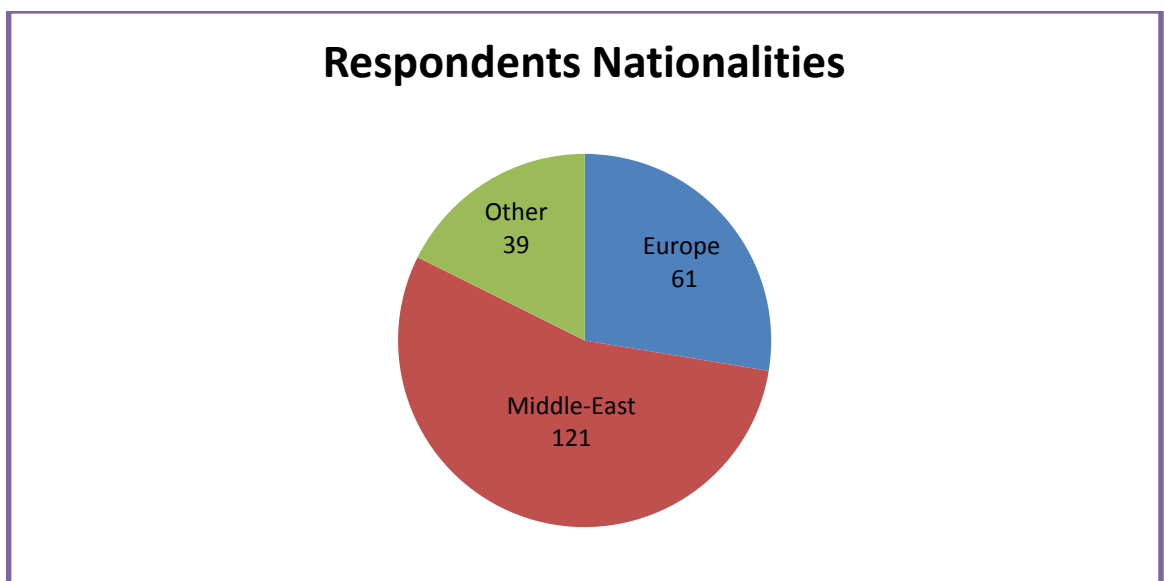


Figure 6- 5: Respondents Nationalities

Business Sectors:

Question 4 asked each participant to indicate the type of business or industry they represent. The results are presented in Figure 6-6. The largest sector (22%) represented IT/Software.

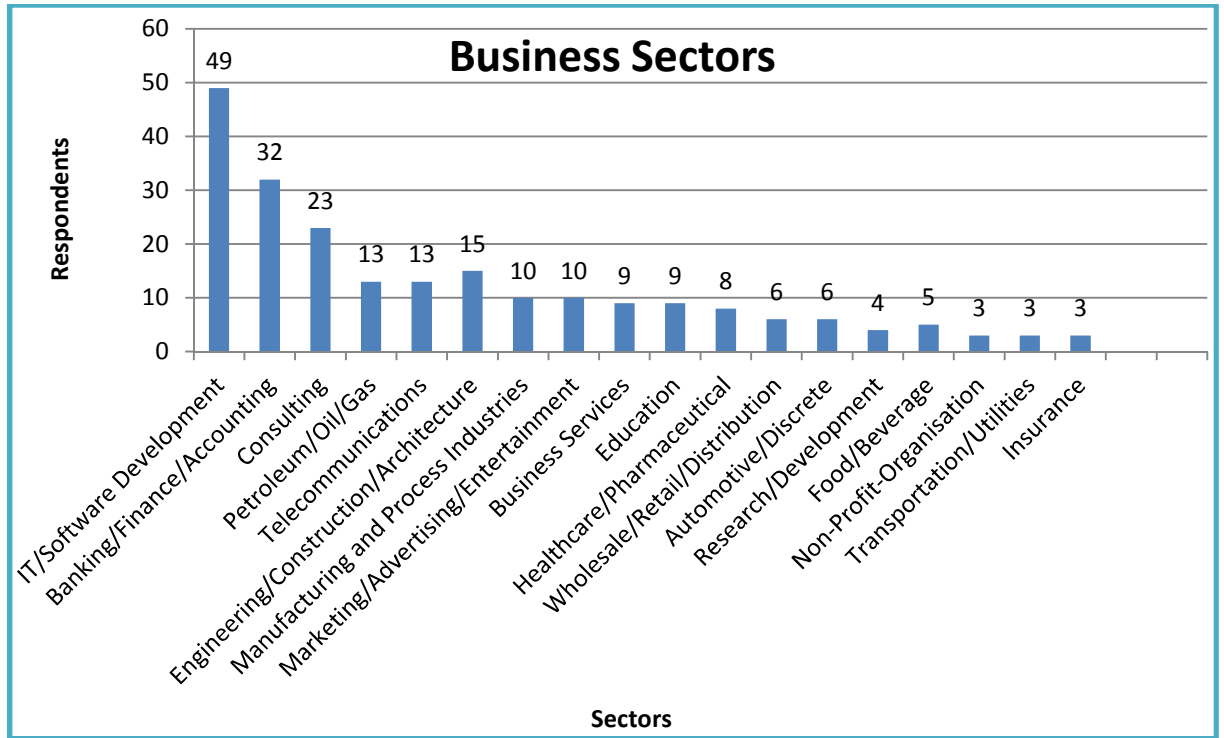


Figure 6- 6: Business Sectors

Business Activities:

The vast majority of respondents (73%) are working in service activities, 11% in manufacturing activities and 16% in both. Figure 6-7 shows the business activities of respondents.

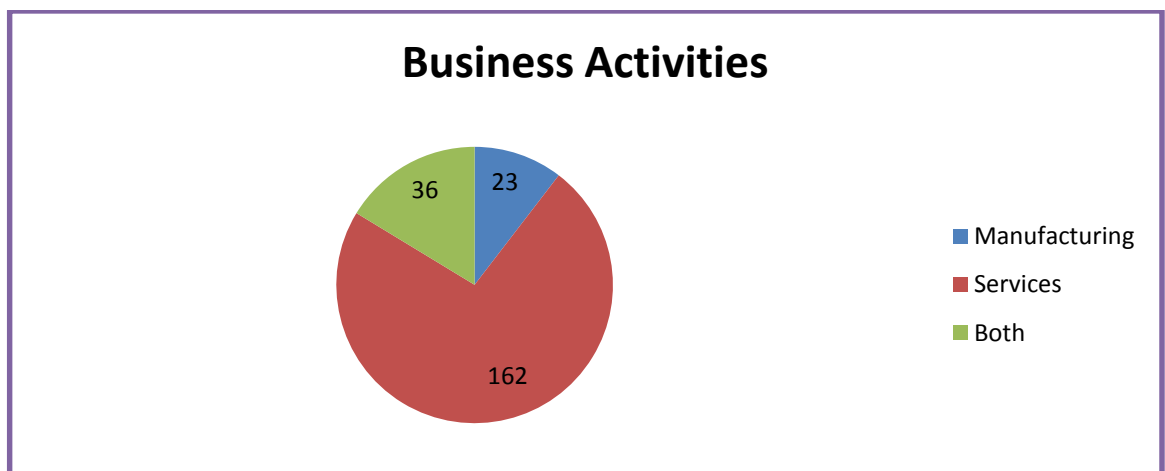


Figure 6- 7: Business Activities

Number of Employees work for the company "Branch":

Figure 6-8 shows that 29% of the respondents are working in MNCs with 100-499 employees, 19% with 1000-4999 employees and 12% with more than 5000 employees in their own branch.

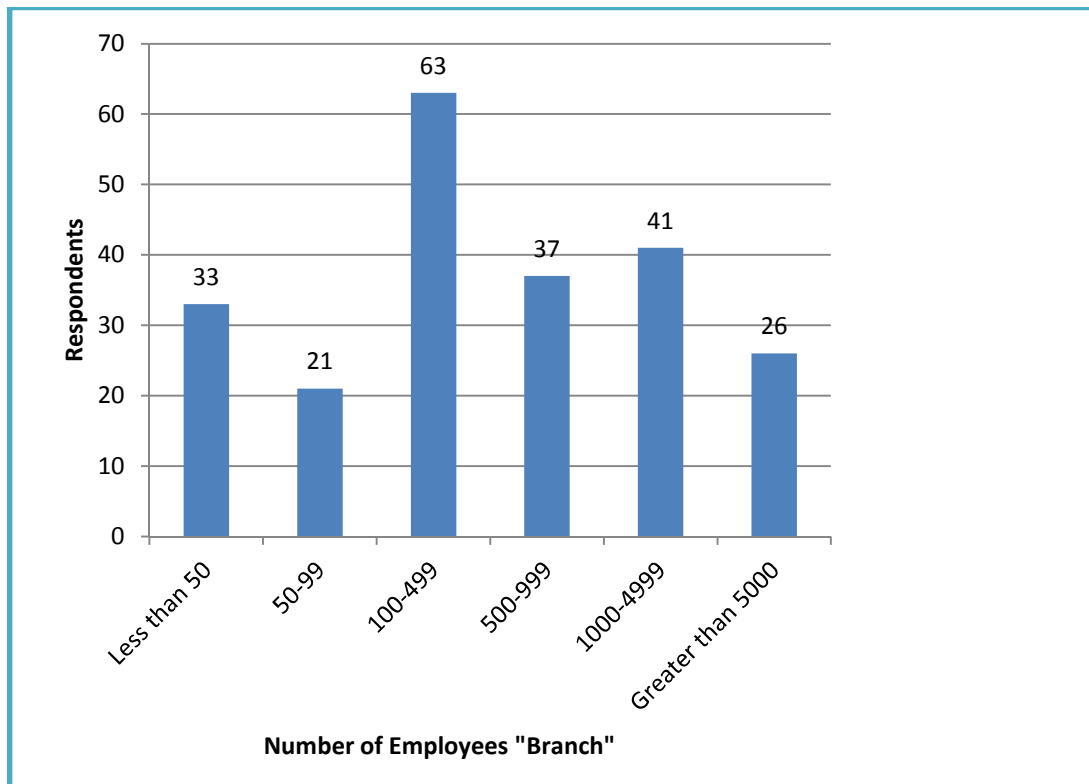


Figure 6- 8: Number of Employees in the Branch

Number of Employees work for the company worldwide:

The majority of respondents (59%) are working in MNCs with more than 5000 employees worldwide. Figure 6-9 shows that only 11% of respondents are working in organisations with fewer than 50 employees worldwide.

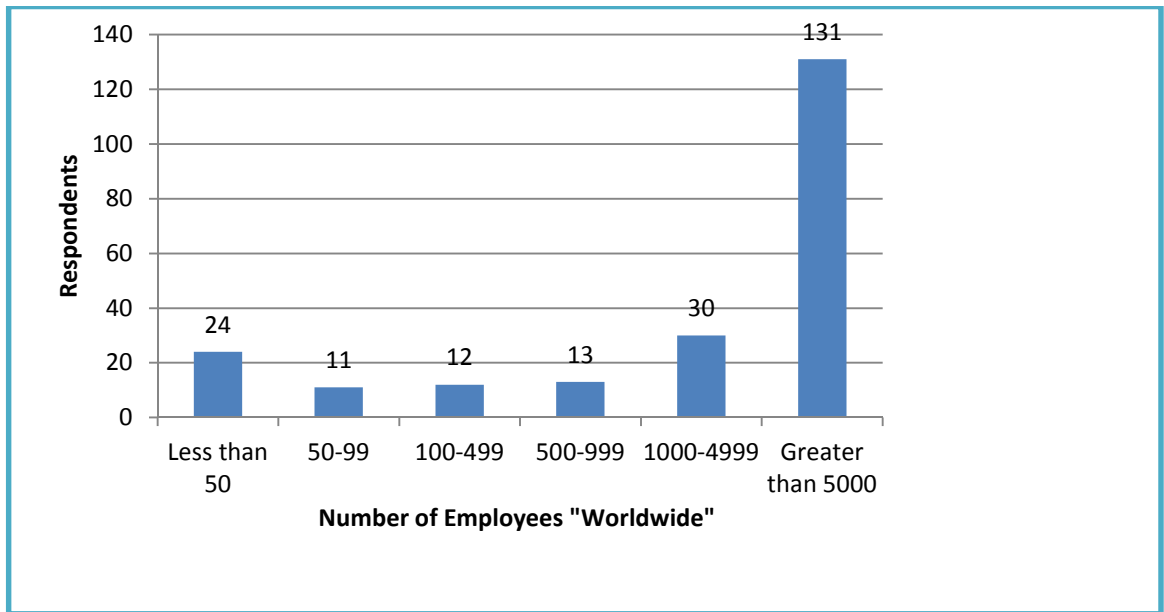


Figure 6- 9: Number of Employees Worldwide

Country of Response:

Respondents were asked about the countries they are working in. Responses indicated 20 countries: 9 in Europe and 11 in the Middle-East. As explained before, 13 participants were disqualified because they are not operating in the EME region. Table 6-3 shows countries of response in the EME region.

Table 6- 3: Countries of Response

Countries of response					
Europe			Middle-East		
Country	n	%	Country	n	%
Austria	5	2.3	Bahrain	5	2.3
France	12	5.4	Egypt	34	15.4
Germany	15	6.8	Iraq	7	3.2
Greece	11	4.9	Jordan	5	2.3
Italy	7	3.2	Kuwait	6	2.7
Netherlands	8	3.6	Lebanon	5	2.3
Spain	4	1.8	Libya	7	3.2
Switzerland	5	2.3	Qatar	10	4.5
United Kingdom	37	16.7	Saudi Arabia	18	8.1
			Syria	3	1.4
			United Arab Emirates	17	7.7
Total	104	47%	Total	117	53%

Headquarter Countries:

There are 25 headquarter countries: 12 in Europe, 8 in the Middle-East, 2 in North America and 3 in Asia. The results are presented in Table 6-4.

Table 6- 4: Head Quarter Countries

Region	Headquarter Countries	
	n	%
Asia:		
India	3	1.4
Japan	2	0.9
South Korea	2	0.9
Europe:		
Austria	3	1.4
Denmark	1	0.4
Finland	1	0.4
France	11	4.9
Germany	15	6.8
Greece	5	2.3
Italy	3	1.4
Netherlands	3	1.4
Spain	2	0.9
Sweden	3	1.4
Switzerland	4	1.8
United Kingdom	48	21.7
Middle-East:		
Bahrain	3	1.4
Egypt	21	9.5
Jordan	2	0.9
Kuwait	5	2.3
Lebanon	2	0.9
Qatar	6	2.7
Saudi Arabia	12	5.4
United Arab Emirates	10	4.5
North America:		
Canada	2	0.9
United States	52	23.5
Total: 25 Countries	221	100%

Job Title:

Participants were asked to write the title that best describes their job functions. They include Chief Executive Officers, General Manager, Knowledge Manager, Consultant, Financial Analyst, HR Executives Project Manager and other titles. The results are presented in Table 6-5.

Table 6- 5: Job Title

Job Title	n	%
Account Executives/Directors/Managers	10	4.5
Audit Managers/Seniors	12	5.4
Business Intelligence Executives/Directors/Managers	6	2.7
Business Development Executives/Directors/Managers	7	3.2
Chief Executive Officers	4	1.8
Communications Managers/Specialists	7	3.2
Customer Services Directors/Managers	10	4.5
Consultants	10	4.5
Database Engineers/Managers	6	2.7
Decision Analysts	5	2.3
Financial Services Analysts/Executives/Directors/Managers	19	8.7
General Managers	6	2.7
Human Resources Directors/Managers	11	4.9
IT Executives/Directors/Managers	27	12.2
Knowledge Management Executives/Directors/Managers	5	2.3
Legal Affairs Manager	3	1.4
Marketing Executives/Directors/Managers	6	2.7
Product Development Manager	7	3.2
Project Executives/Directors/Managers	12	5.4
Public Relations Executives/Directors/Managers	6	2.7
Quality Assurance Executives/Directors/Managers	6	2.7
Researchers	5	2.3
Research & Development Executives/Directors/Managers	4	1.8
Risk Manager	3	1.4
Sales Executives/Directors/Managers	11	4.9
Services Development Executives/Directors/Managers	8	3.6
Supply Chain Executives/Directors/Managers	5	2.3
Total	221	100%

Managerial Levels:

The respondents were asked about their own managerial level in their organisation. Top-level management is represented by 14% of participants, 31% middle-level management, and around 14% for the supervisory level. See Figure 6-10.

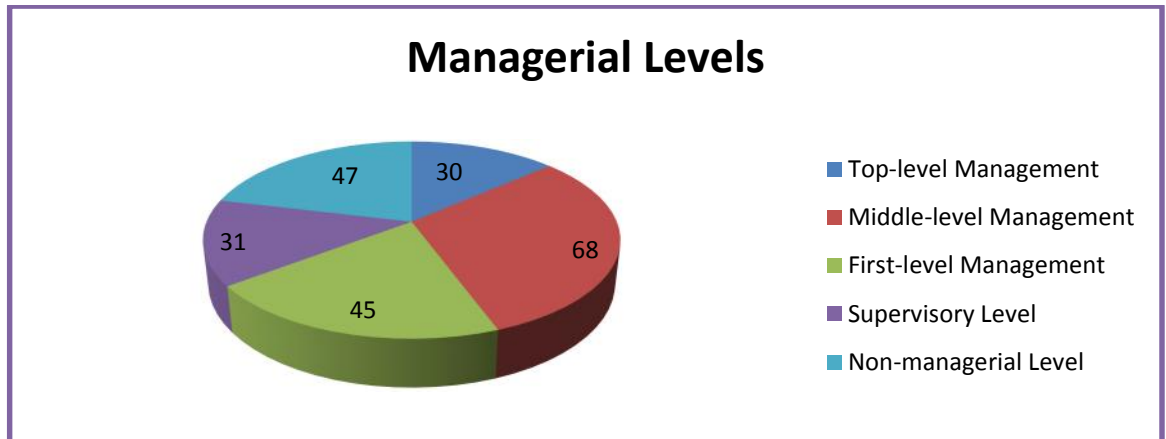


Figure 6- 10: Managerial Levels

Departments:

Participants are working in a variety of departments. Ten categories were established, but some participants identified others, such as compliance, insurance, decision analysis, project and change management, procurement services and corporate legal affairs. Figure 6-11 shows the responses to this question.

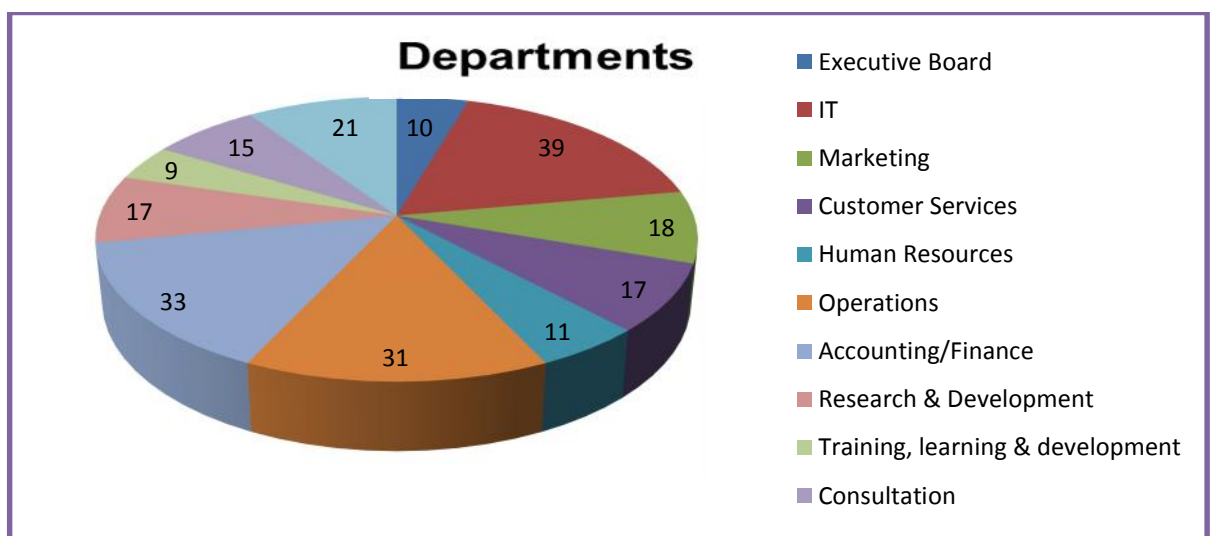


Figure 6- 11: Departments

Work experience:

Participants were asked how long they have been working in their organisations. Figure 6-12 illustrates that most have more than 4 years' work experience in their organisations.

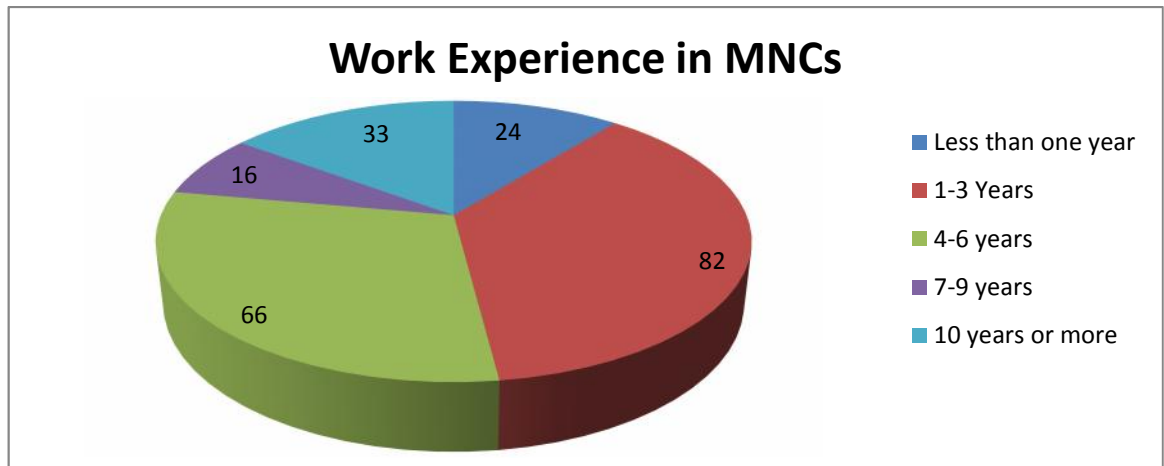


Figure 6- 12: Work Experience in MNCs

Multinational Corporations:

In this question, participants were asked whether or not their organisations are MNCs, in order to identify their eligibility for this research. As already explained, 11 participants were disqualified from the study.

Participants' KMS usage:

Question 16 also tested the qualifications of the respondents by asking whether they are using KMSs. The answer "YES" moved them on to part two. If the answer was "NO", another screen asked them to explain why, after which the questionnaire ended; 30 participants fell into this category. Six reasons were presented to the participants, with one option allowing them to specify other reasons in an open-ended text response. Participants were given the option of choosing one or multiple reasons. One respondent selected "other, please specify" in question 17 and contributed the following comment: "I request it but top management does not see a real value for such system". Further study of the reasons for not using KMSs in organisations and of organisational attitudes toward KMS is recommended. Figure 6-13 shows the reasons for not using KMS in MNCs.

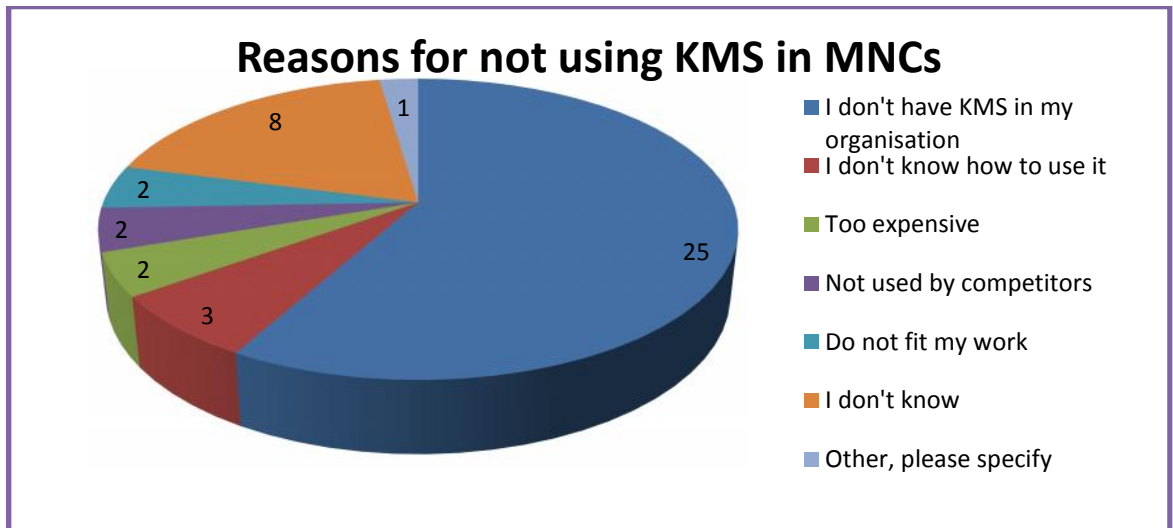


Figure 6- 13: Reasons for Not Using KMS in MNCs

KMS tools used in MNCs:

This question asked participants to select the KMS tools that they use in their organisations. Based on the literature review, a list of nineteen tools was presented and respondents were given the option of choosing one or more. All the tools are used in MNCs, but “Intranet/Enterprise Knowledge Portals” is the most frequently selected tool (66%). From this table we can also see that the least-used is “Knowledge Harvesting Tools”, (9%). Table 6-6 illustrates the KMS tools used in MNCs.

Table 6- 6: KMS Tools Used in MNCs

KMS Tools	n	%
Collaborative Computing Tools	80	36%
Knowledge Servers	61	28%
Intranet / Enterprise Knowledge Portals	146	66%
Electronic Document Management	107	48%
Knowledge Harvesting Tools	19	9%
Search Engines	100	45%
Knowledge Management Suites	29	13%
Competitive intelligence systems	26	12%
Supply chain management systems	62	28%
Customer relationship management systems	89	40%
Knowledge repository/base	60	27%
E-learning	117	53%
Multimedia conferencing	95	43%
Groupware	26	12%
Directory of experts	45	20%
Electronic discussion board / forum	62	28%
Business intelligence	57	26%
Instant massaging / chatting	105	48%
Decision support systems	35	16%
Other, please specify	16	7%
I don't know	13	6%

13 participants did not know which KMS tools were used in their organisation and, 16 respondents identified other KMS tools used that were not mentioned in the list: Tacit Knowledge Capturing Tools, Knowledge Networks, Knowledge Detection Status, Yammer, SharePoint, Knowledge Sharing Web Based cloud (Drop-Box), Custom Build Tools and Document Management System.

Participants' Experience in using KMS:

Responses to this question indicated that all the respondents have KMS experience, with around 18% having less than 1 year and 43% more than five years. The results are illustrated in Figure 6-14.

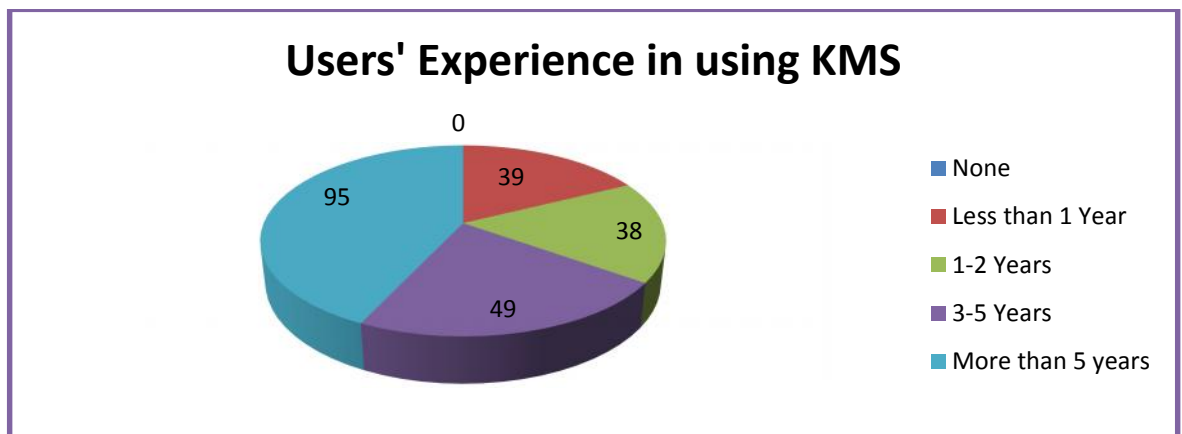


Figure 6- 14: Users' Experience in Using KMS

6.3.3 Summary of demographic characteristics and profiles

In summary, the answers to the questions mentioned above indicated that respondents to the survey questionnaire are KMS professionals and practitioners and they represent:

- A variety of positions in MNCs.
- MNCs with various types of business.
- Different types of department.
- MNCs from different countries in the EME region.
- Both male and female.
- Different managerial levels.
- Have different years of work experience in MNCs.
- Use different KMS tools.
- Have different years of experience in using KMS tools.

Since almost all respondents indicated that they are using KMS and working in MNCs, their responses can be used to examine KS by using KMSs to support DMP in MNCs. Table 6-7 summarises the demographic characteristics and profiles of survey respondents.

Table 6- 7: Demographic Characteristics and Profiles of Survey Respondents (n=221)

Variable	Category	Frequency	%
Gender	Male	171	77
	Female	50	23
Age	Under 25 years	13	6
	25-35 years	147	67
	36-45 years	36	16
	46-55 years	14	6
	Over 55 years	11	5
Country of Nationality	Europe	61	28
	Middle-East	121	54
	Other	39	18
Business Activities	Manufacturing	23	11
	Services	162	73
	Both	36	16
Number of Employees at company location	Less than 50	33	15
	50 - 99	21	9
	100 - 499	63	28
	500 - 999	37	17
	1,000 - 4,999	41	19
	5,000 or more	26	12
Number of Employees worldwide	Less than 50	24	11
	50 - 99	11	5
	100 - 499	12	5
	500 - 999	13	6
	1,000 - 4,999	30	14
	5,000 or more	131	59
Country of Work	Europe: 9 Countries	104	47
	Middle-East: 11 Countries	117	53
Headquarter Region	Asia: 3 Countries	7	3
	Europe: 12 Countries	99	45
	Middle-East: 8 Countries	61	28
	North America: 2 Countries	54	24
Managerial Levels	Top-level Management	30	14
	Middle-level Management	68	31
	First-level Management	45	20
	Supervisory Level	31	14
	Non-managerial Level	47	21
Work Experience	Less than one year	24	11
	1-3 Years	82	37
	4-6 years	66	30
	7-9 years	16	7
	10 years or more	33	15
KMS Experience	Less than 1 Year	39	18
	1-2 Years	38	17
	3-5 Years	49	22
	More than 5 years	95	43

6.3.4 Descriptive Statistics

The participants were asked to give their opinions and beliefs regarding the survey constructs based on seven-point Likert-scales to measure these constructs. *Appendix E* shows the mean, standard deviation and variance of each item in each construct.

6.3.5 Data Normality

Normality has serious effects only in small samples (50 cases) as the impact effectively diminishes when sample size is 200 cases. However, skewness and kurtosis were used to check normality regarding measured constructs. The acceptable limits of observation values, ± 1 for skewness and ± 2 for kurtosis, were used (Byrne, 2010; Hair *et al.*, 2010; Kline, 2005; Muthén and Kaplan, 1985). Skewness was found to be less than ± 1 and kurtosis less than ± 2 , which revealed that there is no deviation from data normality. The results are represented in Table 6-8.

Table 6- 8: Data Normality

	N	Mean	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
INV	221	5.4495	-.566	.164	-.121	.326
CON	221	5.1926	-1.146	.164	1.686	.326
ADP	221	5.1312	-1.172	.164	1.190	.326
MIS	221	5.3690	-.890	.164	.499	.326
PRE	221	5.4457	-1.527	.164	2.644	.326
PRU	221	5.7051	-.584	.164	-.169	.326
KMS	221	5.2149	-.836	.164	-.602	.326
KS	221	4.9299	-.362	.164	.279	.326
PIS	221	4.3741	-.833	.164	.189	.326
DMS	221	4.6244	-.811	.164	.092	.326
DMA	221	4.5871	-.657	.164	-.006	.326
OE	221	5.1259	-.978	.164	.790	.326
Valid N (listwise)	221					

6.4 STRUCTURAL EQUATION MODELLING ANALYSIS

Structural equation modelling (SEM) is a collection of different statistical models that seeks to explain and examine the interrelationships among multiple dependent and independent variables simultaneously (Byrne, 2010; Hair *et al.*, 2006). SEM was selected for data analysis because it can test the causal relationships between different constructs with multiple measurement items, it has strong statistical procedures that can deal with complex models, it provides the link between scores on a measuring instrument and the underlying constructs they are designed to measure, through a Confirmatory Factor Analysis (CFA) model which tests the relationships between constructs by using a structural model (Byrne, 2010; Hair *et al.*, 2006; Tabachnick *et al.*, 2001). AMOS by default provides many other fit statistics in its output file. However, it is essential first to assess the important aspects in fitting hypothesised models by testing the model fitting process, the statistical significance of constructs, the estimation process and the goodness-of-fit statistics. In this research, CFA first-order examination was conducted, followed by CFA second-order assessment, and then SEM.

6.4.1 Goodness-of-fit indices

There is no single statistical test in SEM that can best describe the strength of the model's predictions (Byrne, 2010). Accordingly, multiple-fit indices should be used to assess goodness-of-fit and the final results. There are three main types of fit measure indices in SEM: absolute fit indices, incremental fit indices and parsimonious fit indices (Byrne, 2010; Hair *et al.*, 2006). The ability of the overall model fit was assessed using absolute fit indices such as the likelihood ratio statistic Chi-square (χ^2), Normed chi square (CMIN/DF) and Root Mean Square Error of Approximation (RMSEA). Incremental indices like the Incremental Index of Fit (IFI), Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) were used to compare the hypothesised model against some baseline model and standards. To address the issue of parsimony in the assessment of model fit, statistical goodness-of-fit as well as the number of estimated parameters are taken into account; CMIN/DF and IFI were used to investigate the estimated model and whether it could be improved by specifying fewer estimated parameter paths. Table 6-9 summarises the recommended level of goodness-of-fit measures used in this study.

Table 6- 9: Goodness-of-fit Statistics in SEM

Index	Abbreviation	Type of fit measure	Rules of Thumb Recommended value of good-fit of the model	References
Chi-square	χ^2	Model fit	χ^2 , df, p >0.05	(Byrne, 2010; Field, 2009; Hair <i>et al.</i> , 2010)
Normed chi square	CMIN/DF	Absolute fit and parsimony of model	$1.0 < \chi^2/df < 3.0$	(Byrne, 2010; Joreskog, 1993; Hair <i>et al.</i> , 2010)
The Incremental Index of Fit	IFI	Incremental fit, parsimony and sample size	≥ 0.90	(Bentler, 1992; Byrne, 2010; Gerbing and Anderson, 1993)
Tucker-Lewis Index	TLI	Incremental fit	≥ 0.90	(Byrne, 2010; Hu and Bentler, 1999)
Comparative Fit Index	CFI	Incremental fit	≥ 0.90	(Bentler, 1990; Bentler, 1992; Byrne, 2010; Gerbing and Anderson, 1993; Hu and Bentler, 1999)
Root Mean Square Error of Approximation	RMSEA	Absolute fit	≤ 0.08 good fit	(Browne and Cudeck, 1993; Byrne, 2010; Hu and Bentler, 1999)

6.4.2 Measurement Model

The measurement model covers seven factors: Knowledge Management Systems usage (KMS); Perceived Ease of Use (PRE); Perceived Usefulness (PRU); Knowledge Sharing (KS); Organisational Culture (OC); Decision-Making Processes (DMP) and Organisational Effectiveness (OE). These factors were measured by 70 items (indicators). Table 5-1 in section 5.5 summarises all constructs and their measurement items with their code names. It is important to take particular note of the fact that Organisational Culture (OC) and Decision Making Processes (DMP) do not have their own set of measured indicators; rather, they are linked indirectly to those measuring the lower order factors. Accordingly first-order and second-order CFA models were assessed.

To evaluate the measurement model and the model fit, CFA and SEM were analysed through examining the goodness-of-fit indices, model estimates, standardised residuals, reliability, validity and significant structural relationships. Table 6-10 summarises the statistics used in the analysis.

Table 6- 10: Summary of Statistics

Term	Measure	Rule of Thumb	References
Average Variance Extracted (AVE)	Construct Validity; Convergent Validity; Discriminant Validity	AVE ≥ 0.5	(Byrne, 2010; Hair <i>et al.</i> , 2010)
Construct Reliability	Internal Consistency; Reliability	Estimates value ≥ 0.7	(Byrne, 2010; Field, 2009; Hair <i>et al.</i> , 2010)
Covariances	Construct Validity; Nomological Validity	Estimates are positive and significant	(Field, 2009; Hair <i>et al.</i> , 2010)
Correlations	Construct Validity; Nomological Validity	Estimates are positive and significant	(Field, 2009; Hair <i>et al.</i> , 2010)
Critical Ratio (C.R.)	Hypothesised Relationships and path analysis	Estimates value ≥ 1.96	(Hair <i>et al.</i> , 2010; Kline, 2005)
Cronbach's Alpha	Internal Consistency; Reliability	Estimates value ≥ 0.7	(Byrne, 2010; Field, 2009; Hair <i>et al.</i> , 2010)
Descriptive Statistics	Mean, Standard Deviation and Variance	Summarise demographic information and items analysis	(Byrne, 2010; Field, 2009; Hair <i>et al.</i> , 2010)
Kurtosis	Data normality	Observation values $\leq \pm 2$	(Hair <i>et al.</i> , 2010; Kline, 2005)
Skewness	Data normality	Observation values $\leq \pm 1$	(Hair <i>et al.</i> , 2010; Kline, 2005)
Squared Inter-construct Correlations (SIC)	Construct Validity; Discriminant Validity	SIC $<$ AVE	(Byrne, 2010; Hair <i>et al.</i> , 2010; Kline, 2005)
Standardised Regression Weights	Factor Loadings; Construct Validity; Convergent Validity	Estimates value ≥ 0.5	(Byrne, 2010; Hair <i>et al.</i> , 2010)

6.5 FACTOR ANALYSIS

Factor analysis (FA) techniques are used to analyse the structure of the correlations among a large number of measurement variables through defining a large set of common underlying dimensions or factors (Hair *et al.*, 2010). Field (2009) refers to the importance of FA in understanding the structure set of items, constructing a questionnaire and managing the data set. Moreover, a factor analytic model like CFA focuses exclusively on the extent to which the observed variables are linked to their underlying latent factors and on the link between factors and their measured variables (Byrne, 2010). The CFA technique involves combining variables on a factor or the precise set of factors for testing hypotheses (Hair *et al.*, 2010). Byrne (2010) states that in SEM, once the model is specified, then its plausibility is tested based on sample data which comprises all observed variables in the model. In this study, CFA was conducted to test and confirm the relationships between the observed variables under each hypothesised construct (Zikmund, 2012; Hair *et al.*, 2010; Byrne, 2010). Accordingly, the main purpose of using SEM and following the process of statistical modelling in model-testing is to check the model fit through determining the goodness-of-fit between the hypothesised model and the sample data.

6.5.1 Confirmatory Factor Analysis

This research conducted a quantitative analysis by using the two-step approach in SEM recommended by Anderson and Gerbing (1988). In the first step, CFA was used by conducting a measurement model evaluation in order to examine the unidimensionality, validity and reliability of latent constructs, using AMOS. In the next step, the structural model procedure was conducted in order to examine and test the hypothesised relationships between the latent constructs in the proposed research model. To assess the measurement model, the goodness-of-fit indices, validity and reliability of the measurement model were considered in the CFA. In this research, CFA was examined twice, in first-order and second-order, to examine the measurement model.

6.5.2 First-order CFA model

The measurement model in this study was evaluated using the Maximum Likelihood (ML) estimation techniques. Table 6-11 shows fit indices that assess the specification of the model. Results revealed that the values of some indices are not consistent with the

recommended values of the fit indices, indicating the need for further refinement of the model.

Table 6- 11: Goodness-Of-Fit Statistics for CFA Initial Model

Indices	χ^2	df	CMIN/DF	IFI	TLI	CFI	RMSEA
Standard			$1.0 < \chi^2/df < 3.0$	≥ 0.90	≥ 0.90	≥ 0.90	≤ 0.08
Results	4603.775	2279	2.020	0.836	0.825	0.835	0.068

Kline (2005) recommends that further detailed assessment must be conducted to refine the model and achieve better fit. Byrne (2010) and Hair *et al.* (2009) highlight some criteria to be followed in assessing the measurement model, including loading estimates, regression weights, standardised residuals and modification indices. Therefore, the output of the initial CFA run was inspected to check any item proving to be problematic. As a result, fourteen items were dropped from the model because the assessment of the regression weights indicated that the estimates of some items were insignificant and their loadings were greater than 0.05; the standardised residuals were greater than 2.5 in absolute value, and they should preferably be less than 2.5, although standardised residuals between 2.5 and 4 may not necessitate any changes to the model if there are no other problems related to those two items (Hair *et al.*, 2010). Accordingly, the following items were removed from the model: (INV6, INV7, INV8, INV9, CON2, CON9, ADP2, ADP4, ADP9, MIS7, MIS9, PRU2, OE5 and OE6) and the measurement model was re-run, as recommended by Byrne (2010), Hair *et al.* (2010) and Kline (2005). However, because of the word limit, only final CFA measurement model results will be presented. The measurement model CFA first-order is depicted in Figure 6-15.

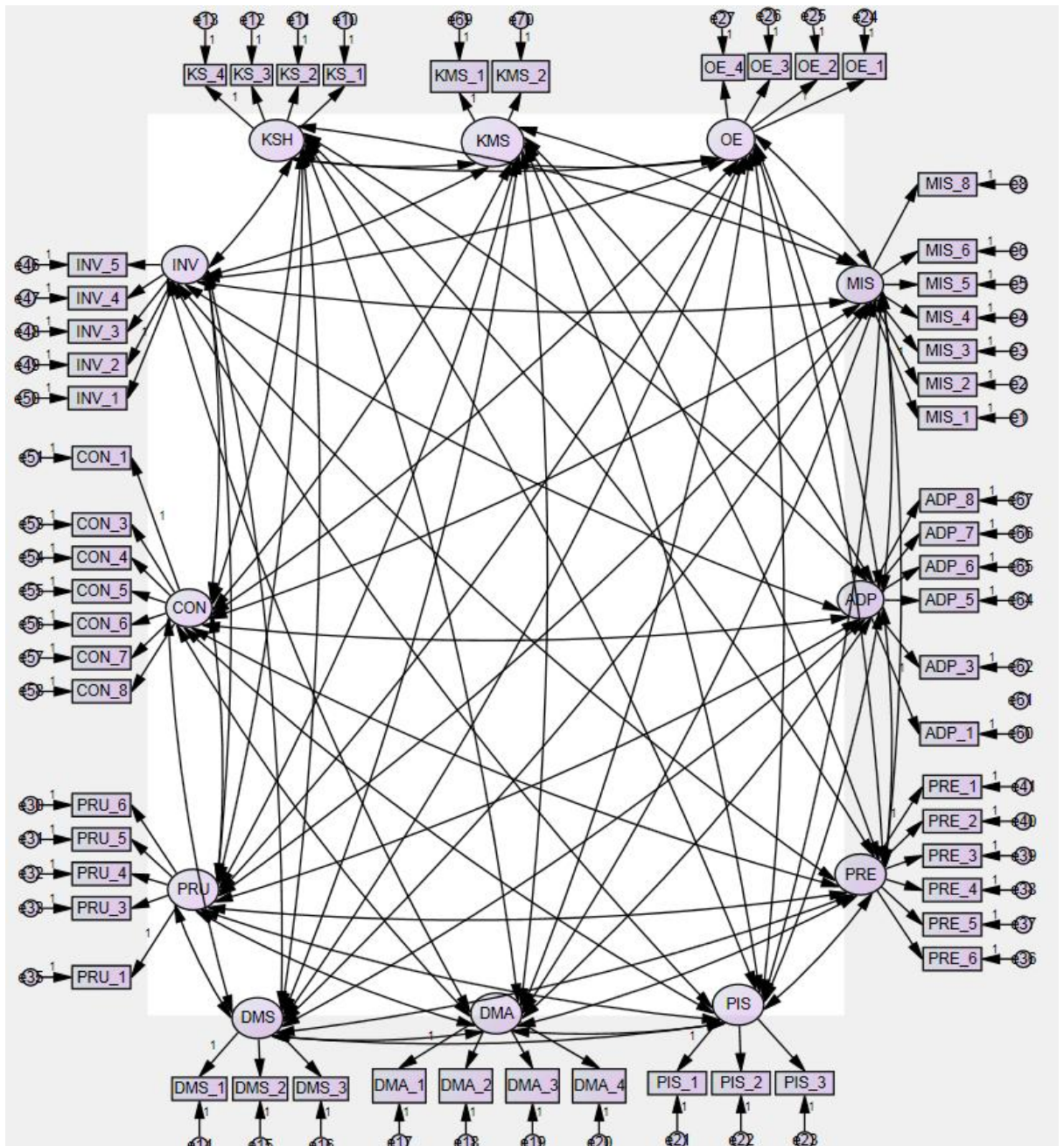


Figure 6- 15: Hypothesised First-Order CFA Model

The results of the CFA first-order measurement model revealed that goodness-of-fit was improved and the revised model demonstrated a better fit to the data. Table 6-12 presents the goodness-of-fit statistics of the CFA first-order measurement model.

Table 6- 12: Goodness-Of-Fit Statistics for CFA First-Order Model

Indices	χ^2	df	<i>p</i>	CMIN/DF	IFI	TLI	CFI	RMSEA
Standard				$1.0 < \chi^2 / df < 3.0$	≥ 0.90	≥ 0.90	≥ 0.90	≤ 0.08
Results	2151.626	1419	$p < 0.00$	1.526	0.932	0.925	0.931	0.049

All goodness-of-fit measures exceeded the minimum recommended values and confirmed that the model adequately fits the data. The standardised regression weights and the estimates were all statistically significant and the standardised residuals were all within the acceptable level (see *Appendix E*).

6.5.2.1 Reliability of Constructs of CFA first-order model

In this study, Cronbach's alpha reliability coefficients were used to assess the internal consistency of each measure. Construct reliability is a measure of reliability and internal consistency based on the square of the total of factor loadings for a construct; it was calculated for each construct in the model using this formula suggested by Fornell and Larcker (1981) and Hair *et al.* (2010)

$$CR = \frac{\left(\sum_{i=1}^n \lambda_i\right)^2}{\left(\sum_{i=1}^n \lambda_i\right)^2 + \left(\sum_{i=1}^n u_i\right)}$$

Where,

λ_i is factor loadings (standardised regression weights)

n is total number of items

u_i is the error variance term for each latent construct

Equation 1: Construct Reliability

The rule of thumb for good construct reliability is 0.7, which indicates that internal consistency exists (Byrne, 2010; Field, 2009; Hair *et al.*, 2010).

Table 6-13 shows that all constructs in the model have high internal consistency and adequate reliability.

Table 6- 13: Construct Reliability of CFA First-Order Model

Constructs	Items	Construct Reliability	Cronbach's Alpha
Organisational Culture: Involvement (INV)	5	0.835	0.831
Organisational Culture: Consistency (CON)	7	0.920	0.919
Organisational Culture: Adaptability (ADP)	6	0.895	0.895
Organisational Culture: Mission (MIS)	7	0.941	0.947
Perceived Ease of Use (PRE)	6	0.955	0.955
Perceived Usefulness (PRU)	5	0.946	0.945
Knowledge Management Systems Usage (KMS)	2	0.855	0.855
Knowledge Sharing (KS)	4	0.874	0.870
Decision Making Processes: Problem Identification Speed (PIS)	3	0.934	0.932
Decision Making Processes: Decision Making Speed (DMS)	3	0.949	0.944
Decision Making Processes: The extent of Analysis in Decision Making (DMA)	4	0.920	0.920
Organisational Effectiveness (OE)	4	0.905	0.903

6.5.2.2 Validity of Constructs of CFA first-order model

In this study, construct validity can be assessed by convergent, discriminant and nomological validity.

6.5.2.2.1 Convergent Validity of CFA first-order model

Average Variance Extracted (AVE), factor loadings of construct and Construct Reliability (CR) were used to assess the convergent validity of each construct. The following formula was used to calculate AVE (Fornell and Larcker, 1981; Hair *et al.*, 2010).

$$AVE = \frac{\sum_{i=1}^n \lambda_i^2}{n}$$

Where,

λ_i is factor loadings (standardised regression weights)

i is total number of items

n is the sample size

Equation 2: Average Variance Extracted

To assess the convergent validity, minimum cut-off criterion for factor loading, the standardised regression loading is >0.5 , and AVE reliability > 0.5 . Table 6-16 shows that all the standardised regression weights (factor loadings) were greater than the minimum cut-off point (>0.5) and all AVEs were greater than >0.5 . The results in Table 6-14 show a high level of convergent validity of the constructs used in the first-order model.

Table 6- 14: Convergent Validity of CFA First-Order Model

Constructs	Items	Standardised Regression Weights (Factor Loadings)	Average Variance Extracted (AVE)	
Organisational Culture: Involvement (INV)	INV1	0.566	0.506	
	INV2	0.752		
	INV3	0.763		
	INV4	0.810		
	INV5	0.638		
Organisational Culture: Consistency (CON)	CON1	0.699	0.623	
	CON3	0.748		
	CON4	0.784		
	CON5	0.827		
	CON6	0.798		
	CON7	0.828		
	CON8	0.831		
Organisational Culture: Adaptability (ADP)	ADP1	0.808	0.587	
	ADP3	0.849		
	ADP5	0.736		
	ADP6	0.700		
	ADP7	0.738		
	ADP8	0.757		
Organisational Culture: Mission (MIS)	MIS1	0.799	0.697	
	MIS2	0.858		
	MIS3	0.909		
	MIS4	0.866		
	MIS5	0.794		
	MIS6	0.845		
	MIS8	0.765		
Perceived Ease of Use (PRE)	PRE1	0.888	0.779	
	PRE2	0.875		
	PRE3	0.891		
	PRE4	0.848		
	PRE5	0.866		
	PRE6	0.927		
Perceived Usefulness (PRU)	PRU1	0.777	0.780	
	PRU3	0.868		
	PRU4	0.899		
	PRU5	0.919		
	PRU6	0.944		
Knowledge Management Systems Usage (KMS)	KMS1	0.893	0.747	
	KMS2	0.834		
Knowledge Sharing (KS)	KS1	0.931	0.643	
	KS2	0.933		
	KS3	0.580		
	KS4	0.706		
Decision Making Processes: Problem Identification Speed (PIS)	PIS1	0.934	0.824	
	PIS2	0.884		
	PIS3	0.905		
Decision Making Processes: Decision Making Speed (DMS)	DMS1	0.975	0.863	
	DMS2	0.978		
	DMS3	0.825		
Decision Making Processes: The extent of Analysis in Decision Making (DMA)	DMA1	0.804	0.743	
	DMA2	0.842		
	DMA3	0.873		
	DMA4	0.924		
Organisational Effectiveness (OE)	OE1	0.860	0.705	
	OE2	0.881		
	OE3	0.870		
	OE4	0.739		

6.5.2.2.2 Discriminant Validity of CFA first-order model

To assess the discriminant validity, the AVE for each construct was compared with the corresponding Squared Inter-construct Correlation (SIC). The discriminant validity of each construct exists when AVE is greater than SIC. Table 6-15 reveals that AVE estimates of all constructs in the first-order model are greater than their SIC, which demonstrates a high level of discriminant validity of the constructs.

Table 6- 15: Squared Inter-Construct Correlations of CFA First-Order Model

Construct	INV	CON	ADP	MIS	PRE	PRU	KMS	PIS	KSH	DMS	DMA	OE
INV	1.000											
CON	0.291	1.000										
ADP	0.308	0.572	1.000									
MIS	0.166	0.527	0.432	1.000								
PRE	0.031	0.022	0.034	0.025	1.000							
PRU	0.032	0.056	0.040	0.028	0.288	1.000						
KMS	0.065	0.065	0.096	0.066	0.120	0.120	1.000					
PIS	0.077	0.121	0.102	0.067	0.095	0.222	0.094	1.000				
KS	0.099	0.181	0.210	0.163	0.023	0.043	0.135	0.181	1.000			
DMS	0.056	0.132	0.111	0.063	0.119	0.231	0.095	0.766	0.188	1.000		
DMA	0.040	0.105	0.130	0.048	0.135	0.199	0.080	0.537	0.130	0.642	1.000	
OE	0.043	0.138	0.145	0.150	0.152	0.160	0.113	0.268	0.107	0.228	0.275	1.000

6.5.2.2.3 Nomological Validity of CFA first-order model

Nomological validity was tested by examining whether the correlations between the constructs in the measurement model make sense (Hair *et al.*, 2010). In this research the construct correlations (estimates) were used to assess the nomological validity of the model. Tables 6-16 and 6-17 show that all of the estimates are positive and significant.

Table 6- 16: Covariances of CFA First-Order Model: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
INV	<-->	CON	.361	.072	5.017	***
INV	<-->	ADP	.503	.096	5.232	***
INV	<-->	MIS	.291	.066	4.413	***
INV	<-->	PRE	.159	.070	2.266	.023
INV	<-->	PRU	.122	.053	2.297	.022
INV	<-->	KMS	.315	.105	3.002	.003
INV	<-->	PIS	.299	.090	3.337	***
INV	<-->	KS	.307	.083	3.688	***
INV	<-->	DMS	.277	.093	2.973	.003
INV	<-->	DMA	.209	.084	2.501	.012
INV	<-->	OE	.207	.081	2.568	.010
CON	<-->	ADP	.900	.130	6.901	***
CON	<-->	MIS	.680	.100	6.802	***
CON	<-->	PRE	.174	.087	2.009	.044
CON	<-->	PRU	.211	.068	3.102	.002
CON	<-->	KMS	.415	.129	3.213	.001
CON	<-->	PIS	.493	.114	4.338	***
CON	<-->	KS	.544	.107	5.066	***
CON	<-->	DMS	.560	.122	4.596	***
CON	<-->	DMA	.442	.110	4.018	***
CON	<-->	OE	.486	.108	4.494	***
ADP	<-->	MIS	.831	.122	6.809	***
ADP	<-->	PRE	.305	.119	2.558	.011
ADP	<-->	PRU	.244	.091	2.687	.007
ADP	<-->	KMS	.682	.177	3.847	***
ADP	<-->	PIS	.619	.150	4.121	***
ADP	<-->	KS	.793	.144	5.503	***
ADP	<-->	DMS	.695	.160	4.339	***
ADP	<-->	DMA	.670	.150	4.455	***
ADP	<-->	OE	.672	.145	4.650	***
MIS	<-->	PRE	.198	.091	2.181	.029
MIS	<-->	PRU	.158	.069	2.284	.022
MIS	<-->	KMS	.443	.134	3.298	***
MIS	<-->	PIS	.391	.113	3.450	***
MIS	<-->	KS	.551	.109	5.065	***
MIS	<-->	DMS	.409	.120	3.415	***
MIS	<-->	DMA	.320	.109	2.938	.003
MIS	<-->	OE	.538	.112	4.797	***
PRE	<-->	PRU	.644	.103	6.233	***
PRE	<-->	KMS	.759	.172	4.410	***
PRE	<-->	PIS	.591	.144	4.119	***
PRE	<-->	KS	.259	.125	2.078	.038
PRE	<-->	DMS	.715	.154	4.637	***
PRE	<-->	DMA	.677	.145	4.683	***
PRE	<-->	OE	.685	.139	4.928	***
PRU	<-->	KMS	.572	.132	4.337	***
PRU	<-->	PIS	.677	.119	5.706	***

			Estimate	S.E.	C.R.	P
PRU	<-->	KS	.270	.096	2.829	.005
PRU	<-->	DMS	.750	.127	5.915	***
PRU	<-->	DMA	.617	.116	5.308	***
PRU	<-->	OE	.529	.108	4.921	***
KMS	<-->	PIS	.803	.205	3.919	***
KMS	<-->	KS	.868	.188	4.609	***
KMS	<-->	DMS	.876	.217	4.032	***
KMS	<-->	DMA	.714	.199	3.584	***
KMS	<-->	OE	.811	.194	4.188	***
PIS	<-->	KS	.878	.163	5.404	***
PIS	<-->	DMS	2.170	.234	9.285	***
PIS	<-->	DMA	1.616	.211	7.669	***
PIS	<-->	OE	1.090	.176	6.184	***
KS	<-->	DMS	.973	.173	5.624	***
KS	<-->	DMA	.716	.157	4.575	***
KS	<-->	OE	.622	.147	4.221	***
DMS	<-->	DMA	1.913	.233	8.211	***
DMS	<-->	OE	1.091	.184	5.937	***
DMA	<-->	OE	1.062	.177	6.003	***

*** p < 0.01

Table 6- 17: Correlations of CFA First-Order Model: (Group number 1 - Default model)

			Estimate
INV	<-->	CON	.539
INV	<-->	ADP	.554
INV	<-->	MIS	.408
INV	<-->	PRE	.177
INV	<-->	PRU	.180
INV	<-->	KMS	.254
INV	<-->	PIS	.277
INV	<-->	KS	.314
INV	<-->	DMS	.236
INV	<-->	DMA	.201
INV	<-->	OE	.208
CON	<-->	ADP	.756
CON	<-->	MIS	.726
CON	<-->	PRE	.147
CON	<-->	PRU	.237
CON	<-->	KMS	.255
CON	<-->	PIS	.348
CON	<-->	KS	.425
CON	<-->	DMS	.364
CON	<-->	DMA	.324
CON	<-->	OE	.372
ADP	<-->	MIS	.655
ADP	<-->	PRE	.190
ADP	<-->	PRU	.202
ADP	<-->	KMS	.310

			Estimate
ADP	<-->	PIS	.322
ADP	<-->	KS	.457
ADP	<-->	DMS	.334
ADP	<-->	DMA	.362
ADP	<-->	OE	.380
MIS	<-->	PRE	.158
MIS	<-->	PRU	.166
MIS	<-->	KMS	.256
MIS	<-->	PIS	.259
MIS	<-->	KS	.404
MIS	<-->	DMS	.250
MIS	<-->	DMA	.220
MIS	<-->	OE	.387
PRE	<-->	PRU	.537
PRE	<-->	KMS	.347
PRE	<-->	PIS	.309
PRE	<-->	KS	.150
PRE	<-->	DMS	.345
PRE	<-->	DMA	.368
PRE	<-->	OE	.390
PRU	<-->	KMS	.347
PRU	<-->	PIS	.471
PRU	<-->	KS	.208
PRU	<-->	DMS	.481
PRU	<-->	DMA	.446
PRU	<-->	OE	.400
KMS	<-->	PIS	.306
KMS	<-->	KS	.367
KMS	<-->	DMS	.308
KMS	<-->	DMA	.283
KMS	<-->	OE	.336
PIS	<-->	KS	.425
PIS	<-->	DMS	.875
PIS	<-->	DMA	.733
PIS	<-->	OE	.518
KS	<-->	DMS	.434
KS	<-->	DMA	.360
KS	<-->	OE	.327
DMS	<-->	DMA	.801
DMS	<-->	OE	.478
DMA	<-->	OE	.524

Accordingly, the CFA first-order results showed that constructs used in the measurement model possessed adequate reliability, and convergent, discriminant, and nomological validity.

6.5.3 Second-order CFA model

It is important to take particular note of the fact that OC and DMP do not have their own set of measured indicators; rather, they are linked indirectly to those measuring the lower order factors. Accordingly, second-order CFA model analysis is required to complete the assessment of the measurement model. To assess the goodness-of-fit of the second-factor CFA model, the same steps are followed as with the first-factor CFA model. The measurement model: CFA second-order is depicted in Figure 6-16.

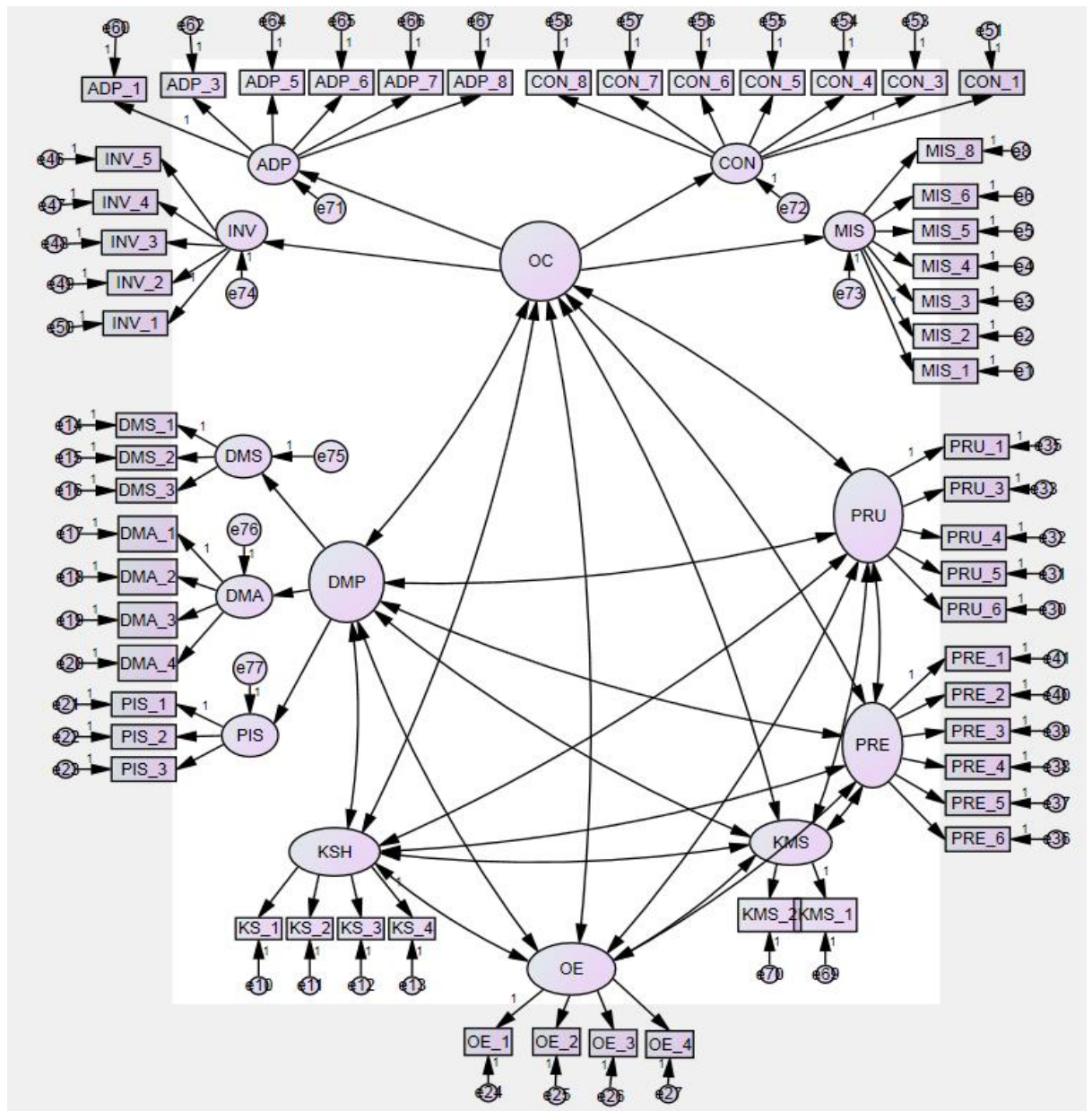


Figure 6- 16: Hypothesised Second-Order CFA Model

Table 6-18 shows the goodness-of-fit statistics for the CFA second-order measurement model. Results show that the values of all indices are consistent with the recommended values of the fit indices and better than the first-order model.

Table 6- 18: Goodness-Of-Fit Statistics for CFA Second-Order Model

Indices	χ^2	df	<i>p</i>	CMIN/DF	IFI	TLI	CFI	RMSEA
Standard				1.0 < χ^2/df < 3.0	≥ 0.90	≥ 0.90	≥ 0.90	≤ 0.08
Results	2206.243	1457	$p < 0.00$	1.514	0.931	0.925	0.927	0.048

All goodness-of-fit measures surpassed the minimum recommended values and confirmed that the model adequately fits the data. The standardised regression weights and the estimates were all statistically significant and the standardised residuals were all within the acceptable level (see *Appendix E*).

6.5.3.1 Reliability of Constructs of CFA second-order model

The rule of thumb for good construct reliability is 0.7, which indicates that internal consistency exists. Table 6-19 shows that all constructs in the model have high internal consistency and adequate reliability.

Table 6- 19: Construct Reliability of CFA Second-Order Model

Constructs	Items	Construct Reliability	Cronbach's Alpha
Organisational Culture (OC)	25	0.868	0.950
Perceived Ease of Use (PRE)	6	0.955	0.955
Perceived Usefulness (PRU)	5	0.946	0.945
Knowledge Management Systems Usage (KMS)	2	0.854	0.855
Knowledge Sharing (KS)	4	0.875	0.870
Decision Making Processes (DMP)	10	0.928	0.955
Organisational Effectiveness (OE)	4	0.905	0.903

6.5.3.2 Validity of Constructs of CFA second-order model

In this study, construct validity of CFA second-order model is assessed by convergent, discriminant and nomological validity.

6.5.3.2.1 Convergent Validity of CFA second-order model

Table 6-20 shows that all the standardised regression weights (factor loadings) were greater than the minimum cut-off point (≥ 0.5) and all AVEs were greater than ≥ 0.5 . The

results presented in Table 6-22 show a high level of convergent validity of the constructs used in the second-order model.

Table 6- 20: Convergent Validity of CFA Second-Order Model

Constructs	Items	Standardised Regression Weights (Factor Loadings)	Average Variance Extracted (AVE)
Organisational Culture (OC)	INV	0.598	0.627
	CON	0.896	
	ADP	0.854	
	MIS	0.787	
Perceived Ease of Use (PRE)	PRE1	0.888	0.779
	PRE2	0.875	
	PRE3	0.891	
	PRE4	0.848	
	PRE5	0.866	
	PRE6	0.927	
Perceived Usefulness (PRU)	PRU1	0.777	0.780
	PRU3	0.868	
	PRU4	0.899	
	PRU5	0.919	
	PRU6	0.944	
Knowledge Management Systems Usage (KMS)	KMS1	0.893	0.747
	KMS2	0.834	
Knowledge Sharing (KS)	KS1	0.931	0.643
	KS2	0.933	
	KS3	0.580	
	KS4	0.706	
Decision Making Processes (DMP)	PIS	0.910	0.813
	DMS	0.958	
	DMA	0.832	
Organisational Effectiveness (OE)	OE1	0.860	0.705
	OE2	0.881	
	OE3	0.870	
	OE4	0.739	

6.5.3.2.2 Discriminant Validity of CFA second-order model

Table 6-21 shows that AVE estimates of all constructs in the second-order model are greater than their SIC, which demonstrates a high level of discriminant validity of the constructs.

Table 6- 21: Squared Inter-Construct Correlations of CFA Second-Order Model

Construct	OC	DMP	PRE	PRU	KMS	KSH	OE
OC	1.000						
DMP	0.165	1.000					
PRE	0.038	0.134	1.000				
PRU	0.061	0.261	0.288	1.000			
KMS	0.106	0.108	0.120	0.122	1.000		
KSH	0.254	0.206	0.023	0.043	0.135	1.000	
OE	0.189	0.284	0.152	0.160	0.114	0.107	1.000

6.5.3.2.3 Nomological Validity of CFA second-order model

Tables 6-22 and 6-23 reveal that all of the estimates in the second-order are positive and significant.

Table 6- 22: Covariances of CFA Second-Order Model: (Group Number 1 - Default Model)

			Estimate	S.E.	C.R.	P
PRE	<-->	PRU	.643	.103	6.231	***
PRE	<-->	KMS	.760	.172	4.414	***
PRE	<-->	KS	.259	.124	2.080	.038
PRE	<-->	OC	.106	.043	2.441	.015
PRE	<-->	DMP	.560	.123	4.542	***
PRU	<-->	KMS	.574	.132	4.348	***
PRU	<-->	KS	.270	.096	2.828	.005
PRU	<-->	OC	.100	.035	2.901	.004
PRU	<-->	DMP	.588	.105	5.604	***
KMS	<-->	KS	.869	.189	4.612	***
KMS	<-->	OC	.241	.070	3.452	***
KMS	<-->	DMP	.691	.172	4.024	***
KS	<-->	OC	.294	.065	4.511	***
KS	<-->	DMP	.753	.141	5.329	***
OC	<-->	DMP	.211	.054	3.916	***
PRE	<-->	OE	.685	.139	4.930	***
PRU	<-->	OE	.529	.108	4.919	***
KMS	<-->	OE	.813	.194	4.195	***
KS	<-->	OE	.622	.148	4.218	***
OE	<-->	OC	.258	.062	4.147	***
OE	<-->	DMP	.901	.155	5.820	***

*** p < 0.01

Table 6- 23: Correlations of CFA Second-Order Model: (Group Number 1 - Default Model)

			Estimate
PRE	<-->	PRU	.537
PRE	<-->	KMS	.347
PRE	<-->	KS	.150
PRE	<-->	OC	.197
PRE	<-->	DMP	.366
PRU	<-->	KMS	.349
PRU	<-->	KS	.208
PRU	<-->	OC	.247
PRU	<-->	DMP	.511
KMS	<-->	KS	.367
KMS	<-->	OC	.325
KMS	<-->	DMP	.329
KS	<-->	OC	.504

			Estimate
KS	<-->	DMP	.454
OC	<-->	DMP	.407
PRE	<-->	OE	.390
PRU	<-->	OE	.400
KMS	<-->	OE	.337
KS	<-->	OE	.327
OE	<-->	OC	.435
OE	<-->	DMP	.533

In summary, the CFA second-order results showed that constructs used in the measurement model possessed adequate reliability, and convergent, discriminant and nomological validity. They confirmed that the model fits the data and indicated no further refinement of the model was required; the unidimensionality of the model and data were established.

6.6 STRUCTURAL MODEL

CFA results revealed reliability, validity and the goodness-of-fit of the constructs used in the measurement model. Path estimates, standardised residuals and modification indices were assessed and showed the fitness of the model. To assess the goodness-of-fit of the structure model, the same steps will be followed as with the CFA model to evaluate the significance, direction and size of the structural parameter estimates. SEM was used to test the hypotheses. The structural model represents a set of dependence relationships between the constructs of the hypothesised model, to determine whether or not the relationships between constructs exist (Byrne, 2010; Hair *et al.*, 2010). Table 6-24 classifies the latent constructs used in the proposed theoretical model into two main categories (Exogenous and Endogenous constructs) and it also shows the twelve hypotheses represented by causal paths (H1a, H1b, H2a, H2b, H3a, H3b, H4, H5a, H5b, H5c, H5d and H6) that were used to test the relationships between these constructs.

Table 6- 24: Paths’ Causal Relationships

Exogenous Constructs	Endogenous Constructs	Hypothesis	Hypothesis Relationships (+)
KMS usage (KMS)	Knowledge Sharing (KS) Decision Making Processes (DMP)	H1a H1b	KMS KS KMS DMP
Perceived Ease of Use (PRE)	Perceived Usefulness (PRU) KMS usage (KMS)	H2a H2b	PRE PRU PRE KMS
Perceived Usefulness (PRU)	KMS usage (KMS) Organisational Effectiveness (OE)	H3a H3b	PRU KMS PRU OE
Knowledge Sharing (KS)	Decision Making Processes (DMP)	H4	KS DMP
Organisational Culture (OC)	KMS usage (KMS) Knowledge Sharing (KS) Decision Making Processes (DMP) Organisational Effectiveness (OE)	H5a H5b H5c H5d	OC KMS OC KS OC DMP OC OE
Decision Making Processes (DMP)	Organisational Effectiveness (OE)	H6	DMP OE

6.6.1 Goodness-of-fit indices of structural model

Goodness-of-fit indices and other parameter estimates were examined to assess the hypothesised structural model. The fit indices show that the hypothesised structural model provided a good fit with the data. The absolute fit measures and the incremental fit measures indicate goodness-of-fit of the model. Table 6-25 shows the goodness-of-fit statistics of the structural model.

Table 6- 25: Goodness-Of-Fit Statistics of Structural Model

Indices	χ^2	df	<i>p</i>	CMIN/DF	IFI	TLI	CFI	RMSEA
Standard				1.0 < χ^2/df < 3.0	≥0.90	≥0.90	≥0.90	≤ 0.08
Results	2268.316	1466	p<0.00	1.547	0.926	0.922	0.926	0.050

6.6.2 Hypothesis Testing

Coefficient parameter estimates and the covariance matrix are important measures in assessing and testing the structural model. Hair *et al.* (2010), stated that the parameter coefficient value is statistically significant at .05 levels when the Critical Ratio is higher than 1.96 for an estimate. The parameter estimates are presented in Table 6-26. The estimates regarding the measurement items and error terms associated with latent constructs are presented in *Appendix E*.

Table 6- 26: Regression Weights of Latent Constructs

			Estimate	S.E.	C.R.	P
PRU	<---	PRE	.404	.052	7.757	.00
KMS	<---	OC	.965	.321	3.004	.00
KMS	<---	PRU	.400	.150	2.665	.00
KMS	<---	PRE	.277	.112	2.482	.00
KS	<---	OC	1.368	.299	4.577	.00
KS	<---	KMS	.185	.055	3.368	.00
DMP	<---	OC	.542	.236	2.293	.02
DMP	<---	KMS	.144	.052	2.779	.00
DMP	<---	KS	.250	.071	3.500	.00
OE	<---	DMP	.394	.084	4.716	.00
OE	<---	PRU	.267	.090	2.975	.00
OE	<---	OC	.828	.258	3.203	.00

Note: *Estimate* = regression weight; *S.E* = standard error; *C.R* = critical ratio, *P* = significance value

Accordingly, the results show that the twelve causal paths' estimated t-values were above the 1.96 critical values at the significant level $p = 0.01$, except H5c at the significant level $p = 0.05$. For instance, the hypothesised path between KMS usage and knowledge sharing with C.R. value of 3.368 (>1.96) was statistically significant at 1% level. Similarly, path between organisational culture and decision-making processes with C.R. value of 2.293 (>1.96) was statistically significant at 5% level. Figure 6-17 shows the final structural model.

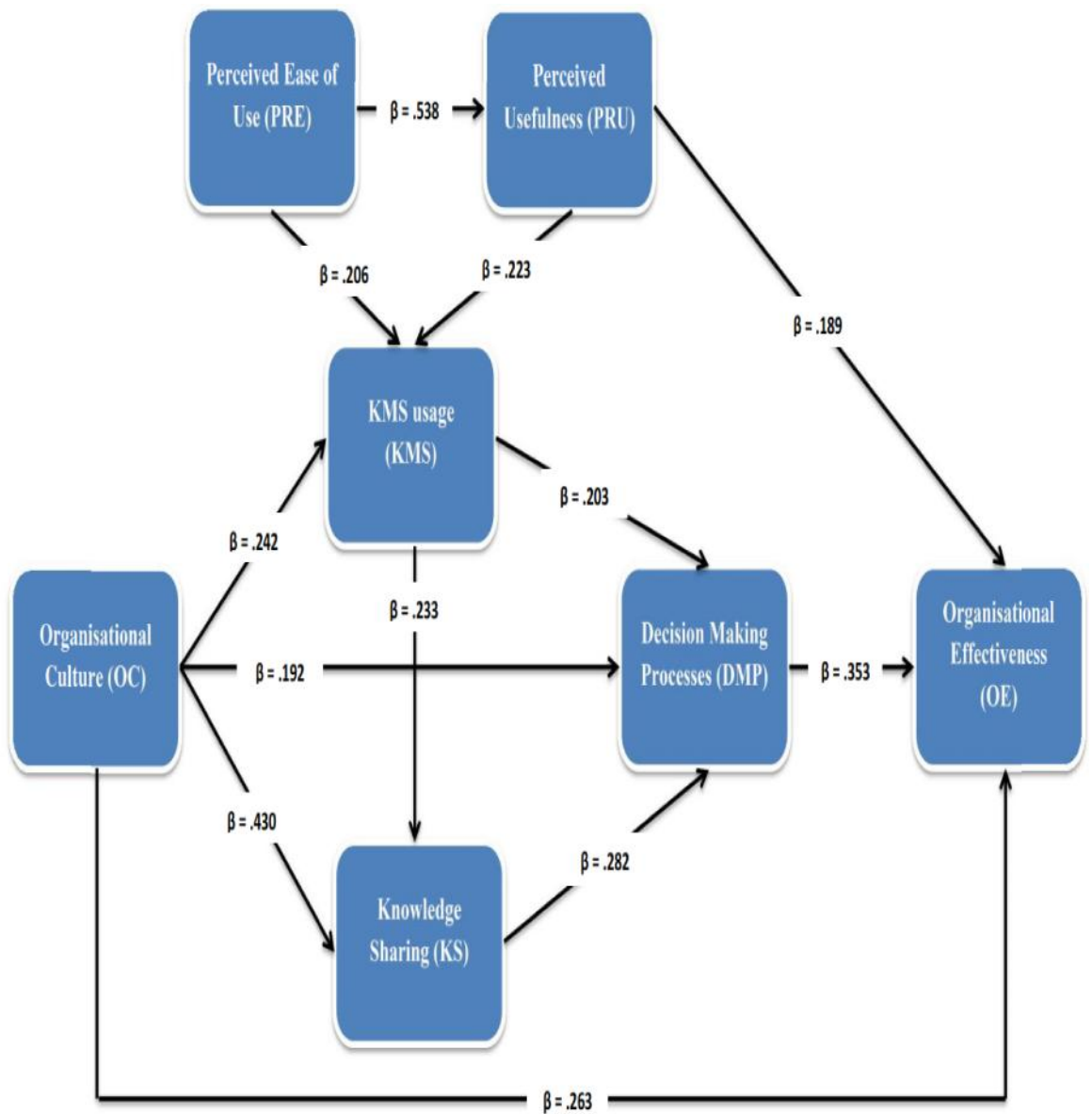


Figure 6- 17: Structural Model

Thus, the assessment of the parameter estimates results indicated that the twelve hypothesised paths are all positive and significant. The standardised estimates for all hypotheses are statistically significant and show support for the hypotheses. Accordingly, all hypotheses were accepted. These results are presented in Table 6-27

Table 6- 27: Hypothesis Testing

Hypothesis	Hypothesis Relationships (+)	Standardised Regression Weights ()	Supported
H1a: There is a positive and significant relationship between Knowledge Management Systems usage and Knowledge Sharing in MNCs.	KMS KS	0.233	YES **
H1b: There is a positive and significant relationship between Knowledge Management Systems usage and Decision Making Processes in MNCs.	KMS DMP	0.203	YES **
H2a: Perceived Ease of Use will have a positive and significant effect on user’s Perceived Usefulness of KMS in MNCs.	PRE PRU	0.538	YES **
H2b: Perceived Ease of Use will have a positive and significant effect on Knowledge Management Systems usage in MNCs.	PRE KMS	0.206	YES **
H3a: Perceived Usefulness will have a positive and significant effect on Knowledge Management Systems usage in MNCs.	PRU KMS	0.223	YES **
H3b: Perceived Usefulness will have a positive and significant effect on Organisational Effectiveness in MNCs.	PRU OE	0.189	YES **
H4: There is a positive and significant relationship between Knowledge Sharing and Decision Making Processes in MNCs.	KS DMP	0.282	YES **
H5a: There is a positive and significant relationship between Organisational Culture and Knowledge Management Systems usage in MNCs.	OC KMS	0.242	YES **
H5b: There is a positive and significant relationship between Organisational Culture and Knowledge Sharing in MNCs.	OC KS	0.430	YES **
H5c: There is a positive and significant relationship between Organisational Culture and Decision Making Processes in MNCs.	OC DMP	0.192	YES *
H5d: There is a positive and significant relationship between Organisational Culture and Organisational Effectiveness in MNCs.	OC OE	0.263	YES **
H6: There is a positive and significant relationship between Decision Making Processes and Organisational Effectiveness in MNCs.	DMP OE	0.353	YES **

***p < 0.05; **p < 0.01**

As shown in Tables 6-26 and 6-27, the main model estimations indicated that all 12 hypotheses are positively significant and supported.

H1a: There is a positive and significant relationship between Knowledge Management System usage and Knowledge Sharing in MNCs.

As revealed in parameter estimates, the standardised regression weight and critical ratio for KMS usage to KS is 0.233 and 3.368 respectively, suggesting that this path is statistically significant. The results revealed strong support for hypothesis H1a, as proposed in the research model. This demonstrates that KMS usage has a strong and positive significant effect on knowledge sharing, implying that if there is an increase in KMS usage then it will positively influence knowledge sharing in MNCs.

H1b: There is a positive and significant relationship between Knowledge Management System usage and Decision-Making Processes in MNCs.

As shown in parameter estimates, the standardised regression weight and critical ratio for KMS usage to DMP is 0.203 and 2.779 respectively, suggesting that this path is statistically significant. The results revealed strong support for hypothesis H1b. This demonstrates that KMS usage has a strong and positive significant effect on decision-making processes, indicating that if there is an increase in KMS usage then it will positively influence decision-making processes in MNCs.

H2a: Perceived Ease of Use will have a positive and significant effect on user's Perceived Usefulness of KMSs in MNCs.

As indicated in parameter estimates, the standardised regression weight and critical ratio for PRE to PRU is 0.538 and 7.757 respectively, suggesting that this path is statistically significant. The results revealed strong support for hypothesis H2a. This demonstrates that the perceived ease of use has a strong and positive significant effect on the perceived usefulness of KMSs, indicating that the perceived ease of use positively influences the perceived usefulness of KMSs in MNCs.

H2b: Perceived Ease of Use will have a positive and significant effect on Knowledge Management System usage in MNCs.

As revealed in parameter estimates, the standardised regression weight and critical ratio for PRE to KMS usage is 0.206 and 2.482 respectively, suggesting that this path is statistically significant. The results revealed strong support for hypothesis H2b. This demonstrates that the perceived ease of use of KMS has a strong and positive significant

effect on KMS usage, indicating that the perceived ease of use positively influences KMS usage in MNCs, but it was found to be relatively less influential than the PRU.

H3a: Perceived Usefulness will have a positive and significant effect on Knowledge Management System usage in MNCs.

As shown in parameter estimates, the standardised regression weight and critical ratio for PRU to KMS usage is 0.223 and 2.665 respectively, suggesting that this path is statistically significant. The results demonstrated strong support for hypothesis H3a. This reveals the perceived usefulness of KMS has a strong and positive significant effect on KMS usage, indicating that the perceived usefulness positively influences KMS usage in MNCs.

H3b: Perceived Usefulness will have a positive and significant effect on Organisational Effectiveness in MNCs.

As shown in parameter estimates, the standardised regression weight and critical ratio for PRU to OE is 0.189 and 2.975 respectively, suggesting that this path is statistically significant. The results demonstrated strong support for hypothesis H3b. This reveals the perceived usefulness of KMS has a strong and positive significant effect on organisational effectiveness, indicating that the perceived usefulness positively influences organisational effectiveness in MNCs.

H4: There is a positive and significant relationship between Knowledge Sharing and Decision-Making Processes in MNCs.

As revealed in parameter estimates, the standardised regression weight and critical ratio for KS to DMP is 0.282 and 3.500 respectively, suggesting that this path is statistically significant. The results revealed strong support for hypothesis H4. This demonstrates that knowledge sharing has a strong and positive significant effect on decision-making processes, indicating that an increase in knowledge sharing will positively influence decision-making processes in MNCs.

H5a: There is a positive and significant relationship between Organisational Culture and Knowledge Management Systems usage in MNCs.

As indicated in parameter estimates, the standardised regression weight and critical ratio for OC to KMS usage is 0.242 and 3.004 respectively, suggesting that this path is

statistically significant. The results revealed strong support for hypothesis H5a. This demonstrates that organisational culture has a strong and positive significant effect on KMS usage, indicating that organisational culture positively influences KMS usage in MNCs.

H5b: There is a positive and significant relationship between Organisational Culture and Knowledge Sharing in MNCs.

As shown in parameter estimates, the standardised regression weight and critical ratio for OC to KS is 0.430 and 4.577 respectively, suggesting that this path is statistically significant. The results revealed strong support for hypothesis H5b. This demonstrates that organisational culture has a strong and positive significant effect on knowledge sharing, indicating that organisational culture positively influences knowledge sharing in MNCs.

H5c: There is a positive and significant relationship between Organisational Culture and Decision-Making Processes in MNCs.

As revealed in parameter estimates, the standardised regression weight and critical ratio for OC to DMP is 0.192 and 2.293 respectively, suggesting that this path is statistically significant. The results revealed strong support for hypothesis H5c. This demonstrates that organisational culture has a strong and positive significant effect on decision-making processes, indicating that organisational culture positively influences decision-making processes in MNCs.

H5d: There is a positive and significant relationship between Organisational Culture and Organisational Effectiveness in MNCs.

As indicated in parameter estimates, the standardised regression weight and critical ratio for OC to OE is 0.263 and 3.203 respectively, suggesting that this path is statistically significant. The results revealed strong support for hypothesis H5d. This demonstrates that organisational culture has a strong and positive significant effect on organisational effectiveness, indicating that organisational culture positively influences organisational effectiveness in MNCs.

H6: There is a positive and significant relationship between Decision-Making Processes and Organisational Effectiveness in MNCs.

As revealed in parameter estimates, the standardised regression weight and critical ratio for DMP to OE is 0.353 and 4.716 respectively, suggesting that this path is statistically significant. The results demonstrated strong support for hypothesis H6. This reveals that decision-making processes have a strong and positive significant effect on organisational effectiveness, indicating that they positively influence organisational effectiveness in MNCs.

6.7 CONCLUSIONS

This chapter presented the results of this study. Several statistical procedures were used before conducting SEM through SPSS and AMOS. Descriptive statistics, skewness and kurtosis were used to investigate the normality of the data and the results demonstrated that data were normally distributed. SEM was chosen to examine and test the measurement and structural models. CFA and goodness-of-fit measures were used to assess the fit of the measurement model. Assessment of CFA first-order suggested that the measurement model needed to be rectified as some fit indices were lower than the cut-off points. Accordingly, fourteen items were dropped and CFA was checked again for the measurement model; the goodness-of-fit indices were improved and the revised model revealed better fit to the data. CFA second-order analysis was conducted and the results showed that constructs used in the measurement model possessed adequate reliability, and convergent, discriminant, and nomological validity. The results confirmed that the model fits the data and indicated that no further refinement of the model was required; the unidimensionality of the model and data was established. The structural model was then used to assess the hypothesised model and test the relationships between the constructs. All hypotheses were accepted and the main model estimations indicated that all hypotheses are statistically significant and supported.

CHAPTER SEVEN: DISCUSSION

7.1 INTRODUCTION

This chapter summarises and discusses the findings of chapters six in relation to the literature, research question and objectives, and the hypotheses presented in chapter five. The chapter discusses the hypothesised model and the twelve hypotheses regarding the relationships between the constructs in the structural model.

7.2 THE HYPOTHESISED MODEL

A questionnaire was administered to collect the data concerning KS by KMSs to support DMPs in MNCs. A survey instrument was developed by adapting measures used in previous studies that assessed organisational culture, perceived ease of use, perceived usefulness, KMS usage, knowledge sharing, decision-making processes and organisational effectiveness. In this study, 241 completed questionnaires were returned out of 631, a response rate of 38.2%. However, 20 responses were discarded because 13 were not operating in the EME region, and seven respondents gave the same score for all the Likert scale items. Accordingly, 221 completed questionnaires (a response rate of 35%) were used in the data analysis. The participants in this study represent a diverse cross-section of businesses at different managerial levels and in different countries. The survey questionnaire was targeted at KMS professionals, users, practitioners, decision makers and managers working in MNCs in the EME region who are using KMSs in KS and are involved in DMPs. Structural Equation Modelling (SEM) with Analysis of Mean and Covariance Structures (AMOS) was used to analyse the data, test the twelve hypotheses in the hypothesised model, and assess the relationships between the constructs. The assessment of parameter estimates results indicated that the twelve causal paths' t-values were above the 1.96 critical figure at the significant level $p < 0.01$, except H5c at the significant level $p < 0.05$. The results revealed that the standardised estimates for all hypotheses are statistically significant and show support for the hypotheses. Accordingly, all hypotheses were accepted; the main model estimations indicated that all hypotheses are statistically significant and supported. The following sections will discuss the hypothesis testing and the main findings of this study.

7.2.1 Knowledge Management System usage impact on Knowledge Sharing

In this research, the proposed model hypothesised that there is a positive and significant relationship between Knowledge Management Systems usage and Knowledge Sharing in MNCs (H1a). The hypothesis testing led to the following findings (H1a: KMS → KS, $\beta = 0.233$, $t\text{-value} = 3.368$, $p < 0.01$). The results revealed strong support for hypothesis H1a. This demonstrates that KMS usage has a strong and significant positive effect on KS, implying that if there is an increase in KMS usage then it will positively influence KS in MNCs. This finding is consistent with other research which provided empirical evidence of KMS usage on KS (e.g. Riege, 2007; Bolloju *et al.*, 2002; Cabrera *et al.*, 2006; Jarvenpaa and Staples, 2001; Kankanhalli *et al.*, 2005; Lee and Choi, 2003; Nicolas, 2004; Nielsen and Michailova, 2007; Shin, 2004).

Kulkarni *et al.* (2006) state that KMSs are ineffective if they are not used. Shin (2004) pointed out that KMSs enhance the quality of KM by supplying tools for effective storage and sharing of knowledge, and through facilitating knowledge creation and KS. Furthermore, Bolloju *et al.* (2002) stressed that in order to assist the creation of new knowledge effectively, KMSs must support not only the creation, but also the gathering, organisation and sharing of existing knowledge. Cabrera and Cabrera (2005) and Wang and Noe (2010) maintained that KS using KMSs facilitates a community of practice and makes ideas, experiences, best practice and knowledge accessible and available to all employees in an organisation.

KS is a significant issue in MNCs, where knowledge cannot be effective unless it is shared. Holm *et al.* (2001) pointed out that in MNCs, knowledge can be generated in various parts and shared with diverse parts of an interconnected network of organisational units. Ghoshal and Bartlett (1995), Gupta and Govindarajan (2000) and Sia *et al.* (2010) suggested that KS between MNC units requires particular coordination mechanisms and tools in this complex environment to facilitate KS. Therefore, they are always looking for support from their IT departments to utilise, facilitate and use the existing knowledge effectively and efficiently (Montazemi *et al.*, 2012). Dennis and Vessey (2005) state that KMSs succeed in playing a vital and dynamic role in enabling employees in MNCs easily to find expertise residing in the organisation and to support interactions toward KS. Wang and Noe (2010) suggest that MNCs need to pay close

attention to cultural issues in developing organisational practices and global KS systems that will facilitate KS, as there is no one universal set of practices that can be used to facilitate KS in global and multi-national companies.

7.2.2 Knowledge Management Systems impact on Decision-Making Processes

In this research, the proposed model hypothesised that there is a positive and significant relationship between Knowledge Management System usage and Decision-Making Processes in MNCs (H1b). The hypothesis testing led to the following findings (H1b: $KMS \rightarrow DMP, \beta = 0.203, t\text{-value} = 2.779, p < 0.01$). The results revealed strong support for hypothesis H1b, which was proposed in the research model. This shows that KMS usage has a strong and positive significant effect on the DMP, indicating that an increase in KMS usage will positively influence the DMP in MNCs. This finding is consistent with research that has found a positive relationship between KMS usage and DM (e.g. Bolloju *et al.*, 2002; Courtney, 2001; Leidner and Elam, 1993, 1995; Martinsons and Davison, 2007; Nicolas, 2004; Vlahos *et al.*, 2004).

Technology plays a vital role in business, as it helps employees in accessing the knowledge they need when they need it and provides the tools with which decision makers and users can leverage their knowledge in the context of their work (Chong and Chong, 2009; Bals *et al.*, 2007). Nemati *et al.* (2002) state that knowledge management initiatives can facilitate capturing, coding and KS within organisations, which is expected to result in well-informed decision processes. Maier (2010) highlights different kinds of KMS which can be used in KS and to support DM in several ways, including allowing employees to have direct access to both knowledge and experts. Bolloju *et al.* (2002) recommended organisations use KMSs with DSSs to make effective, supportive and successful decisions, as appropriate integration of DSSs and KMSs will not only support the required interaction but will also create and find new opportunities for improving the quality of support provided by each system.

Martinsons and Davison (2007) confirm that the success of KMSs and IS in supporting DM will depend critically on how well IT applications are improved and adapted to fit the decision styles of their intended users. Thus, a global KMS and IS must have the flexibility to meet different decision styles and fit the DMP. Bolloju *et al.* (2002) point out some benefits of integrating DSS and KMSs: enhancing the quality of support in

real-time adaptive active decision support; supporting acquisition, exploitation, creation and accumulation of knowledge in organisations; facilitating the discovery of patterns and trends in the accumulated knowledge; and supporting the means and tools for building up organisational memory. Regarding MNCs, Nielsen and Michailova (2007) point out that over the past three decades, many MNCs have considered KMSs for the purpose of sharing, utilising and integrating knowledge. They are often attributed with increasing the flexibility of MNCs, responding faster to the current changing environment, improving DM and spurring greater innovation.

7.2.3 Perceived Ease of Use impact on User's Perceived Usefulness of using KMSs

In the proposed model, it was hypothesised that the Perceived Ease of Use will have a positive and significant effect on users' Perceived Usefulness of using KMSs in MNCs (H2a). The hypothesis testing led to the following results (H2a: $PRE \rightarrow PRU, \beta = 0.538$, $t\text{-value} = 7.757$, $p < 0.01$). The results revealed strong support for hypothesis H2a, as proposed in the research model. This demonstrates that PRE has a strong and positive significant effect on the Perceived Usefulness of KMSs, indicating that it positively influences the PRU of KMSs in MNCs. The result is consistent with other research that proves a significant relationship between PRE and PRU (e.g. Adams *et al.*, 1992; Davis 1989, 1993; King and Marks, 2008; Venkatesh *et al.*, 2003).

This finding also agrees with research that shows that job satisfaction, performance appraisals, organisational commitment, and employees' perceptions regarding ease of use and usefulness of technology can affect KS (Bock *et al.*, 2005; DeVries *et al.*, 2006; Lin, 2007; Wang and Noe, 2010). PRU is also seen as being directly impacted by PRE (Davis, 1989, 1993; Venkatesh *et al.*, 2003). Moreover, Davis (1989) highlighted that employees' expectations and attitudes are heavily grounded in the technology acceptance model, which describes how individual behaviours are influenced by beliefs and attitudes.

7.2.4 Perceived Ease of Use impact on Knowledge Management Systems usage

Perceived Ease of Use was hypothesised to have a positive and significant effect on Knowledge Management System usage in MNCs (H2b). The hypothesis testing led to

the following results (H2b: PRE → KMS, $\beta = 0.206$, t-value = 2.482, $p < 0.01$). The results revealed strong support for hypothesis H2b, as proposed in the research model. This demonstrates that PRE has a strong and positive significant effect on KMS usage, indicating that it positively influences KMS usage in MNCs, although it was found to be relatively less influential than PRU. This result is consistent with research that has found a positive relationship between PRE and KMS usage (e.g. Adams *et al.*, 1992; Davis, 1989, 1993; King and Marks, 2008; Vlahos *et al.*, 2004; Venkatesh *et al.*, 2003).

Davis (1989, 1993) and Venkatesh *et al.* (2003) explain through TAM the impact of individuals' perceptions regarding their PRE towards a particular technological system that determines the actual use of this technology; it uses the individual's behavioural intention to use a system as a mediator. In TAM, PRE was significantly correlated with intended use and actual system usage, and PRU is also seen as being directly impacted by PRE.

7.2.5 Perceived Usefulness impact on Knowledge Management Systems usage

Perceived Usefulness was hypothesised to have a positive and significant effect on Knowledge Management Systems usage in MNCs (H3a). The hypothesis testing led to the following results (H3a: PRU → KMS, $\beta = 0.223$, t-value = 2.665, $p < 0.01$). The results demonstrated strong support for hypothesis H3a. This reveals that PRU of KMSs has a strong and positive significant effect on KMS usage, indicating that PRU positively influences KMS usage in MNCs. This result is consistent with research that has found a positive relationship between PRU and KMS usage (Adams *et al.*, 1992; Cabrera *et al.*, 2006; Davis 1989, 1993; King and Marks, 2008; Kulkarni *et al.*, 2006; Vlahos *et al.*, 2004; Venkatesh *et al.*, 2003).

TAM demonstrates that it is individuals' perceptions based on their PRU towards a particular technological system that determine the actual use of this technology. In this model PRU was significantly correlated with intended use and actual system usage and also found to be relatively more influential than PRE (Davis, 1989, 1993; Venkatesh *et al.*, 2003).

7.2.6 Perceived Usefulness impact on Organisational Effectiveness

The model in this research hypothesised that Perceived Usefulness will have a positive and significant effect on Organisational Effectiveness in MNCs (H3b). The hypothesis testing led to the following results (H3b: PRU → OE, $\beta = 0.189$, t-value = 2.975, $p < 0.01$). The results demonstrated strong support for hypothesis H3b. This reveals that PRU of KMSs has a strong and positive significant effect on OE, indicating that it positively influences OE in MNCs. Lesser *et al.* (2001) showed how the usefulness of communities of practice like IT activities in MNCs can add value to the organisation by: creation of higher-quality knowledge, fewer surprises and planned revisions, greater capacity in dealing with unstructured problems, more effective KS among business and corporate staff units, improved likelihood of implementing joint goals, and improved employee skills and learning. Jennex *et al.* (2008) linked the usefulness of KMS usage and OE by suggesting measuring the success of KMS in terms of organisational performance: product and service quality, productivity, innovative ability and activity, competitive capacity and position in the market, proximity to customers and customer satisfaction, employee satisfaction, communication and KS, and knowledge transparency and retention. However, there is not much literature regarding the relationship between PRU and OE. Accordingly, this finding strengthens the need for further studies regarding the relationship between PRU and OE in MNCs in the future.

7.2.7 Knowledge Sharing impact on Decision Making Processes

In this research, the proposed model hypothesised that there is a positive and significant relationship between Knowledge Sharing and Decision Making Processes in MNCs (H4). The hypothesis testing led to the following findings (H4: KS → DMP, $\beta = 0.282$, t-value = 3.500, $p < 0.01$). The results revealed strong support for hypothesis H4, as proposed in the research model. This demonstrates that KS has a strong and positive significant effect on the DMP in MNCs. This finding is consistent with the research (e.g.: David *et al.*, 2000; DeTienne and Jackson, 2001; Nicolas, 2004; Nielsen and Michailova, 2007; Zhang and Lu, 2007).

DeTienne and Jackson (2001) claimed that organisations are usually seeking new ways of leveraging and sharing knowledge to support their DMP, and that knowledge enables them to achieve their objectives through increasing their capacity for DM (David *et al.*, 2000). Wang and Noe (2010) also state that effective KS is not moving knowledge from

one location to another, but the basic notion is that the sharing of viable knowledge should assist with collaborative problem solving in the organisation, directly and indirectly, supported by networks and tools. Zhang and Lu (2007) suggested that in order to assist knowledge workers to make decisions efficiently and effectively, organisations should incorporate a KM paradigm into the enterprise's business processes so that knowledge workers can share knowledge and use it effectively and efficiently in their daily work. Regarding MNCs, Nielsen and Michailova (2007) point out that over the past three decades, many MNCs have considered KMSs for the purpose of sharing, utilising and integrating knowledge, enabling them to be more flexible, respond faster to the changing environment, improve DM and spur greater innovation.

7.2.8 Organisational Culture impact on Knowledge Management Systems

Usage

In the proposed model, it was hypothesised that there is a positive and significant relationship between Organisational Culture and Knowledge Management Systems usage in MNCs (H5a). The hypothesis testing led to the following results (H5a: OC KMS, $\beta = 0.242$, $t\text{-value} = 3.004$, $p < 0.01$). The results revealed strong support for hypothesis H5a, as proposed in the research model. This demonstrates that OC has a strong and positive significant effect on KMS usage in MNCs. This result is consistent with research that has found a positive relationship between OC and KMS usage (e.g. Alavi *et al.*, 2006; David *et al.*, 2000; Huber, 2001; Kankanhalli *et al.*, 2005; Leidner *et al.*, 2012; Nielsen and Michailova, 2007; Ruppel and Harrington, 2001).

Huber (2001) points out that OC affects the behaviour of knowledge workers in forming and adhering to KS, and using the knowledge in the context of KMSs. Alavi *et al.* (2006) emphasise the importance and influence of OC on the use of KMSs and the outcomes of such use, stressing that "any differences in cultural values within firms will lead to divergent organisational and individual outcomes from KMS use". Ruppel and Harrington (2001) point out that when the OC shows strong concern for the organisation's members and an atmosphere of mutual confidence and trust between them, early adoption of KMSs is most likely to occur. Kankanhalli *et al.* (2005) believe that OC supports KS by using KMSs through different reward and incentive policies. David *et al.* (2000) point out that the benefits of using a new technology infrastructure like KMSs are limited if OC values and practices are not supportive of KS and using

these systems across units. Research has also shown that organisations with cultures emphasising innovation are more likely to use KMSs and facilitate KS through subjective norms that encourage sharing (Bock *et al.*, 2005; Ruppel and Harrington, 2001; Wang and Noe, 2010). Regarding MNCs, Nielsen and Michailova (2007) maintain that most MNCs adopt the same type of KMSs for relatively long periods of time; OC and other relevant organisational factors also influence KMS use, design and implementation.

7.2.9 Organisational Culture impact on Knowledge Sharing

In this study, it was hypothesised that there is a positive and significant relationship between Organisational Culture and Knowledge Sharing in MNCs (H5b). The hypothesis testing led to the following results (H5b: OC → KS, $\beta = 0.430$, t-value = 4.577, $p < 0.01$). The results revealed strong support for hypothesis H5b. This demonstrates that OC has a strong and positive significant effect on KS in MNCs. This result is consistent with the research (Courtney, 2001; Alavi *et al.*, 2006; Michailova and Minbaeva, 2012; Minbaeva *et al.*, 2003; Jarvenpaa and Staples, 2001; David *et al.*, 2000; Wang and Noe, 2010; Cabrera and Cabrera, 2005; Kulkarni *et al.*, 2006; Leidner *et al.*, 2012; Zheng *et al.*, 2010; Shin, 2004).

Shin (2004) shows that OC can facilitate knowledge creation and sharing by developing a positive work environment and effective reward systems. Michailova and Minbaeva (2012) point out that knowledge is embedded and carried through organisational culture, policies, practices, systems and employees. However, KS does not occur automatically, but requires substantial organisational efforts aimed at encouraging close relationships between organisations' members. Courtney (2001) says that KM in organisations enhances communication and KS between organisational members, and enriches interpretation and coordinating actions between them. Accordingly, a cooperative OC must be created in such organisations to allow effective KS and communication between employees. However, OC that emphasises competition between employees may pose a barrier to KS, while cooperation between teams helps in creating trust, an essential condition for KS (Schepers and VandenBerg, 2007; Wang and Noe, 2010; Willem and Scarbrough, 2006).

7.2.10 Organisational Culture impact on the Decision Making Processes

In this study, it was hypothesised that there is a positive and significant relationship between Organisational Culture and Decision Making Processes in MNCs (H5c). The hypothesis testing led to the following results (H5c: OC → DMP, $\beta = 0.192$, t-value = 2.293, $p < 0.05$). The results revealed strong support for hypothesis H5c. This demonstrates that OC has a strong and positive significant effect on the DMP in MNCs. Politis (2003) believes that OC can facilitate KS, open communication, develop an understanding of work-related problems, and encourage organisational members to gather new knowledge in order to develop useful decisions. However, there is not much literature regarding the relationship between OC and DMP in MNCs, so this finding strengthens the need for further studies regarding the relationship between OC and DMP in MNCs.

7.2.11 Organisational Culture impact on Organisational Effectiveness

In this study, it was hypothesised that there is a positive and significant relationship between Organisational Culture and Organisational Effectiveness in MNCs (H5d). The hypothesis testing led to the following results (H5d: OC → OE, $\beta = 0.263$, t-value = 3.203, $p < 0.01$). The results revealed strong support for hypothesis H5d. This demonstrates that OC has a strong and positive significant effect on OE in MNCs. This result is consistent with the research (Daft, 2009; Denison, 1990, 1996; Denison and Mishra, 1995; Fey and Denison, 2003; Gold *et al.*, 2001; Lee and Choi, 2003; Zheng *et al.*, 2010).

Zheng *et al.* (2010) state that OC is a key organisational asset and is associated with OE. Moreover, OC is a source of competitive advantage, and several empirical researchers have shown that it is a significant factor in OE (Barney, 1991; Gordon and DiTomaso, 1992; Wilkins and Ouchi, 1983; Zheng *et al.*, 2010). Likewise, Davenport and Prusak (2000) stress that KM practices need to fit with OC in order to create a competitive advantage. Zheng *et al.* (2010) point out that KM initiatives play a potentially mediating role in linking OC with OE, as successful KM is believed to enhance and improve organisations' competitive advantage, innovation and employee relations, and to lower costs. Denison and Mishra (1995); Denison, (1996); Fey and Denison (2003); Gold *et al.*, (2001), agree that OC encompasses the social and technical systems of organisations and also affects organisational effectiveness.

7.2.12 Decision Making Processes impact on Organisational Effectiveness

In the proposed model, it was hypothesised that there is a positive and significant relationship between Decision Making Processes and Organisational Effectiveness in MNCs (H6). The hypothesis testing led to the following results (H6: DMP → OE, $\beta = 0.353$, $t\text{-value} = 4.716$, $p < 0.01$). The results demonstrated strong support for hypothesis H6. This reveals that the DMP has a strong and positive significant effect on OE in MNCs. This result is consistent with the research (Eisenhardt, 1989; Huber, 1990; Leidner and Elam, 1993, 1995; Wang and Noe, 2010).

Efficiency in DM has become more significant to organisations as the competitive environmental situations have increased and knowledge has become critical to organisational performance (Eisenhardt, 1989; Eisenhardt and Santos, 2002; Huber, 1990; Leidner and Elam, 1993, 1995). Wang and Noe (2010) say that decisions based on KM can help organisations in reducing costs, elaborating products and services, improving team performance, encouraging a firm's innovation capabilities and increasing sales and revenue from new products and services.

7.3 CONCLUSION

This chapter aimed to discuss the key findings of this study regarding the factors that affect KS by using KMSs to support the DMP in MNCs, and the hypothesised model that assesses the relationships between the constructs in the structural model. The participants of this study all used KMSs in supporting DM. They represent a diverse cross-section of businesses, at different managerial levels and in different countries. Most of the respondents use KMSs in supporting KS and DM on a daily basis. The proposed model helped to explain the overall relationships among these factors, and the main model estimations indicated that all the hypotheses proposed in this study are statistically significant. The next chapter will present the conclusions of this thesis.

CHAPTER EIGHT: CONCLUSIONS

8.1 INTRODUCTION

The main aim of this study was to examine the impact of using KMSs on knowledge sharing to support decision-making processes in MNCs. This aim was achieved through conducting and analysing a literature review, followed by exploratory research with thematic analysis of 42 semi-structured interviews to identify the factors affecting KS. A set of strong overarching themes concerning these factors were identified in a conceptual framework. A structural model was proposed, based on the thematic analysis and the literature review, to examine the relationships among these factors through using structural equation modelling with the AMOS statistical package. This chapter summarises the results and conclusions of the thesis, discusses the theoretical and managerial implications of the findings, highlights the limitations of the study, and makes suggestions for further areas of research. Figure 8-1 summarises the research process of this study to confirm the research activities that was presented in Figure 1-1.

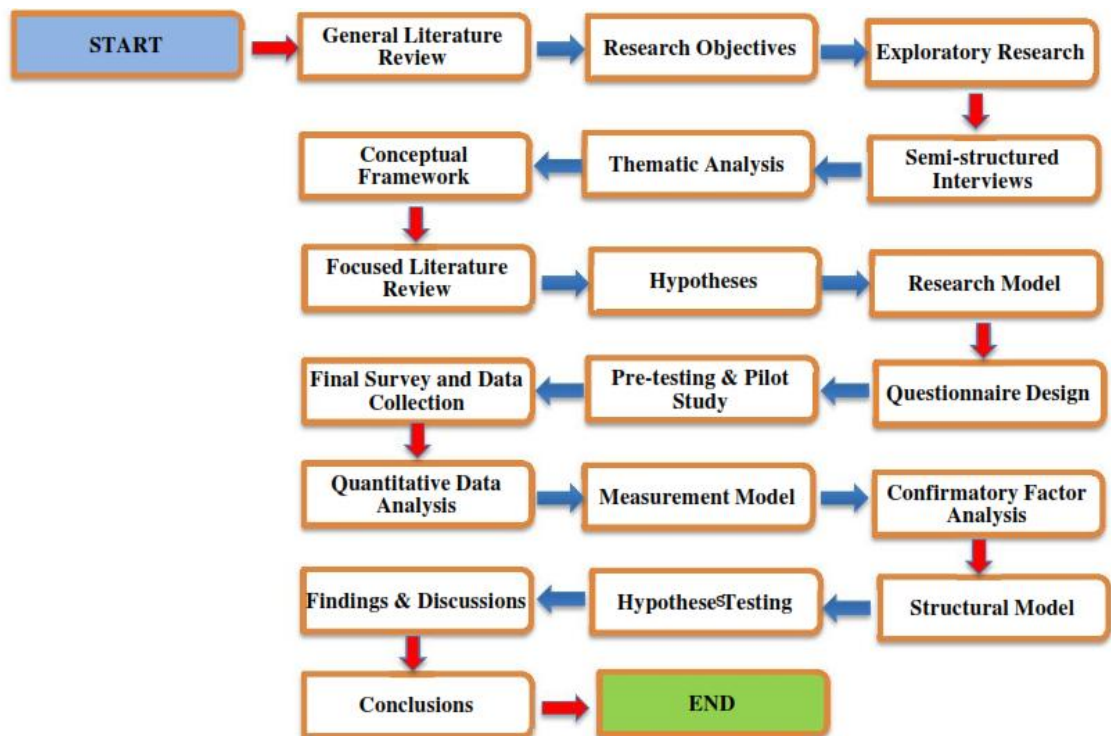


Figure 8- 1: Research Process

8.2 SUMMARY OF THE STUDY AND RESEARCH FINDINGS

This study has endeavoured to identify and examine the factors that affect KS by using KMSs to support DMP in MNCs. It has focused on organisational culture, perceived ease of use and perceived usefulness of KMS usage, knowledge sharing, decision-making processes and organisational effectiveness in MNCs. This section discusses the key findings of the study in keeping with the research objectives.

With regard to the *first objective* “Explore KMSs applications, Knowledge Sharing Practices and Decision-making Processes in MNCs”, theories, relevant literature, and prior studies were reviewed which summarise the main topics of the study regarding OC, KS, KMSs, DMP and OE. Taken together, these reviews suggest the need for a more concentrated focus on the use of KMSs in KS and DMP and, specifically, a more integrated consideration of the factors affecting KS by using KMSs like OC to support DMP in MNCs. Reaching the first objective of the study helped in achieving research objectives and answering the research question by highlighting research possibilities that have been overlooked implicitly in research to date, noticing explicit recommendations for further research, avoiding repetition of work that has been done before, and providing an insight into research methodologies, approaches, and strategies which are appropriate to the research question and objectives. A variety of research techniques were employed in this study to answer the research question and to achieve the research objectives. The mixed methods approach was adopted, bringing together semi-structured interviews and an e-survey.

Addressing the *second objective* “Identify the factors that affect Knowledge Sharing by using KMSs to support Decision-making Processes in MNCs”, 42 semi-structured interviews were conducted to explore the main dimensions that affect KS by using KMSs to support DMP. The main themes concerning factors affecting KS were identified from the thematic analysis and summarised in a conceptual framework (Figure 4-6) comprising four core dimensions. In the first dimension *Knowledge Management Systems*, three themes were identified: Technology Acceptance, Communication Tools, and KMS Usage. In the second dimension *Knowledge Sharing Practices*, three themes were identified: Content, Willingness to Share, and External Factors. In the third dimension *Culture*, the three themes were: National Culture, Organisational Culture, and

Information Technology Culture. In the fourth dimension *Decision-making Processes*: Extent of Analysis and Speed of Decision-making were identified.

The *third objective* was to “Develop a structural model to examine the relationships between the factors that affect knowledge sharing by using KMSs to support decision-making processes in MNCs”. A model was proposed to explain the overall relationships between these factors. It comprises seven constructs: organisational culture, perceived ease of use and perceived usefulness of using KMSs, KMS usage, knowledge sharing, decision-making processes and organisational effectiveness in MNCs. The relationships between the seven constructs were posited in twelve hypotheses based on the findings of the thematic analysis, literature review, and the research objectives.

This study went a step further than merely identifying the factors that affect KS. Specifically, the study explored which factors influence knowledge sharing, KMS usage, DMP, and OE, to achieve the *last objective* “Test the empirical validity of the proposed research model in the context of multinational corporations in Europe and the Middle-East”. A survey approach was used to test the model. The survey questionnaire was designed based on previously validated, reliable scales, and survey instruments used in previous studies. In this study, 221 completed questionnaires were returned and used out of 631, with a response rate of 35%. The study presented profiles of MNCs and participants who are using KMSs in supporting KS and the DMP. Structural Equation Modelling (SEM), using the Analysis of Mean and Covariance Structures (AMOS) software, was used to examine and test the measurement and structural models. Confirmatory Factor Analysis (CFA) was conducted and the results showed that constructs used in the measurement model possessed adequate reliability, and convergent, discriminant and nomological validity. Then, the structural model (Figure 6-17) was assessed; the results revealed that the standardised estimates for all hypotheses are statistically significant and show support for all hypotheses at 1% level, except H5c at 5% level.

The findings showed that OC and KMSs usage have a positive and significant effect on KS, but OC has a greater positive impact on KS ($r=0.430$) than KMS usage ($r=0.233$). The results revealed also that OC, PRE and PRU have positive and significant effects on KMS usage, but OC has a greater positive impact ($r=0.242$) than PRE ($r=0.206$) PRU ($r=0.223$). The results demonstrated that PRE has a strong and positive significant effect

on PRU ($r=0.538$). The study results also showed that OC, KS and KMS usage have positive and significant effects on DMP, but KS has a greater positive impact ($r=0.282$) than KMS usage ($r=0.203$), and OC (0.192). The findings showed that OC, PRU and the DMP have a positive and significant effect on OE, but that the DMP has a greater positive impact on OE ($r=0.353$) than OC ($r=0.263$) and PRU (0.189).

8.3 SUMMARY OF CONCLUSIONS

The study findings and results present substantial answers to the unresolved issues in the literature identified in chapters one and two. First, besides providing empirical evidence of the relationships between knowledge management usage, knowledge sharing and decision-making processes, this study suggests that decision-making processes could be an intervening mechanism between organisational culture, knowledge management systems, knowledge sharing and organisational effectiveness.

Second, the study provides some insights in integrating the resource-based view and knowledge-based view; with regard to the latter, the findings suggest that knowledge sharing should not be seen in isolation, as it is a central mechanism that leverages the influence of organisational culture and KMS usage on decision-making processes. The results support resource-based view in viewing knowledge as a shared resource when using knowledge management systems to support decision-making processes in MNCs; it is one step closer to organisational effectiveness in the paths leading from organisational culture to organisational effectiveness and also in paths leading from perceived ease of use and perceived usefulness to organisational effectiveness, as depicted in Figure 6-17. Further exploration is needed to examine the relationship between perceived usefulness and organisational effectiveness.

Third, the results support the technology acceptance model in that perceived ease of use and perceived usefulness affect usage of knowledge management systems. Similarly, the findings support the positive significant relationship between perceived ease of use and perceived usefulness in TAM.

Fourth, organisational culture exerts a significant impact on KMS usage above and beyond that of perceived ease of use and perceived usefulness. Organisational culture

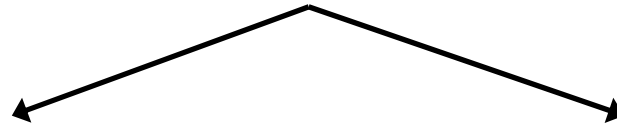
also exerts a significant impact on knowledge sharing above and beyond that of KMS usage. Furthermore, organisational culture has a significant effect on organisational effectiveness, but its effect is less than that of decision-making processes when this is taken into consideration. Organisational culture was also found to make a significant contribution and have a positive relationship with KMS usage, knowledge sharing, decision-making processes and organisational effectiveness. This might be because organisational culture determines “the basic beliefs, values, and norms regarding the why and how of knowledge generation, sharing, and utilisation in an organisation” (Rašula *et al.*, 2012). This finding supports the call for managerial attention in MNCs to create an organisational culture that encourages knowledge sharing and KMS usage.

Finally, knowledge sharing was found to fully mediate the influence of KMS usage on the decision-making processes. This finding suggests that how well knowledge is shared by using knowledge management systems is largely associated with how well decision-making processes are translated into value to the organisation.

8.4 CONTRIBUTIONS

The contributions and implications of the findings of this study are described separately as theoretical and managerial contributions, and summarised in Figure 8-2.

Contributions and Implications



Theoretical

- This study applied TAM, RBV, and KBV in a new context of using KMSs in KS to support DMP in MNCs.
- This study provided a new conceptual framework with a set of strong overarching themes concerning the factors that affect KS by using KMSs to support DMP in MNCs based on semi-structured interviews and thematic analysis.
- This study is distinguished from the existing empirical work by providing a model that examines the relationships between a wide range of factors that affect KS by using KMSs in MNCs.
- This study used sophisticated statistical tools (structural equation modelling with AMOS) in testing measurement and structural models, which have been limited in previous literature.
- The study will make important contribution to the literature in IS, KMSs, DM and KS which will help MNCs to understand the factors that affect KS by using KMSs to support DM.
- This study attempted to minimise the paucity of the studies in the domain of KMS usage, DM and KS applications from the MNCs perspective.
- The conceptual framework, questionnaire, and the model are designed to be easy to use, so they can be applied in other research and in organisations.

Managerial

- The findings give fruitful insights to managers, decision-makers, and KMS designers inside MNCs to better understand the KMS users' needs to improve KMSs, increase KS and support the DMP.
- Given the large investment in developing KMSs, an understanding of the factors affecting users' acceptance and usage of KMSs is useful for MNCs so they can prioritise their resources in an effective way.
- The model speaks the language of business by focusing on management and organisational practices related to technology acceptance and usage, organisational culture, KMS usage, knowledge sharing, decision-making and organisational effectiveness.
- This study suggested OC as a significant factor that affects KMS usage, KS, DM, and OE. Thus, management, decision-makers, and designers in MNCs are recommended to foster an "organisational culture" that enables employees in all branches and at all levels to utilise available knowledge, using KMSs easily.
- The study proposed a new conceptual framework and model that would help IT specialists and managers in identifying new ways of leveraging and sharing knowledge by using KMSs to support DM in MNCs.

Figure 8- 2: Summary of Research Contributions and Implications

8.4.1 Theoretical Contributions

The results of this study make a number of significant theoretical contributions. First, this research applied RBV, KBV and TAM models in a new context of using KMSs in KS to support DM in MNCs. The success of the amalgamation of a wider range of factors that affect KS by using KMSs to support the DMP in one model (i.e. organisational culture, perceived ease of use and perceived usefulness of using KMSs, KMS usage, knowledge sharing, decision-making processes and organisational effectiveness) is evident from the results. Moreover, the results suggest that the proposed model can explain the impact of different factors on KMS usage, KS, DM, and OE in MNCs. Thereby, the results of this study extend TAM by understanding users' perceptions regarding the usefulness and ease of use of using KMSs in KS and DM in MNCs. The findings also extend the RBV by showing how KMSs can support DM and KS, and by taking OC as a vital factor which affects KS, KMS usage, DM and OE to make the best use of knowledge available in an organisation and create the best value. This study also extends the KBV in the context of KS through showing the impact of OC and KMS usage in deploying and sharing knowledge assets in MNCs, resulting in a better understanding of knowledge as a competitive resource and linking it with KS, DM and OE.

Second, this study contributes to our understanding of KS in different fields, by reviewing and integrating the literature from several disciplines. Generally, based on the literature review, it was concluded that there is a substantial body of literature which discusses how KMSs can be used to facilitate KS and DM separately. There is thus a gap in the literature regarding the use of KMSs in supporting the DMP, especially in MNCs. Thus, although several studies relating to KS have been conducted in information systems, organisational science, decision-making, international business, and organisational effectiveness, there has been no research to date to consider all the variables used in this study.

Third, this study provides a new conceptual framework that identifies the factors that affect KS by using KMSs to support DM in MNCs. The conceptual framework will make important contribution to the literature in IS, KMS usage and KS, which will help MNCs to identify new ways of leveraging and sharing knowledge to support the DMP.

Fourth, the model developed in this study examined the relationships between organisational culture, perceived ease of use and perceived usefulness of KMSs, KMS usage, knowledge sharing, decision-making processes and organisational effectiveness in MNCs in Europe and the Middle-East. This distinguishes the study from the existing empirical work on KMSs and KS, by examining a wider range of variables that affect KS by using KMSs to support the DMP. The model developed here extends existing theoretical models. In addition, the conclusions and findings generated from this study will be an original contribution to the knowledge base in the fields of IS, KMSs and KS.

Fifth, most qualitative studies regarding KS provide a rich and in-depth examination of the organisational context in which it occurs, and most of the quantitative studies suffer from significant limitations such as measuring KS by using either willingness or intention to share knowledge, and questionnaires completed by a single source or country during one time period. These limitations do not allow researchers to explore KS in different regions and rule out possible alternative explanations for significant results.

Therefore, this study contributes by using mixed methods with rich data for a current empirical study of participants in MNCs in a diverse cross-section of businesses, at different managerial levels, of different nationalities, and in different countries of Europe and the Middle-East. In addition, structural equation modelling using the AMOS statistical package was used to test the measurement and structural models. The use of this research methodology with sophisticated statistical tools has been limited in previous literature. Accordingly, this study sets a new pattern in the research on KS and KMS applications.

8.4.2 Managerial Implications

The results of this study have many contributions and implications for different stakeholders such as staff, managers, decision-makers, KMS designers, IT specialists, and consultants in MNCs, as discussed below.

The unprecedented increase in the use of KMSs to facilitate KS and support the DMP, and its benefits (e.g. reducing production costs, helping in developing new products and projects, improving team performance and the organisation's innovation capabilities, and increasing sales and revenue) is compelling MNCs to develop KMSs that facilitate

KS and provide users with access to knowledge at anytime and anywhere. MNCs spend a lot of money in establishing KMSs that capture, store, share and improve access to knowledge, but this does not always bring about the expected outcomes. Given the large investment in developing KMSs, an understanding of the factors affecting users' acceptance and usage of KMSs is useful so that MNCs can prioritise their resources in an effective way. For example, PRU and PRE were found to be significant factors that exert a strong impact on users' usage of KMSs, and PRE was found to have a significant impact on PRU. PRU was also found to have a significant impact on OE.

MNCs are recommended to consider OC as a significant factor that affects KMS usage, KS, DM and OE. They are also advised to create a favourable environment or OC to enable employees in all branches and at all levels to utilise their knowledge resources by using KMSs in KS. The findings suggest that OC had the highest impact on KS and KMS usage; in addition, KS had the highest impact on the DMP, and the DMP had the highest impact on OE. Accordingly, MNCs are recommended to ensure compatibility between the KMSs used to share knowledge between branches and the users' requirements, by supporting the OC to increase the usage of KMSs in KS to support DM and improve OE. The relationships identified in this study indicate the significance of these factors as prerequisites to the success of KS. Such factors must be strongly emphasised in OC. Furthermore, it is important to consider the uniqueness of every OC in removing obstacles to KS through examining potential challenges or problems that might exist in the organisation, and suggesting relevant solutions. The study findings also indicate that DMP can influence OE when it is in alignment with OC, KMS usage, and KS. Therefore, OC can support MNCs' ability to create value through leveraging and sharing knowledge, and all four dimensions of OC: adaptability, consistency, involvement, and mission, which favourably contribute to the success of KS, KMS usage, the DMP, and OE when combined.

Furthermore, there appears to be a role for KMS developers and designers by ensuring that they design KMSs that effectively meet the needs and wants of both users and MNCs. Additionally, in order to increase KMS usage and KS to support DM, MNCs should arrange orientation and training sessions by IT departments to inform users on the use of KMSs, their potential benefits for both users and the organisation, and IT services if required. This would help to increase PRU and PRE which will emphasise

users' trust and confidence in KMSs and KS. Moreover, in order to increase KS by using KMSs to support DMP, MNCs should build KMSs that are accessible at anytime and anywhere, are useful and easy to use, support job performance, require little effort, are supported with artificial intelligence tools, are quick, customised and interactive, support smart-phone applications, are unified, precise, secure, reliable, and have translator, dictionary, and multi-media communication tools. However, managers must not limit their attention to the factors mentioned above; it is strongly recommended that they consider the existence of other factors outside the scope of this study such as politics, corruption, national culture and IT culture, which may have an influence on KS. Also, since this study was conducted in MNCs, managers must consider their specific organisation which might significantly influence the results.

In summary, the study proposed a model that would help MNCs to identify new ways of leveraging and sharing knowledge to support DM. This model can provide many advantages to managers and staff, such as:

- The model has been conducted and tested with participants who represent different positions in MNCs, several types of business, numerous departments, different nationalities, MNCs operating in different countries in Europe and the Middle-East, male and female, different managerial levels, different years of work experience in MNCs, and different years of experience in using KMSs tools.
- The model is distinguished from existing empirical work on KMSs and KS by the introduction of a wider range of factors.
- The reliability and validity of the research-based model have been proven.
- The model measures seven variables, each consisting of a number of indices (56 in total). The index items are adapted and derived from previous studies.
- The model is linked with organisational effectiveness, which focuses on performance and business outcomes of using knowledge assets.
- The model speaks the language of business, focusing on management and organisational practices related to technology acceptance and usage, organisational culture, KMS usage, knowledge sharing, decision-making and organisational effectiveness. This makes it easier for MNCs to use and apply; it can also be connected to key strategic initiatives, metrics and capabilities.

- The survey had a global reach, covering MNCs in 20 countries (9 in Europe and 11 in the Middle-East).
- The survey and model are designed to be easy to use, and applicable to other studies and organisations.
- The study had the privilege of collecting rich data from top global MNCs with large numbers of customers from diverse industries, identified from the ORBIS database 2012.
- The findings give fruitful insights to managers inside MNCs to improve KS by using KMSs to support the DMP.

The findings indicate that participants in MNCs tend to use KMSs regularly to share best practice and knowledge with other branches all over the world. Moreover, knowledge is the core of their business and it is also the reason for their existence and survival. Knowledge as a source of competitive advantage will continue to gain in importance, and MNCs will be compelled to apply knowledge through KS to improve organisational effectiveness and performance. KMSs will continue to evolve and support KS and the DMP. Though this study shed light on several unresolved issues in the literature, the results and findings should be interpreted in light of its limitations.

8.5 LIMITATIONS OF THE STUDY

Although the results and findings of this study are promising and valuable, a few limitations have been recognised which might be useful for other researchers to consider in the future.

First, the study was conducted in different MNCs with several types of business, and restricted to a limited number of countries. Obviously, there is no reason to assume that the results obtained in this study can be generalised to other MNCs, other countries, other functional areas or other industries. Second, the model developed in this study represents a reasonable starting point as it was tested on a sample size (221 responses), which certainly will have some implications for the generalisability of the findings. Third, it would in fact be unreasonable to assume that OC, KMS tools, PRU, PRE, and DMP are the same in all MNCs, as organisations have such diverse goals, operating in different sectors in different countries with employees with different backgrounds, knowledge, educations, willingness to share, experience of working in MNCs, etc.

Fourth, OE was measured by using subjective measures only because MNCs' accounting standards differ from one country to another and it is difficult in practice to obtain financial data in some countries, especially in the Middle-East. There is thus a need for further study with a larger sample size, in the hope that some of the neglected variables can be considered, such as national culture, IT culture, etc. If this is possible, then the limitations mentioned above will become opportunities to be explored in future research.

8.6 RECOMMENDATIONS FOR FURTHER RESEARCH

Throughout the current research, some notes and research ideas were observed which were not related to the main question or objectives of the thesis, but which are interesting and deserve more attention in future work. In particular, additional research might authenticate the generalisability of the findings.

To generalise the results and make significant analysis, further research needs to be conducted through using the same questionnaire with a much larger sample size. Furthermore, testing and exploring the model developed in this study in other cultural settings, including African, Asian or other western countries, will be valuable in providing evidence concerning the robustness of the research model across different cultural settings. It would also be interesting for future researchers to test and explore the model developed for this study as a case study in a single MNC with branches all over the world. In addition, the data was collected in this study through a cross-sectional survey; future research is recommended with more in-depth investigations using longitudinal data.

Another direction for further research could be using subjective and objective measures in measuring OE instead of using subjective measures only. Further research could also be conducted to expand the research model by including additional factors from the conceptual framework, such as IT culture, national culture, and politics which were excluded because of the time constraint. Conducting comparative studies is also suggested, to expand the research model by testing it in different regions or industries. Finally, research to identify the most important reasons for *not* sharing knowledge using KMSs in MNCs is recommended. Thus, future research can probe deeper into the finer details of the KMS body of KS and DM by using the conceptual framework, questionnaire, proposed model, and the findings of this thesis.

8.7 AND THEN?

The research process undertaken in this study was described at the start of the thesis as a spiral, involving several stages. Now the study has finally reached the end of the last stage. But for me, the end of this spiral is the start of the next one, as the real research process has just begun and will never stop.....

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APPENDICES

Appendix (A): Interview Invitation & Information Sheet



Manchester Business School
The University of Manchester,
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Manchester, UK
Tel: + (44) 751 526 5108
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Dear Mr./Ms.,

Greetings, my name is Mahmoud Abdelrahman, I am a PhD student at Manchester Business School in The University of Manchester, I had my MSc. from Manchester Business School in "Information Systems, Organisations and Management", BSc in "Management and Business Administration" and now I am in the process of pursuing my PhD in "Business Systems" under the supervision of Professor Simon French and Doctor Nadia Papamichail .

I am writing a thesis on Knowledge Sharing by using Knowledge Management Systems to Support Decision Making Processes in Multinational Corporations. The aim of this study is to analyse how Knowledge Management Systems could effectively be utilised to facilitate knowledge sharing in Multinational Corporations to support Decision Making Processes.

I would be very grateful if I might interview you and several people from your company to discuss the use of Knowledge Management Systems in knowledge sharing and how it can support decision making processes. The interview will last between 25 and 45 minutes.

Your input is really so important to the success of this study and your contribution will ensure that your organisation's views are represented.

I would like to conduct this interview with you at any time convenient for you; I am generally available to interview you between *15th of May and 30th of June 2010*. The interview can be conducted via (*Telephone or SKYPE or MSN or Yahoo*) or face to face if possible at any time convenient for you. The data provided will be anonymous and used with complete confidentiality for research purposes only. At the conclusion of the study, a copy of the final research report and conclusions will be available upon request. This study has been approved by "Manchester Business School Postgraduate Research Ethics Committee" with reference number: MBS-PGR/N401.

If you have any question regarding the research, please do not hesitate to contact with me by phone at + (44) 751 5265 108 or via e-mail at mahmoud.abdelrahman@postgrad.mbs.ac.uk

Your time and participation are greatly appreciated, please let me know if you are willing to take part and suggest a time when the interview might take place.

I look forward to receiving your reply.

Thank you :)

--

Kind Regards,
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Information Sheet

You are being invited to take part in a research study as part of a student project. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Please ask if there is anything that is not clear or if you would like more information.

Title of research project:

Knowledge Sharing by using Knowledge Management Systems to Support Decision Making Processes in Multinational Corporations.

This study will be conducted by *Mahmoud Abdelrahman*. This study is a part of his PhD in Manchester Business School at the University of Manchester.

The *aim* of this study is to analyse how Knowledge Management Systems could be more effectively utilised to facilitate knowledge sharing to support Decision Making Processes in Multinational Corporations.

Your participation will be appreciated through an interview to discuss the use of Knowledge Management Systems in knowledge sharing and how it can support the processes of decision making in your organisation. The interview will last between 25 and 45 minutes. Your input is really so important to the success of this study and your contribution will ensure that your organisation's views are represented. Your participation is entirely voluntary and you are free to leave the study at any time without being required to give any reason for leaving. The data provided will be anonymous and used with complete confidentiality for research purposes only. At the conclusion of the study, copies of the final research report will be available upon request.

This study has been approved by "*Manchester Business School Postgraduate Research Ethics Committee*" with reference number: MBSPGR/N401.

If you have any question regarding the research, please do not hesitate to contact with me by phone at + (44) 751 5265 108 or via e-mail at mahmoud.abdelrahman@postgrad.mbs.ac.uk

Your time and participation are greatly appreciated and I look forward to receiving your input.

Thank you ☺

Best Regards
Mahmoud Abdelrahman
PhD Candidate in "Business Systems"
Manchester Business School,
The University of Manchester
Tel: + (44) 751 5265 108

Appendix (B): Interview Protocol

1. Background Information:

- Information about the organisation
- Information about the participant- age, functional experience, experience in the industry, experience with the firm.

2. Brief introduction of the research project: we are investigating factors that affect knowledge sharing through using knowledge management systems to support decision making processes in MNCs.

- Do you share knowledge in your organisation?
- How do you share knowledge in your organisation?
- What are the factors that affect knowledge sharing in your organisation?
- What are the cultural issues that can affect knowledge sharing in MNCs?
- What are the incentives that encourage knowledge sharing in MNCs?
- Do you have KMSs in your organisation? Do you use them?
- How KMSs facilitate knowledge sharing in your organisation?
- Do the applications of KMSs increase the sharing of knowledge among MNCs units?
- What are the barriers and drivers of using KMSs in sharing knowledge in your organisation?
- How can KMSs support DMP in your organisation?
- What are the barriers and drivers of using KMSs in supporting DMP in your organisation?
- What are the KMSs characteristics that can facilitate knowledge sharing to support DMP in MNCs?

Appendix (C): Consent Form



Manchester Business School
The University of Manchester
Booth Street East, M15 5PB
Manchester, UK
Tel: + (44) 751 526 5108
Fax: + (44) 161 275 6596
mahmoud.abdelrahman@postgrad.mbs.ac.uk
www.mbs.ac.uk

Faculty of Humanities

Consent Form for Participants Taking Part in Student Research Projects

Title of the research: Knowledge Sharing by using Knowledge Management Systems to Support Decision Making Processes in Multinational Corporations.

Name of Researcher: MAHMOUD ABDELRAHMAN

School: MANCHESTER BUSINESS SCHOOL

Participant (volunteer): Please read this and if you are happy to proceed, sign below.

The researcher has given me my own copy of the information sheet which I have read and understood. The information sheet explains the nature of the research and what I would be asked to do as a participant. I understand that the research is for a student project and that the confidentiality of the information I provide will be safeguarded unless subject to any legal requirements. He has discussed the contents of the information sheet with me and given me the opportunity to ask questions about it.

I agree to take part as a participant in this research and I understand that I am free to withdraw at any time without giving any reason and without detriment to myself.

Signed:

Date:

Name BLOCK LETTERS:

Researcher

I confirm that I have discussed with the participant the contents of the information sheet.

Signed:

Date:

Appendix (D): Survey

Pilot Survey Invitation E-Mail

Dear Mr/Ms.,

Greetings, my name is Mahmoud Abdelrahman, I am a PhD student at Manchester Business School in The University of Manchester.

I am currently in the process of pursuing my data collection. I am writing a thesis on “Knowledge Sharing by using Knowledge Management Systems to Support Decision Making Processes in Multinational Corporations”. The aim of this study is to analyse how Knowledge Management Systems could effectively be utilised to facilitate knowledge sharing and Decision Making Processes in Multinational Corporations.

I am writing to you to kindly request your participation in an online trial run examination of my survey. The purpose of this trial is to assist in fine-tuning of the survey and in identifying and eliminating potential problems before deploying the questionnaire to the intended participants. The survey instrument used in this study is entirely web-based. Participants will take the survey over the Internet using standard web browser software. I have outlined below some basic requests and instructions.

To complete the survey, kindly just click on the following link:

http://mbs.qualtrics.com/SE/?SID=SV_9Yct4PXcRPgELLC

Please read each question carefully and answer it, you can find also the definitions of terms used in questionnaire attached in this e-mail. While some of you are experts in the subject, many of you may not be familiar with Knowledge Management Systems or related topics. Regardless of your level of expertise in the subject matter, I desire and appreciate your input. The goal of this trial run is not to gather subject-oriented data, but rather to refine the survey instrument. Please note the amount of time required to complete the survey and report it along with your comments to me by e-mail.

If you have any question regarding the research, please do not hesitate to contact with me by phone at + (44) 751 5265 108 or via e-mail at mahmoud.abdelrahman@postgrad.mbs.ac.uk
Your reply to this questionnaire is very essential to my study. Thank you for your time and assistance in this research.

--

Kind Regards,
Mahmoud Abdelrahman
Doctoral Programme Member
Manchester Business School,
The University of Manchester
Tel.: +44 751 526 5108
email: mahmoud.abdelrahman@postgrad.mbs.ac.uk

Questionnaire Invitation

Dear Mr/Ms.,

Greetings, my name is Mahmoud Abdelrahman, I am a PhD student at Manchester Business School in The University of Manchester. I obtained my MSc. degree from Manchester Business School in the area of "Information Systems, Organisations and Management", and I am now in the process of pursuing my PhD.

I am writing a thesis on "Knowledge Sharing by using Knowledge Management Systems to Support Decision Making Processes in Multinational Corporations". The aim of this study is to analyse how Knowledge Management Systems could effectively be utilised to facilitate knowledge sharing to support Decision Making Processes in Multinational Corporations.

I am writing to you to kindly request your participation in an online survey. I would be very grateful if you and possibly several other people from your company could participate in my research. Your input is important to the success of this study, and your participation will ensure that your organisation's views are represented.

Completing the survey will take approximately 15-20 mins. You will just be asked to click on the answers. To complete the survey, kindly just click on the following link:

http://mbs.qualtrics.com/SE/?SID=SV_bQ6Nj5xmeuAJCol

Please be assured that your response will be anonymous and used with complete confidentiality for research purposes only. At the end of this study, a copy of the final research report and conclusions will be available upon request.

This study has been approved by "Manchester Business School Postgraduate Research Ethics Committee" with reference number: MBSPGR/N401

If you have any question regarding the research, please do not hesitate to contact with me by phone at + (44) 751 5265 108 or via e-mail at mahmoud.abdelrahman@postgrad.mbs.ac.uk
Your time and assistance are greatly appreciated and I look forward to having your participation in my research.

Thank you :)

--

Kind Regards,
Mahmoud Abdelrahman
Doctoral Programme Member
Manchester Business School,
The University of Manchester
Tel.: +44 751 526 5108
email: mahmoud.abdelrahman@postgrad.mbs.ac.uk

E-mail Reminder

Dear Mr/Ms.,

Greetings, approximately 1 week ago, I sent you e-mail requesting your participation in an academic survey as a part of my PhD's research. The survey is an on-line questionnaire developed to accumulate data related to using Knowledge Management Systems in Knowledge Sharing to Support Decision Making Processes in Multinational Corporations.

In case you did not receive my e-mail, I want to contact you again and request your participation. I understand you are busy, but your contribution is really valuable and I am passionate about this project and I will gladly share my final anonymous results with you if you wish to receive them.

The survey can be accessed through the following link:

http://mbs.qualtrics.com/SE/?SID=SV_bQ6Nj5xmeuAJCol

Your time and participation are greatly appreciated.

--

Kind Regards,
Mahmoud Abdelrahman
Doctoral Programme Member
Manchester Business School,
The University of Manchester
Tel.: +44 751 526 5108
email: mahmoud.abdelrahman@postgrad.mbs.ac.uk

Questionnaire



The University of Manchester
Manchester Business School

Dear Sir/Madam,

Thank you for taking the time to complete this survey. Your answer is important to us; the survey comprises of 4 parts and all parts are required. It will take approximately 15-20 minutes to complete the survey as you will just be asked to click on the answers. At the end of the survey you may leave your contact details if you wish to see the results of the survey.

The main purpose of this research is to examine the impact of organisational culture on knowledge sharing through using Knowledge Management Systems (KMS) to support decision-making (DM) processes in multinational corporations (MNC). The contribution of this study will help in finding out new ways of leveraging and sharing knowledge to improve your organisational performance in the future.

This survey asks for your opinion, so there is no right or wrong answer. Please respond to the questionnaire based on your own judgment, regardless of what you think others expect or what is socially acceptable. Please be assured that your response will be used for research purposes only and your details will be kept anonymous and confidential. Your participation is much appreciated, as your participation is of the greatest importance to the success of this study.

--

Kind Regards,

Mahmoud Abdelrahman

Doctoral Programme Member

Manchester Business School,

The University of Manchester

Tel.: +44 751 526 5108

email: mahmoud.abdelrahman@postgrad.mbs.ac.uk

Survey Completion
0% 100%

>>

Part 1/4: Respondent and Organisation Profile

1 **Your Gender**

2 **Your Age**

3 **Your country of nationality:**

4 **Industry Type:**

- | | | |
|--|---|--|
| <input type="checkbox"/> Automotive/Discrete | <input type="checkbox"/> Healthcare/Pharmaceutical | <input type="checkbox"/> Petroleum/Oil/Gas |
| <input type="checkbox"/> Banking/Finance/Accounting | <input type="checkbox"/> Insurance | <input type="checkbox"/> Research/Development |
| <input type="checkbox"/> Business Services | <input type="checkbox"/> IT/Software Development | <input type="checkbox"/> Telecommunications |
| <input type="checkbox"/> Consulting | <input type="checkbox"/> Manufacturing and Process Industries | <input type="checkbox"/> Transportation/Utilities |
| <input type="checkbox"/> Education | <input type="checkbox"/> Marketing/Advertising/Entertainment | <input type="checkbox"/> Wholesale/Retail/Distribution |
| <input type="checkbox"/> Engineering/Construction/Architecture | <input type="checkbox"/> Non-Profit-Organisation | <input type="checkbox"/> Other, please specify |
| <input type="checkbox"/> Food/Beverage | <input type="checkbox"/> Online Business | <input type="text"/> |

5 **Business activities:**

6 **How many employees work at your company location?**

7 **How many employees work for your company worldwide?**

8 **What is your country of residence?**

9 **In which country do you primarily work?**

10 **Country of your organisation's headquarters:**

11 **Your Job Title:**

12 **What best describes your managerial level in your organisation:**

- Top-level management
- Middle-level management
- First-level management
- Supervisory level
- Non-managerial Level
- Other, please specify

13 **Your Department:**

Accounting/Finance

Consultation

Customer Services

Executive Board

Human Resources

IT

Marketing

Operations

Research & Development

Training, learning & development

Other, please specify

14 **How long have you been working in this organisation?**

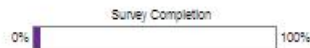
Less than one year	1-3 Years	4-6 years	7-9 years	10 years or more
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15 **Is your organisation a multinational corporation?**

16 **Do you use Knowledge Management Systems (KMS) in your organisation?**

Knowledge Management Systems are defined here as: "IT-based systems designed specifically to facilitate the sharing, integration and utilisation of knowledge". KMS facilitate the flow of knowledge in the organisation from the person(s) who know to the person(s) who need to know. (Example: Intranet, Knowledge portals, Search engines, Business intelligence, Lotus notes, Collaborative computing tools.....etc)

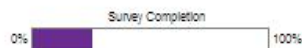
Yes	No	I don't know
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



The University of Manchester
Manchester Business School

17 **I don't use Knowledge Management Systems in my organisation, because (check all that apply)**

-
- I don't have KMS in my organisation
 - I don't know how to use it
 - Too expensive
 - Not used by competitors
 - Do not fit my work
 - I don't know
 - Other, please specify



Part 2/4: Knowledge Management Systems Usage, Perceived Ease of Use and Usefulness and Knowledge Sharing

18 **Select the Knowledge Management Systems tools that you are using in your organisation (check all that apply):**

- | | | |
|--|---|---|
| <input type="checkbox"/> Collaborative Computing Tools | <input type="checkbox"/> Competitive intelligence systems | <input type="checkbox"/> Customer relationship management systems |
| <input type="checkbox"/> Knowledge Servers | <input type="checkbox"/> Supply chain management systems | <input type="checkbox"/> Electronic discussion board / forum |
| <input type="checkbox"/> Intranet / Enterprise Knowledge Portals | <input type="checkbox"/> Knowledge repository/base | <input type="checkbox"/> Business intelligence |
| <input type="checkbox"/> Electronic Document Management | <input type="checkbox"/> E-learning | <input type="checkbox"/> Instant messaging / chatting |
| <input type="checkbox"/> Knowledge Harvesting Tools | <input type="checkbox"/> Multimedia conferencing | <input type="checkbox"/> Decision support systems |
| <input type="checkbox"/> Search Engines | <input type="checkbox"/> Groupware | <input type="checkbox"/> I don't know |
| <input type="checkbox"/> Knowledge Management Suites | <input type="checkbox"/> Directory of experts | <input type="checkbox"/> Other, please specify <input type="text"/> |

19 **How many years of experience do you have in using Knowledge Management Systems (KMS)?**

- None Less than 1 Year 1-2 Years 3-5 Years More than 5 years
-

20 **With what frequency do you personally use Knowledge Management Systems (KMS) in your organisation?**

- Infrequently Less than Once a Month Once a Month 2-3 Times a Month Once a Week 2-3 Times a Week Daily
-

21-26 **Using your own opinion and judgement, please state to what extent you agree or disagree with the following:**

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
Learning to operate KMS is easy for me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find it easy to get KMS to do what I want it to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My interaction with KMS is clear and understandable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find KMS are flexible to interact with	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy for me to become skilful at using KMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find KMS to be easy to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27-32 **Using your own opinion and judgement, please state to what extent you agree or disagree with the following:**

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
Using KMS in my job enables me to accomplish tasks more quickly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using KMS improves my job performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using KMS in my job increases my productivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using KMS enhances my effectiveness in my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using KMS makes it easier to do my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find KMS to be useful in my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In this survey:

- **We refer to "Knowledge" as:** a combination of experience, values, contextual information and expert insight that help evaluate and incorporate new experience and information in your organisation.
- **We refer to "Knowledge Sharing" as:** The transmission and dissemination of knowledge from the initial location to where it is needed and applied, by which knowledge is exchanged among individuals who are sending and/or receiving knowledge. It is the flow of knowledge in the organisation between the person(s) who know and the person(s) who need to know.

33 **With what frequency do you personally use Knowledge Management Systems (KMS) for knowledge sharing in your organisation?**

Infrequently	Less than Once a Month	Once a Month	2-3 Times a Month	Once a Week	2-3 Times a Week	Daily
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34-37 **Using your own opinion and judgement, please indicate to what extent you:**

	Not at all	To a very small extent	To a small extent	To a moderate extent	To a large extent	To a very large extent	Completely
Gain knowledge from colleagues in your own department	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use knowledge from colleagues in your own department	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gain knowledge from colleagues in other departments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use knowledge from colleagues in other departments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Part 3/4: Organisation's Culture

38-46 **Using your own opinion and judgement, please state to what extent you agree or disagree with the following:
In my organisation.....**

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
Decisions are usually made at the level where the best knowledge is available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge is widely shared so that everyone can get the knowledge he or she needs when it's needed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Everyone believes that he or she can have a positive impact	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Working in this organisation is like being part of a team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This organisation relies on horizontal control and coordination to get work done, rather than hierarchy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teams are the primary building blocks of this organisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compared with our competitors, this organisation is constantly improving in many dimensions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This organisation is continuously investing in the skills of employees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The capability of people in this organisation is viewed as an important source of competitive advantage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

47-55 **In my organisation:**

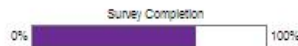
	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
The leaders and managers follow the guidelines that they set for the rest of the organisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is a clear and consistent set of values in this organisation that governs the way we do business	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This organisation has an ethical code that guides our behaviour and tells us right from wrong	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When disagreements occur, we work hard to achieve solutions that benefit both parties in the disagreement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to reach consensus, even on difficult issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We often have trouble reaching agreement on key issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People from different organisational units still share a common perspective	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to coordinate projects across functional units in this organisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is good alignment of goals across levels of this organisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

56-64 **In my organisation:**

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
This organisation is very responsive and changes easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This organisation responds well to competitors and other changes in the business environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This organisation continually adopts new and improved ways to do work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer comments and recommendations often lead to changes in this organisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer input directly influences our decisions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The interests of the final customer often get ignored in our decisions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We view failure as an opportunity for learning and improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This organisation encourages and rewards those who take risk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We make certain that we coordinate our actions and efforts between different units in this organisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

65-73 **In my organisation:**

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
This organisation has long-term purpose and direction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This organisation has a clear mission that gives meaning and direction to our work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This organisation has a clear strategy for the future	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is widespread agreement about goals of this organisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leaders of this organisation set goals that are ambitious, but realistic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The leadership has clearly stated the objectives we are trying to meet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have a shared vision of what this organisation will be like in the future	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leaders of this organisation have a long-term orientation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our vision creates excitement and motivation for our employees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>




Part 4/4: Decision Making Processes and Organisation's Effectiveness

74-83 To what extent has Knowledge Management Systems (KMS) helped you to:

	Not at all	To a very small extent	To a small extent	To a moderate extent	To a large extent	To a very large extent	Completely
Identify potential problems faster	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sense the key factors impacting your area of responsibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Notice potential problems before they become serious crises	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make decisions quicker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shorten the time frame for making decisions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spend less time in meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spend significantly more time analysing data before making a decision	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Examine more alternatives in decision making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use more sources of information in decision making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engage in more in-depth analysis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

84-89 How do you compare the overall performance of your organisation with the key competitors:

	Extremely poor	Very poor	Poor	Average	Good	Very good	Excellent
Market share	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sales growth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Profitability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employee satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of products and/or services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New product development	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Survey Completion
0%  100%

<< >>

Finally

Would you like to tell us anything else regarding your experience in Knowledge Management Systems, Knowledge Sharing and Decision Making in your organisation?

Would you like us to send you a copy of our research findings?

- Yes
 No



Please enter your contact information below:

Title	<input type="text"/>
First Name	<input type="text"/>
Surname	<input type="text"/>
Email	<input type="text"/>



Survey Powered By [Qualtrics](#)

We thank you for your time spent taking this survey.
Your response has been recorded.



Appendix (E): Descriptive Statistics of Construct Items and AMOS Output

- **Descriptive statistics of measured items of Knowledge Management Systems usage (KMS):**

DESCRIPTIVES VARIABLES=KMS1 KMS2

/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
KMS1	221	1	7	5.00	2.163	4.677
KMS2	221	1	7	5.43	1.895	3.591
Valid N (listwise)	221					

- **Descriptive statistics of measured items of Perceived Ease of Use (PRE):**

DESCRIPTIVES VARIABLES=PRE1 PRE2 PRE3 PRE4 PRE5 PRE6

/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
PRE_1	221	1	7	5.57	1.424	2.028
PRE_2	221	1	7	5.35	1.355	1.837
PRE_3	221	1	7	5.51	1.416	2.006
PRE_4	221	1	7	5.29	1.403	1.968
PRE_5	221	1	7	5.53	1.357	1.841
PRE_6	221	1	7	5.43	1.362	1.855
Valid N (listwise)	221					

- **Descriptive statistics of measured items of Perceived Usefulness (PRU):**

DESCRIPTIVES VARIABLES=PRU1 PRU2 PRU3 PRU4 PRU5 PRU6

/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
PRU_1	221	1	7	5.62	1.225	1.500
PRU_2	221	1	7	5.67	1.134	1.286
PRU_3	221	1	7	5.57	1.079	1.165
PRU_4	221	2	7	5.77	1.021	1.042
PRU_5	221	1	7	5.74	1.085	1.176
PRU_6	221	2	7	5.87	1.016	1.033
Valid N (listwise)	221					

- **Descriptive statistics of measured items of Knowledge Sharing (KS):**

DESCRIPTIVES VARIABLES=KS1 KS2 KS3 KS4

/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
KS_1	221	1	7	4.92	1.472	2.166
KS_2	221	1	7	5.19	1.370	1.876
KS_3	221	1	7	5.04	1.255	1.576
KS_4	221	1	7	4.57	1.474	2.174
Valid N (listwise)	221					

- **Descriptive statistics of measured items of Organisational Culture (OC):**

- **Involvement (INV):**

DESCRIPTIVES VARIABLES=INV1 INV2 INV3 INV4 INV5 INV6 INV7 INV8 INV9
/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
INV_1	221	1	7	5.56	1.266	1.602
INV_2	221	1	7	5.41	1.387	1.925
INV_3	221	1	7	5.45	1.146	1.313
INV_4	221	1	7	5.70	1.240	1.538
INV_5	221	1	7	5.39	1.340	1.794
INV_6	221	1	7	5.54	1.226	1.504
INV_7	221	1	7	5.41	1.320	1.743
INV_8	221	1	7	5.06	1.604	2.574
INV_9	221	1	7	5.52	1.467	2.151
Valid N (listwise)	221					

- **Consistency (CON):**

DESCRIPTIVES VARIABLES=CON1 CON2 CON3 CON4 CON5 CON6 CON7 CON8 CON9
/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
CON_1	221	1	7	5.50	1.344	1.806
CON_2	221	1	7	5.52	1.397	1.951
CON_3	221	1	7	5.74	1.372	1.883
CON_4	221	1	7	5.43	1.315	1.729
CON_5	221	1	7	5.16	1.285	1.652
CON_6	221	1	7	5.09	1.448	2.097
CON_7	221	1	7	5.19	1.377	1.897
CON_8	221	1	7	5.30	1.295	1.676
CON_9	221	1	7	3.81	1.596	2.548
Valid N (listwise)	221					

- **Adaptability (ADP):**

DESCRIPTIVES VARIABLES=ADP1 ADP2 ADP3 ADP4 ADP5 ADP6 ADP7 ADP8 ADP9
/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
ADP_1	221	1	7	4.93	1.572	2.473
ADP_2	221	1	7	5.12	1.430	2.044
ADP_3	221	1	7	5.18	1.382	1.910
ADP_4	221	1	7	5.14	1.362	1.854
ADP_5	221	1	7	5.22	1.433	2.053
ADP_6	221	1	7	5.22	1.433	2.053
ADP_7	221	1	7	5.18	1.295	1.676
ADP_8	221	1	7	4.67	1.639	2.687
ADP_9	221	1	7	5.01	1.545	2.386
Valid N (listwise)	221					

- **Mission (MIS):**

DESCRIPTIVES VARIABLES=MIS1 MIS2 MIS3 MIS4 MIS5 MIS6 MIS7 MIS8 MIS9
/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
MIS_1	221	1	7	5.77	1.253	1.569
MIS_2	221	1	7	5.66	1.228	1.507
MIS_3	221	1	7	5.43	1.502	2.255
MIS_4	221	1	7	5.35	1.418	2.010
MIS_5	221	1	7	5.20	1.429	2.042
MIS_6	221	1	7	5.46	1.350	1.822
MIS_7	221	1	7	5.17	1.501	2.252
MIS_8	221	1	7	5.38	1.427	2.036
MIS_9	221	1	7	4.91	1.596	2.546
Valid N (listwise)	221					

• **Descriptive statistics of measured items of Decision Making Processes (DMP):**

- **Problem Identification Speed (PIS):**

DESCRIPTIVES VARIABLES=PIS1 PIS2 PIS3
/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
PIS_1	221	1	7	4.56	1.624	2.638
PIS_2	221	1	7	4.30	1.418	2.010
PIS_3	221	1	7	4.26	1.512	2.285
Valid N (listwise)	221					

- **DM Speed (DMS):**

DESCRIPTIVES VARIABLES=DMS1 DMS2 DMS3
/STATISTICS=MEAN STDDEV VARIANCE MIN MAX .

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
DMS_1	221	1	7	4.76	1.685	2.840
DMS_2	221	1	7	4.75	1.691	2.861
DMS_3	221	1	7	4.37	1.793	3.215
Valid N (listwise)	221					

- **The Extent of Analysis in DM (DMA):**

DESCRIPTIVES VARIABLES=DMA1 DMA2 DMA3 DMA4
/STATISTICS=MEAN STDDEV VARIANCE MIN MAX .

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
DMA_1	221	1	7	4.28	1.815	3.294
DMA_2	221	1	7	4.69	1.642	2.696
DMA_3	221	1	7	4.72	1.682	2.830
DMA_4	221	1	7	4.66	1.697	2.881
Valid N (listwise)	221					

- **Descriptive statistics of measured items of Organisational Effectiveness (OE):**

DESCRIPTIVES VARIABLES=OE1 OE2 OE3 OE4 OE5 OE6

/STATISTICS=MEAN STDDEV VARIANCE MIN MAX.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
OE_1	221	1	7	4.98	1.622	2.631
OE_2	221	1	7	5.03	1.497	2.240
OE_3	221	1	7	5.07	1.571	2.467
OE_4	221	1	7	4.84	1.459	2.128
OE_5	221	1	7	5.59	1.175	1.380
OE_6	221	1	7	5.25	1.292	1.670
Valid N (listwise)	221					

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First-order Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
INV1	<---	INV	1.000			
INV2	<---	INV	1.458	.184	7.941	***
INV5	<---	INV	1.192	.166	7.174	***
INV4	<---	INV	1.403	.170	8.246	***
INV3	<---	INV	1.220	.153	8.001	***
CON6	<---	CON	1.231	.110	11.192	***
CON1	<---	CON	1.000			
CON3	<---	CON	1.092	.104	10.515	***
CON4	<---	CON	1.097	.100	10.996	***
CON7	<---	CON	1.214	.105	11.588	***
CON8	<---	CON	1.146	.099	11.633	***
ADP5	<---	ADP	.846	.069	12.263	***
ADP1	<---	ADP	1.000			
ADP3	<---	ADP	.918	.064	14.369	***
ADP7	<---	ADP	.955	.079	12.040	***
ADP8	<---	ADP	.916	.074	12.323	***
ADP6	<---	ADP	.716	.064	11.267	***
MIS5	<---	MIS	1.135	.085	13.399	***
MIS2	<---	MIS	1.053	.071	14.914	***
MIS1	<---	MIS	1.000			
MIS3	<---	MIS	1.365	.084	16.236	***
MIS4	<---	MIS	1.226	.081	15.105	***
MIS8	<---	MIS	1.091	.086	12.743	***
MIS6	<---	MIS	1.140	.078	14.591	***
PRE4	<---	PRE	.940	.053	17.765	***
PRE5	<---	PRE	.928	.050	18.566	***
PRE2	<---	PRE	.938	.049	19.025	***
PRE1	<---	PRE	1.000			
PRE3	<---	PRE	.997	.050	19.790	***
PRU4	<---	PRU	.964	.063	15.300	***
PRU6	<---	PRU	1.007	.062	16.329	***
PRU5	<---	PRU	1.047	.066	15.760	***
PRU1	<---	PRU	1.000			
PRU3	<---	PRU	.984	.067	14.584	***
KMS2	<---	KMS	1.000			
KMS1	<---	KMS	1.000			
PIS3	<---	PIS	.902	.039	22.906	***
PIS1	<---	PIS	1.000			
PIS2	<---	PIS	.826	.039	21.441	***
KS1	<---	KS	1.000			
KS3	<---	KS	.533	.055	9.771	***
KS4	<---	KS	.760	.058	13.056	***
KS2	<---	KS	.933	.042	22.014	***
DMS3	<---	DMS	.900	.044	20.270	***
DMS1	<---	DMS	1.000			
DMS2	<---	DMS	1.006	.023	44.041	***
DMA4	<---	DMA	1.074	.065	16.579	***
DMA2	<---	DMA	.947	.065	14.526	***

DMA1	<---	DMA	1.000			
DMA3	<---	DMA	1.007	.066	15.316	***
OE4	<---	OE	.773	.060	12.844	***
OE2	<---	OE	.945	.056	16.948	***
OE1	<---	OE	1.000			
OE3	<---	OE	.980	.059	16.631	***
PRE6	<---	PRE	.998	.046	21.778	***
CON5	<---	CON	1.133	.098	11.583	***

First-order Standardised Regression Weights: (Group number 1 - Default model)

			Estimate
INV1	<---	INV	.566
INV2	<---	INV	.753
INV5	<---	INV	.638
INV4	<---	INV	.810
INV3	<---	INV	.763
CON6	<---	CON	.798
CON1	<---	CON	.699
CON3	<---	CON	.748
CON4	<---	CON	.783
CON7	<---	CON	.828
CON8	<---	CON	.831
ADP5	<---	ADP	.752
ADP1	<---	ADP	.809
ADP3	<---	ADP	.846
ADP7	<---	ADP	.741
ADP8	<---	ADP	.754
ADP6	<---	ADP	.704
MIS5	<---	MIS	.794
MIS2	<---	MIS	.858
MIS1	<---	MIS	.799
MIS3	<---	MIS	.909
MIS4	<---	MIS	.865
MIS8	<---	MIS	.765
MIS6	<---	MIS	.845
PRE4	<---	PRE	.848
PRE5	<---	PRE	.866
PRE2	<---	PRE	.875
PRE1	<---	PRE	.888
PRE3	<---	PRE	.891
PRU4	<---	PRU	.899
PRU6	<---	PRU	.944
PRU5	<---	PRU	.919
PRU1	<---	PRU	.777
PRU3	<---	PRU	.868
KMS2	<---	KMS	.893
KMS1	<---	KMS	.834
PIS3	<---	PIS	.905

			Estimate
PIS1	<---	PIS	.934
PIS2	<---	PIS	.884
KS1	<---	KS	.931
KS3	<---	KS	.581
KS4	<---	KS	.706
KS2	<---	KS	.933
DMS3	<---	DMS	.825
DMS1	<---	DMS	.975
DMS2	<---	DMS	.978
DMA4	<---	DMA	.924
DMA2	<---	DMA	.842
DMA1	<---	DMA	.804
DMA3	<---	DMA	.873
OE4	<---	OE	.739
OE2	<---	OE	.881
OE1	<---	OE	.860
OE3	<---	OE	.870
PRE6	<---	PRE	.927
CON5	<---	CON	.828

First-order Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P
INV	.511	.119	4.277	***
CON	.878	.151	5.809	***
ADP	1.612	.227	7.095	***
MIS	.997	.141	7.064	***
PRE	1.593	.190	8.383	***
PRU	.903	.133	6.809	***
KMS	3.005	.338	8.877	***
PIS	2.290	.252	9.091	***
KS	1.867	.210	8.877	***
DMS	2.690	.270	9.948	***
DMA	2.121	.299	7.103	***
OE	1.939	.248	7.805	***
e1	1.084	.112	9.695	***
e2	.831	.101	8.241	***
e3	.546	.067	8.087	***
e4	.526	.073	7.197	***
e5	1.060	.114	9.329	***
e12	.758	.083	9.177	***
e10	.665	.071	9.302	***
e9	.827	.087	9.544	***
e7	.920	.094	9.778	***
e13	.594	.067	8.856	***
e14	.515	.058	8.812	***
e19	.889	.096	9.228	***
e17	.541	.067	8.033	***
e15	.849	.098	8.636	***

	Estimate	S.E.	C.R.	P
e21	1.206	.130	9.306	***
e22	1.023	.111	9.205	***
e20	.842	.088	9.538	***
e27	.750	.079	9.543	***
e26	.502	.057	8.829	***
e25	.389	.050	7.830	***
e24	.396	.044	8.940	***
e23	.566	.059	9.514	***
e30	.840	.086	9.709	***
e28	.519	.057	9.105	***
e35	.551	.059	9.307	***
e36	.459	.050	9.103	***
e33	.428	.048	8.968	***
e32	.425	.049	8.747	***
e34	.413	.047	8.703	***
e41	.198	.023	8.489	***
e42	.182	.023	7.886	***
e43	.112	.017	6.624	***
e38	.591	.060	9.784	***
e40	.286	.032	9.063	***
e65	.411	.053	7.716	***
e63	.337	.053	6.365	***
e64	.437	.052	8.335	***
e46	.289	.059	4.884	***
e48	1.039	.103	10.132	***
e49	1.087	.111	9.786	***
e47	.242	.051	4.738	***
e62	1.021	.102	10.005	***
e60	.138	.028	4.938	***
e61	.126	.028	4.565	***
e59	.420	.066	6.335	***
e57	.782	.089	8.760	***
e56	1.157	.126	9.199	***
e58	.668	.082	8.171	***
e53	.960	.103	9.351	***
e51	.499	.070	7.116	***
e50	.680	.088	7.723	***
e52	.595	.080	7.447	***
e45	.766	.176	4.352	***
e44	1.314	.203	6.462	***
e37	.261	.034	7.658	***
e11	.518	.059	8.862	***

First-order Standardised Residual Covariances (Group number 1 - Default model)

	CON5	PRE6	OE3	OE1	OE2	OE4	DMA3	DMA1	DMA2	DMA4	DMS2	DMS1	DMS3	KS2	KS4	KS3	KS1	PIS2	PIS1
CON5	0																		
PRE6	-0.211	0																	
OE3	-2.276	-0.067	0																
OE1	-1.149	-0.231	-0.052	0															
OE2	-0.912	-1	0.134	0.029	0														
OE4	-1.376	0.221	0.079	-0.144	-0.225	0													
DMA3	-0.445	-0.044	-1.233	-0.66	-0.626	0.656	0												
DMA1	-0.607	0.239	-1.166	-0.161	-0.6	0.964	0.19	0											
DMA2	-0.065	-0.611	-0.07	0.311	0.515	2.492	0.296	-0.015	0										
DMA4	-0.446	-0.603	-0.108	0.227	0.222	1.453	-0.042	-0.024	-0.177	0									
DMS2	-0.961	-0.221	-0.272	0.393	-0.063	0.611	-0.517	-0.145	-0.112	0.252	0								
DMS1	-0.706	0.157	-0.431	0.154	-0.396	0.566	-0.326	-0.141	-0.119	0.216	0.011	0							
DMS3	-1.363	0.275	0.351	0.501	0.126	0.927	0.361	1.294	0.693	0.906	-0.037	-0.056	0						
KS2	-0.576	-0.061	-0.783	0.371	-0.496	0.466	-0.549	-0.49	-0.045	-0.3	-0.274	-0.22	-0.563	0					
KS4	1.407	-0.102	0.445	1.419	0.666	1.347	2.072	0.264	1.669	2.172	2.066	1.903	1.412	-0.273	0				
KS3	1.966	2.034	-0.163	-0.133	-0.16	0.395	1.372	0.647	0.965	1.446	1.049	1.351	1.044	0.041	1.75	0			
KS1	0.056	0.69	-0.52	0.493	0.196	0.146	-0.14	-0.127	0.151	-0.315	-0.346	-0.062	-0.697	0.069	-0.136	-0.516	0		
PIS2	-0.569	-0.036	-0.026	0.363	-0.214	1.322	-0.753	-0.133	-0.156	0.161	-0.12	-0.209	-0.024	0.114	1.426	0.646	-0.215	0	
PIS1	-1.155	-0.516	-0.536	0.255	-0.092	0.506	-0.693	-0.36	-0.351	0.411	0.065	-0.064	0.341	-0.066	1.394	1.113	-0.053	0.062	0
PIS3	-1.526	-0.016	-0.556	0.073	-0.311	1.254	-0.166	-0.229	0.396	0.71	0.064	0.113	0.396	-0.573	1.376	0.636	-0.497	0.032	-0.066
KKK	-0.272	0.67	0.925	1.136	0.662	1.966	1.045	1.313	1.564	1.469	1.622	1.91	1.205	0.677	-0.093	1.167	0.321	2.563	1.629
KKO	-1.025	-0.435	-0.621	-0.149	-1.061	-0.236	-1.396	-0.62	-0.732	-0.66	-1.195	-0.626	-1.937	-0.492	-0.296	0.324	-0.166	-0.919	-0.629
PRU3	-0.366	0.469	-0.067	0.472	0.214	1.512	-0.364	0.192	0.199	0.446	0.072	0.052	0.475	-0.007	0.363	1.465	-0.527	-0.456	0.131
PRU1	-0.061	1.324	-0.694	0.037	-0.526	0.071	0.362	-0.061	-0.545	0.329	0.667	1.004	1.19	0.977	2.044	3.052	0.939	0.363	0.912
PRU6	-1.446	-0.067	-0.092	-0.366	-0.1	0.931	-0.196	0.132	-0.035	0.31	-0.164	-0.037	0.254	-0.356	-0.103	1.004	-0.601	-0.345	0.209
PRU5	-1.144	-0.07	0.009	-0.137	-0.349	0.409	-0.31	-0.275	-0.572	0.196	-0.269	-0.26	0.165	0.175	0.639	1.429	0.196	-0.375	0.173
PRU4	-0.95	-0.307	0.009	-0.424	0.046	1.116	0.201	-0.556	-0.615	-0.027	-0.051	0.063	0.376	-0.039	0.537	1.59	-0.476	-0.175	0.202
PRE3	-0.559	-0.116	1.131	0.576	0.603	1.124	0.905	0.391	0.006	0.362	-0.123	0.294	0.467	-1	-0.657	1.175	-0.414	0.519	-0.067
PRE1	-1.061	0.042	-0.101	-0.352	-1.152	0.664	0.21	-0.353	-0.659	-0.436	-1.034	-0.571	-0.651	-0.27	-0.214	1.753	0.066	-0.276	-1.053
PRE2	-0.61	-0.165	0.13	0.257	-0.147	1.051	1.291	0.214	0.024	0.562	0.201	0.5	0.926	0.504	0.595	1.316	0.793	0.129	0.722
PRE5	-0.697	0.261	0.204	0.679	-0.495	0.561	-0.02	0.165	-0.62	0.122	0.39	0.664	0.476	-0.414	-0.17	1.652	-0.05	0.496	0.045
PRE4	-1.262	0.074	0.292	-0.426	-1.002	0.743	0.25	-0.369	-0.476	0.014	-0.212	0.106	0.422	-0.616	-0.6	0.163	-0.442	0.452	0.263
MIS6	0.179	1.045	-0.521	0.496	-0.07	-0.506	0.211	-0.243	0.053	0.12	-0.363	-0.416	-1.01	-0.667	2.516	0.346	0.044	0.225	-0.936
MIS6	0.243	-0.394	-1.634	-0.645	-1.075	-0.676	0.376	0.246	0.156	-0.01	0.093	-0.177	-0.996	0.126	2.35	0.067	0.241	1.062	-0.166
MIS1	-1.397	-0.266	-0.566	0.191	-0.406	-1.266	-0.332	-0.276	-0.637	-0.204	-0.146	0.003	-1.117	0.047	1.612	0.513	-0.175	-0.341	-1.162
MIS2	-0.917	0.607	-0.711	-0.416	-0.135	-0.946	-0.192	-0.191	0.16	0.071	0.495	0.494	-0.276	-0.612	1.701	-0.054	0.13	0.391	-0.026
MIS3	-0.601	1.583	0.625	1.375	1.023	1.045	-0.223	0.045	-0.406	-0.364	-0.091	0.073	-0.736	-0.205	1.679	0.335	0.1	0.844	0.347
MIS4	0.5	0.006	-0.446	0.421	-0.035	-0.067	0.232	0.672	0.131	0.643	0.732	0.66	-0.054	-0.177	2.504	0.159	0.334	1.003	0.456
MIS5	-0.197	0.6	-0.793	0.115	-0.236	-0.349	0.236	-0.221	0.167	-0.064	-0.665	-0.931	-0.946	-1.305	0.97	-0.311	-1.095	-0.004	-1.217
ADP6	-0.02	0.656	-0.606	0.269	-0.532	-0.616	0.965	0.727	0.372	1.014	0.67	0.596	0.437	-0.397	1.344	1.203	0.431	0.709	0.269
ADP6	1.065	0.797	-0.632	0.473	-0.553	0.451	-1.073	-0.454	-0.605	-0.666	-0.42	-0.149	-0.351	1.475	1.65	0.421	1.6	1.22	-0.34
ADP7	-0.161	1.304	0.241	1.493	0.171	1.225	-1.331	-1.163	-1.747	-1.11	-0.966	-1.014	-0.764	0.092	0.751	0.445	0.575	0.174	-0.571
ADP1	-0.063	0.129	0.069	0.646	-0.077	0.453	-0.547	-1.052	-0.17	-0.564	-0.595	-0.647	-0.719	-0.676	0.543	1.476	-0.456	-0.431	-0.139
ADP3	0.303	-0.091	-0.431	0.506	-0.065	1.04	0.705	0.266	1.362	0.454	0.717	0.655	0.443	-0.966	1.584	1.579	-0.401	1.355	0.421
ADP5	0.261	-0.465	-1.295	0.21	-1.316	-0.04	1.264	0.642	0.617	1.049	0.221	0.671	0.061	-1.039	0.656	2.096	-1.049	0.356	-0.105
CON6	-0.582	1.034	0.501	1.04	0.726	0.306	-0.03	0.453	0.542	0.565	0.295	0.52	-0.063	-0.311	1.934	1.336	0.257	1.203	0.791
CON7	-0.166	-0.293	0.251	1.301	1.123	0.195	-0.227	-0.112	0.936	0.547	0.722	0.912	0.362	-0.72	1.092	1.511	-0.907	0.717	0.632
CON1	-0.417	-0.15	-0.066	0.971	0.656	-0.671	-0.623	-1.113	-0.433	-0.636	-0.371	-0.539	-0.496	-0.134	1.694	1.277	-0.04	-0.367	-0.62
CON3	0.467	1.169	0.525	1.192	0.796	0.366	0.166	-0.553	0.273	-0.264	-0.426	-0.032	-0.69	-0.36	1.835	0.591	0.096	0.63	-0.53
CON4	0.997	1.035	-1.464	-0.536	-0.573	-0.355	0	-0.446	0.456	-0.477	-0.457	-0.243	-0.262	-0.026	1.405	1.277	0.63	0.231	-0.225
CON6	0.136	0.531	-0.309	0.149	-0.283	-0.374	0.166	0.265	0.136	0.467	0.276	0.593	0.654	-0.9	2.206	1.215	-0.013	0.909	1.034
INV5	-0.66	0.063	1.166	1.66	0.695	2.269	-0.535	0.291	0.233	0.435	-0.403	0.217	-0.544	0.17	0.466	0.653	0.313	-0.426	-0.633
INV4	0.067	0.261	0.411	0.346	0.271	1.173	-0.566	1.032	-0.742	0.306	-0.161	0.129	-0.541	0.122	0.041	1.417	0.704	0.526	-0.222
INV3	-0.179	0.221	-0.626	-0.609	-0.966	0.729	-0.751	-0.65	-0.696	-0.623	-0.966	-0.901	-0.672	-0.76	0.024	-0.331	-0.176	-0.351	-0.671
INV2	0.03	0.591	-0.149	-0.373	-0.444	-0.022	0.624	0.616	-0.344	0.652	0.735	1.309	0.654	-0.619	-0.017	1.253	0.375	0.441	1.394
INV1	-0.034	-0.701	-1.473	-0.716	-1.596	0.026	0.096	-0.195	0.715	0.677	0.346	0.31	0.496	-0.927	0.715	-0.553	-0.419	-0.366	-0.136

	PIS3	RKK	RKO	PRU3	PRU1	PRU6	PRU5	PRU4	PRE3	PRE1	PRE2	PRE5	PRE4	MIS6	MIS5	MIS1	MIS2	MIS3	MIS4	
CON5																				
PRE6																				
OE3																				
OE1																				
OE2																				
OE4																				
DMA3																				
DMA1																				
DMA2																				
DMA4																				
DMS2																				
DMS1																				
DMS3																				
KS2																				
KS4																				
KS3																				
KS1																				
FIS2																				
FIS1																				
FIS3	0																			
KKK	1.12	0.616																		
KKO	-1.507	0.207	-0.546																	
PRU3	0.091	1.770	-0.481	0																
PRU1	0.483	2.396	-0.514	0.096	0															
PRU6	-0.22	1.745	-1.014	-0.011	-0.347	0														
PRU5	-0.274	1.382	-1.26	-0.072	0.086	0.096	0													
PRU4	-0.196	1.576	-1.444	-0.015	0.234	0.031	-0.079	0												
PRE3	0.095	1.111	0.19	0.003	0.753	-0.436	-0.89	-0.363	0											
PRE1	-0.606	0.606	-0.476	-0.051	0.89	-0.077	-0.636	-0.303	0.132	0										
PRE2	0.967	0.632	-0.94	1.159	1.556	0.657	-0.146	0.409	0.046	-0.031	0									
PRE5	0.116	0.616	-0.095	0.397	0.951	-0.519	-0.476	-0.904	-0.046	0.299	-0.4	0								
PRE4	0.422	0.425	-0.992	0.611	1.225	0.326	-0.165	0.372	0.027	-0.539	0.765	-0.4	0							
MIS6	-0.366	0.045	-0.973	0.591	0.475	-0.375	-0.092	-0.266	-0.261	-0.577	0.071	0.134	0.326	0						
MIS5	0.465	-0.23	-1.129	0.663	0.252	-0.755	-0.066	-0.159	-1.167	-1.722	-0.999	-1.565	-0.257	0.661	0					
MIS1	-0.928	0.593	0.156	-0.416	-0.795	-1.679	-1.223	-1.273	-1.167	-0.969	-1.396	-1.242	-1.246	-0.519	0.413	0				
MIS2	0.167	0.265	-0.615	0.12	0.573	-0.736	-0.102	-0.727	-0.694	-0.696	0.235	-0.716	0.736	-0.162	-0.216	0.574	0			
MIS3	0.109	0.907	0.133	1.177	1.041	0.508	1.075	0.572	0.634	0.374	0.912	0.516	0.973	-0.315	-0.172	0.242	0.227	0		
MIS4	0.193	0.436	0.123	1.244	0.466	-0.134	0.327	0.029	-0.522	-0.62	-0.149	-0.419	-0.22	-0.17	-0.573	-0.103	0.163	0.106	0	
MIS5	-0.561	0.64	-0.212	0.576	0.469	-0.783	0.225	-0.363	-0.527	-0.39	0.104	-0.266	-0.179	1.019	0.559	-0.31	-0.574	-0.177	-0.323	
ADP6	0.071	-0.126	-0.613	-0.669	-0.142	-0.694	-0.661	-0.2	0.715	0.977	-0.009	-0.351	0.413	-0.255	-0.36	-1.101	-1.135	-1.234	-0.516	
ADP5	-0.221	0.163	-0.271	0.673	0.416	0.072	-0.233	0.26	-0.156	-0.266	-0.095	0.002	-0.214	1.611	1.156	0.439	0.1	0.722	1.663	
ADP7	-0.677	0.162	-0.32	0.841	1.415	-0.061	0.291	0.453	0.956	0.424	0.734	-0.006	0.627	1.072	0.561	0.601	-0.235	0.666	0.956	
ADP1	-1.064	0.366	-0.589	0.334	0.917	-0.593	0.162	0.607	0.26	-0.236	-0.346	-0.521	-0.126	-0.504	0.063	-1.137	-1.919	-0.775	0.442	
ADP3	0.043	0.534	-0.343	0.236	0.724	-0.176	-0.336	0.203	-0.052	-0.447	-0.417	-1.009	-0.564	0.36	0.463	-0.165	-0.763	-0.055	1.726	
ADP5	-0.793	1.623	0.639	0.067	0.712	-0.212	-0.435	0.143	0.355	-0.406	-0.663	-0.71	-1.077	-0.354	0.106	-1.024	-1.644	-1.334	-0.221	
CON6	0.459	1.37	0.774	1.026	1.643	0.153	0.412	0.252	0.954	-0.119	0.623	0.432	0.054	0.971	0.3	-0.647	0.023	0.375	0.634	
CON7	-0.443	1.539	0.13	1.26	1.423	0.399	0.336	0.611	-0.149	-0.755	-0.326	0.134	-1.027	-0.6	-1.414	-1.066	-0.603	-0.729	0.401	
CON1	-1.343	-0.623	-1.321	-0.257	-0.503	-1.265	-0.606	-0.5	-0.762	-1.71	-0.064	-1.73	-1.454	0.693	-0.162	0.499	1.222	0.676	1.62	
CON3	-0.676	0.565	-0.769	1.269	0.653	0.204	0.437	0.513	0.725	0.257	0.916	0.34	0.663	1.69	0.553	0.745	1.27	0.664	1.776	
CON4	-0.593	0.122	-0.067	1.147	1.136	-0.34	0.034	-0.054	0.603	-0.391	0.64	0.396	0.217	-0.054	-0.454	-2.033	-0.617	-0.911	0.161	
CON6	0.697	0.113	-0.562	0.25	1.601	-0.667	-0.212	-0.129	0.071	-0.591	0.615	-0.344	-0.163	0.146	-0.561	-1.496	-0.651	-0.449	0.609	
INV5	-0.494	-2.02	-0.947	0.261	-0.294	-0.397	0.511	-0.664	-0.367	-0.161	-0.727	-0.163	-0.152	-0.046	-0.57	0.641	-0.172	0.416	1.161	
INV4	-0.051	0.275	0.369	0.5	-0.354	-0.259	-0.449	-0.762	0.046	0.196	-0.291	0.254	-0.062	0.512	-0.657	-0.779	-0.915	0.107	0.377	
INV3	-0.693	-0.176	-0.312	0.465	-0.669	-0.352	0.144	-0.329	-0.269	-0.205	-0.176	-0.314	0.671	0.325	-0.013	-0.961	-0.266	0.179	1.073	
INV2	0.697	0.655	0.633	1.151	0.44	0.627	0.762	0.755	0.637	0.23	-0.244	0.169	0.653	0.154	-0.353	-0.975	-0.725	-0.133	0.701	
INV1	0.469	-0.74	-0.161	1.466	-1.467	-0.579	0.047	-0.452	-0.99	-0.646	-0.935	-0.675	-0.496	-0.469	-1.01	-0.043	-0.596	-0.721	1.146	

	MIS5	ADP6	ADP5	ADP7	ADP1	ADP3	ADP5	CON5	CON7	CON1	CON3	CON4	CON6	INV5	INV4	INV3	INV2	INV1
CON5																		
PRE6																		
OE3																		
OE1																		
OE2																		
OE4																		
DMA3																		
DMA1																		
DMA2																		
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PRU5																		
PRU4																		
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PRE2																		
PRE5																		
PRE4																		
MIS6																		
MIS6																		
MIS1																		
MIS2																		
MIS3																		
MIS4																		
MIS5	0																	
ADP6	0.099	0																
ADP5	0.099	-0.123	0															
ADP7	1.472	1.123	1.571	0														
ADP1	0.267	-0.355	-1.02	-0.497	0													
ADP3	1.216	-0.464	-0.697	-0.941	1.112	0												
ADP5	-0.363	0.653	-0.39	-0.244	0.25	0.163	0											
CON5	1.095	-0.855	0.928	-0.06	-0.009	0.164	-0.57	0										
CON7	0.029	-1.393	0.541	-0.481	-0.101	0.064	-0.531	0.952	0									
CON1	0.733	-0.633	0.677	0.324	0.05	0.756	-0.402	-0.302	0.246	0								
CON3	1.05	-0.5	1.64	0.126	-0.627	0.653	-0.738	-0.69	-0.722	1.156	0							
CON4	0.327	0.364	1.213	-0.115	-0.692	0.226	-0.175	-0.563	-0.6	-0.166	0.719	0						
CON6	0.075	-1.607	0.595	-0.732	0.07	-0.362	-0.863	0.558	0.353	-0.675	-0.726	0.026	0					
INV5	-0.084	0.466	0.99	0.73	0.965	0.067	0.304	0.471	-0.632	0.589	0.054	-0.042	-0.354	0				
INV4	-0.05	0.452	1.67	-0.44	-0.306	-0.536	-1.496	1.017	-0.264	-0.661	0.326	0.657	0.423	0.44	0			
INV3	0.916	0.617	0.595	-0.721	0.606	0.07	-0.764	-0.34	-1.466	-1.036	0.14	0.642	0.331	-0.163	0.146	0		
INV2	0.243	0.414	-0.53	-1.063	0.003	-0.262	-0.462	0.964	-0.239	-1.164	-0.6	0.102	0.799	-0.557	-0.022	-0.111	-0.111	0
INV1	0.236	0.526	0.42	-0.375	0.202	0.454	-0.065	0.13	-0.552	0.017	0.135	0.042	-0.526	0.635	-0.961	0.067	0.91	0

Second-order Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
INV	<---	OC	1.000			
CON	<---	OC	1.965	.340	5.784	***
ADP	<---	OC	2.542	.425	5.982	***
MIS	<---	OC	1.843	.315	5.859	***
DMA	<---	DMP	1.000			
DMS	<---	DMP	1.293	.102	12.737	***
PIS	<---	DMP	1.134	.095	11.963	***
INV1	<---	INV	1.000			
INV2	<---	INV	1.452	.184	7.888	***
INV5	<---	INV	1.208	.168	7.209	***
INV4	<---	INV	1.407	.171	8.217	***
INV3	<---	INV	1.220	.153	7.964	***
CON6	<---	CON	1.234	.111	11.143	***
CON5	<---	CON	1.137	.099	11.540	***
CON1	<---	CON	1.000			
CON3	<---	CON	1.094	.105	10.460	***
CON4	<---	CON	1.103	.100	10.981	***
CON7	<---	CON	1.217	.106	11.524	***
CON8	<---	CON	1.150	.099	11.584	***
ADP5	<---	ADP	.842	.069	12.183	***
ADP1	<---	ADP	1.000			
ADP3	<---	ADP	.918	.064	14.354	***
ADP7	<---	ADP	.960	.079	12.127	***
ADP8	<---	ADP	.918	.074	12.355	***
ADP6	<---	ADP	.711	.064	11.168	***
MIS5	<---	MIS	1.135	.085	13.418	***
MIS2	<---	MIS	1.052	.070	14.922	***
MIS1	<---	MIS	1.000			
MIS3	<---	MIS	1.361	.084	16.189	***
MIS4	<---	MIS	1.227	.081	15.140	***
MIS8	<---	MIS	1.093	.085	12.784	***
MIS6	<---	MIS	1.139	.078	14.602	***
PRE4	<---	PRE	.941	.053	17.743	***
PRE5	<---	PRE	.929	.050	18.551	***
PRE2	<---	PRE	.939	.049	19.023	***
PRE1	<---	PRE	1.000			
PRE3	<---	PRE	.998	.050	19.766	***
PRU4	<---	PRU	.964	.063	15.293	***
PRU6	<---	PRU	1.008	.062	16.318	***
PRU5	<---	PRU	1.047	.066	15.750	***
PRU1	<---	PRU	1.000			
PRU3	<---	PRU	.984	.068	14.573	***
KMS2	<---	KMS	1.000			
KMS1	<---	KMS	1.000			
PIS3	<---	PIS	.904	.040	22.828	***
PIS1	<---	PIS	1.000			
PIS2	<---	PIS	.828	.039	21.398	***
KS1	<---	KS	1.000			

			Estimate	S.E.	C.R.	P
KS3	<---	KS	.533	.054	9.782	***
KS4	<---	KS	.760	.058	13.060	***
KS2	<---	KS	.932	.042	21.973	***
DMS3	<---	DMS	.901	.045	20.219	***
DMS1	<---	DMS	1.000			
DMS2	<---	DMS	1.008	.023	43.938	***
DMA4	<---	DMA	1.073	.065	16.613	***
DMA2	<---	DMA	.944	.065	14.505	***
DMA1	<---	DMA	1.000			
DMA3	<---	DMA	1.005	.066	15.339	***
OE4	<---	OE	.770	.060	12.771	***
OE2	<---	OE	.943	.056	16.894	***
OE1	<---	OE	1.000			
OE3	<---	OE	.982	.059	16.693	***
PRE6	<---	PRE	.998	.046	21.741	***

Second-order Standardised Regression Weights: (Group number 1 - Default model)

			Estimate
INV	<---	OC	.598
CON	<---	OC	.897
ADP	<---	OC	.853
MIS	<---	OC	.787
DMA	<---	DMP	.832
DMS	<---	DMP	.958
PIS	<---	DMP	.910
INV1	<---	INV	.565
INV2	<---	INV	.748
INV5	<---	INV	.645
INV4	<---	INV	.811
INV3	<---	INV	.761
CON6	<---	CON	.798
CON5	<---	CON	.828
CON1	<---	CON	.697
CON3	<---	CON	.746
CON4	<---	CON	.786
CON7	<---	CON	.827
CON8	<---	CON	.832
ADP5	<---	ADP	.748
ADP1	<---	ADP	.809
ADP3	<---	ADP	.846
ADP7	<---	ADP	.746
ADP8	<---	ADP	.756
ADP6	<---	ADP	.699
MIS5	<---	MIS	.795
MIS2	<---	MIS	.858
MIS1	<---	MIS	.799
MIS3	<---	MIS	.907
MIS4	<---	MIS	.866

			Estimate
MIS8	<---	MIS	.767
MIS6	<---	MIS	.845
PRE4	<---	PRE	.848
PRE5	<---	PRE	.866
PRE2	<---	PRE	.876
PRE1	<---	PRE	.888
PRE3	<---	PRE	.891
PRU4	<---	PRU	.899
PRU6	<---	PRU	.944
PRU5	<---	PRU	.919
PRU1	<---	PRU	.777
PRU3	<---	PRU	.868
KMS2	<---	KMS	.891
KMS1	<---	KMS	.835
PIS3	<---	PIS	.906
PIS1	<---	PIS	.932
PIS2	<---	PIS	.885
KS1	<---	KS	.931
KS3	<---	KS	.582
KS4	<---	KS	.706
KS2	<---	KS	.933
DMS3	<---	DMS	.825
DMS1	<---	DMS	.975
DMS2	<---	DMS	.979
DMA4	<---	DMA	.924
DMA2	<---	DMA	.840
DMA1	<---	DMA	.806
DMA3	<---	DMA	.873
OE4	<---	OE	.737
OE2	<---	OE	.880
OE1	<---	OE	.861
OE3	<---	OE	.873
PRE6	<---	PRE	.927

Second-order Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P
PRE	1.592	.190	8.376	***
PRU	.902	.133	6.805	***
KMS	3.005	.339	8.874	***
KS	1.868	.210	8.878	***
OE	1.940	.249	7.803	***
OC	.182	.057	3.165	.002
DMP	1.472	.253	5.826	***
e66	.327	.080	4.112	***
e67	.171	.047	3.630	***
e68	.438	.092	4.741	***
e69	.380	.065	5.867	***
e73	.656	.111	5.937	***

	Estimate	S.E.	C.R.	P
e74	.223	.075	2.968	.003
e75	.392	.079	4.982	***
e1	1.086	.112	9.687	***
e2	.844	.102	8.265	***
e3	.549	.068	8.070	***
e4	.523	.074	7.119	***
e5	1.043	.113	9.260	***
e12	.758	.083	9.164	***
e11	.516	.058	8.835	***
e10	.659	.071	9.272	***
e9	.830	.087	9.540	***
e7	.925	.095	9.779	***
e13	.597	.067	8.851	***
e14	.514	.059	8.791	***
e19	.899	.097	9.238	***
e17	.541	.068	8.003	***
e15	.849	.099	8.611	***
e21	1.188	.128	9.258	***
e22	1.017	.111	9.174	***
e20	.853	.089	9.551	***
e27	.748	.078	9.529	***
e26	.499	.057	8.795	***
e25	.398	.051	7.876	***
e24	.396	.044	8.924	***
e23	.564	.059	9.501	***
e30	.835	.086	9.692	***
e28	.519	.057	9.090	***
e35	.551	.059	9.305	***
e36	.459	.050	9.099	***
e33	.426	.048	8.958	***
e32	.427	.049	8.753	***
e34	.413	.047	8.699	***
e41	.198	.023	8.485	***
e42	.182	.023	7.884	***
e43	.112	.017	6.619	***
e38	.591	.060	9.785	***
e40	.287	.032	9.064	***
e65	.408	.053	7.647	***
e63	.343	.054	6.384	***
e64	.434	.052	8.279	***
e46	.288	.059	4.859	***
e48	1.038	.102	10.130	***
e49	1.086	.111	9.784	***
e47	.243	.051	4.748	***
e62	1.022	.102	10.006	***
e60	.142	.028	5.009	***
e61	.121	.028	4.348	***
e59	.417	.067	6.240	***
e57	.790	.090	8.756	***

	Estimate	S.E.	C.R.	P
e56	1.151	.126	9.167	***
e58	.668	.082	8.130	***
e53	.968	.103	9.359	***
e51	.504	.071	7.121	***
e50	.680	.088	7.692	***
e52	.584	.080	7.337	***
e45	.777	.177	4.387	***
e44	1.304	.203	6.416	***
e37	.261	.034	7.654	***

	PRU6	PRU5	PRU4	PRE3	PRE1	PRE2	PRE5	PRE4	MIS6	MIS5	MIS1	MIS2	MIS3	MIS4	MIS5	ADP6	ADP5	ADP7	ADP1	ADP3	ADP5	CON6	CON7
PRE6																							
OE3																							
OE1																							
OE2																							
OE4																							
DMA3																							
DMA1																							
DMA2																							
DMA4																							
DMS2																							
DMS1																							
DMS3																							
KS2																							
KS4																							
KS3																							
KS1																							
PIS2																							
PIS1																							
PIS3																							
KKK																							
KKO																							
PRU3																							
PRU1																							
PRU6	0																						
PRU5	0.095	0																					
PRU4	0.029	-0.061																					
PRE3	-0.437	-0.69	-0.364	0																			
PRE1	-0.074	-0.633	-0.301	0.137	0																		
PRE2	0.654	-0.151	0.405	0.043	-0.031	0																	
PRE5	-0.52	-0.478	-0.906	-0.05	0.302	-0.406	0																
PRE4	0.326	-0.165	0.372	0.027	-0.534	0.761	-0.401	0															
MIS6	-0.707	-0.416	-0.605	-0.256	-0.552	0.094	0.156	0.35	0														
MIS5	-1.06	-0.364	-0.451	-1.166	-1.702	-0.961	-1.566	-0.236	0.662	0													
MIS1	-2.169	-1.527	-1.572	-1.144	-0.945	-1.374	-1.22	-1.226	-0.525	0.391	0												
MIS2	-1.071	-0.431	-1.047	-0.666	-0.67	0.259	-0.692	0.762	-0.163	-0.236	0.569	0											
MIS3	0.155	0.729	0.235	0.666	0.407	0.943	0.546	1.004	-0.295	-0.17	0.256	0.25	0										
MIS4	-0.477	-0.006	-0.299	-0.496	-0.595	-0.126	-0.397	-0.197	-0.162	-0.6	-0.116	0.172	0.119	0									
MIS5	-1.096	-0.062	-0.663	-0.505	-0.367	0.125	-0.245	-0.157	1.011	0.537	-0.32	-0.56	-0.162	-0.339	0								
ADP6	-0.967	-0.732	-0.271	0.93	1.192	0.201	-0.144	0.617	-0.35	-0.456	-1.192	-1.229	-1.316	-0.619	0.005	0							
ADP5	-0.027	-0.33	0.165	0.057	-0.075	0.114	0.209	-0.011	1.451	0.899	0.266	-0.056	0.572	1.493	0.747	-0.096	0						
ADP7	-0.165	0.166	0.352	1.194	0.629	0.936	0.19	0.623	0.896	0.41	0.432	-0.406	0.496	0.772	1.3	1.126	1.605	0					
ADP1	-0.693	0.064	0.51	0.514	-0.003	-0.116	-0.295	0.096	-0.651	-0.065	-1.277	-2.06	-0.913	0.261	0.121	-0.34	-1.041	-0.544	0				
ADP3	-0.26	-0.437	0.103	0.192	-0.204	-0.176	-0.774	-0.332	0.205	0.326	-0.313	-0.913	-0.2	1.555	1.062	-0.416	-0.716	-0.967	1.11	0			
ADP5	-0.295	-0.516	0.063	0.56	-0.164	-0.444	-0.493	-0.665	-0.009	-1.131	-1.953	-1.435	-0.342	-0.473	0.96	-0.377	-0.256	0.263	0.196	0			
CON6	0.324	0.579	0.415	0.626	-0.443	0.301	0.113	-0.256	1.166	0.466	-0.672	0.216	0.599	1.027	1.262	-0.891	0.829	-0.177	-0.095	0.076	-0.621	0	
CON7	0.573	0.506	0.776	-0.47	-1.072	-0.642	-0.179	-1.331	-0.403	-1.246	-0.905	-0.402	-0.503	0.601	0.217	-1.42	0.753	-0.567	-0.177	-0.013	-0.573	0.956	0
CON1	-1.135	-0.659	-0.356	-1.03	-1.975	-0.329	-1.969	-1.707	1.063	-0.023	0.676	1.417	0.895	2.013	0.909	-0.647	0.612	0.241	-0.004	0.7	-0.427	-0.262	0.277
CON3	0.363	0.592	0.665	0.433	-0.032	0.631	0.057	0.565	1.666	0.716	0.926	1.467	0.663	1.972	1.299	-0.523	1.759	0.029	-0.693	0.763	-0.774	-0.662	-0.703
CON4	-0.166	0.165	0.094	0.469	-0.7	0.331	0.094	-0.06	0.113	-0.314	-1.665	-0.651	-0.722	0.346	0.464	0.335	1.102	-0.242	-0.766	0.125	-0.239	-0.569	-0.614
CON5	-1.263	-0.962	-0.791	-0.662	-1.402	-1.129	-1.012	-1.569	0.366	0.404	-1.226	-0.731	-0.59	0.667	-0.023	-0.06	0.962	-0.301	-0.173	0.211	0.205	-0.593	-0.167
CON6	-0.523	-0.051	0.026	-0.241	-0.699	0.306	-0.647	-0.409	0.335	-0.401	-1.326	-0.664	-0.234	0.796	0.251	-1.839	0.503	-0.64	-0.011	-0.443	-0.909	0.555	0.363
INV5	-0.125	0.776	-0.625	0.093	0.319	-0.257	0.304	0.305	-0.567	-1.047	0.14	-0.699	-0.134	0.614	-0.576	0.736	1.25	0.972	1.252	0.362	0.565	0.445	-0.651
INV4	0.105	-0.096	-0.437	0.67	0.623	0.32	0.662	0.532	-0.095	-1.209	-1.345	-1.514	-0.525	-0.246	-0.621	0.636	2.05	-0.097	0.093	-0.122	-1.112	1.039	-0.255
INV3	-0.004	0.465	0.002	0.322	0.366	0.402	0.26	1.237	-0.234	-0.526	-1.502	-0.626	-0.406	0.469	0.36	1.197	0.961	-0.365	1.007	0.464	-0.361	-0.304	-1.446
INV2	0.979	1.125	1.09	1.226	0.616	0.333	0.742	1.417	-0.361	-0.644	-1.475	-1.256	-0.69	0.144	-0.266	0.601	-0.161	-0.739	0.411	0.161	-0.066	1.019	-0.176
INV1	-0.322	0.299	-0.206	-0.553	-0.209	-0.505	-0.45	-0.061	-0.907	-1.395	-0.444	-1.021	-1.159	0.706	-0.165	0.61	0.693	-0.124	0.502	0.766	0.227	0.157	-0.52

	CON3	CON4	CON5	CON6	CON7	CON8	CON9	CON10	CON11	CON12	CON13	CON14	CON15
PRE6													
OE3													
OE1													
OE2													
OE4													
DMA3													
DMA1													
DMA2													
DMA4													
DMS2													
DMS1													
DMS3													
KS2													
KS4													
KS3													
KS1													
PIS2													
PIS1													
PIS3													
KKK													
KKO													
PRU3													
PRU1													
PRU6													
PRU5													
PRU4													
PRE3													
PRE1													
PRE2													
PRE5													
PRE4													
MIS6													
MIS8													
MIS1													
MIS2													
MIS3													
MIS4													
MIS5													
ADP6													
ADP8													
ADP7													
ADP1													
ADP3													
ADP5													
CON6													
CON7													
CON1	0												
CON3	1.166	0											
CON4	-0.167	0.706	0										
CON5	-0.401	0.491	0.965	0									
CON6	-0.653	-0.715	0.004	0.131	0								
INV5	0.579	0.037	-0.076	-0.666	-0.377	0							
INV4	-0.646	0.357	0.667	0.067	0.447	0.349	0						
INV3	-0.991	0.161	0.666	-0.145	0.369	-0.246	0.153	0					
INV2	-1.125	-0.744	0.142	0.061	0.654	-0.595	0.014	-0.052	0				
INV1	0.049	0.164	0.056	-0.01	-0.501	0.563	-0.966	0.069	0.955	0			

Structural Model - Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
PRU	<---	PRE	.404	.052	7.757	***
KMS	<---	OC	.965	.321	3.004	.003
KMS	<---	PRU	.400	.150	2.665	.008
KMS	<---	PRE	.277	.112	2.482	.013
KS	<---	OC	1.368	.299	4.577	***
KS	<---	KMS	.185	.055	3.368	***
DMP	<---	OC	.542	.236	2.293	.022
DMP	<---	KMS	.144	.052	2.779	.005
DMP	<---	KS	.250	.071	3.500	***
ADP	<---	OC	2.548	.427	5.970	***
MIS	<---	OC	1.851	.316	5.851	***
CON	<---	OC	1.973	.342	5.775	***
INV	<---	OC	1.000			
OE	<---	DMP	.394	.084	4.716	***
OE	<---	PRU	.267	.090	2.975	.003
PIS	<---	DMP	1.135	.096	11.819	***
OE	<---	OC	.828	.258	3.203	.001
DMS	<---	DMP	1.298	.104	12.533	***
DMA	<---	DMP	1.000			
con1	<---	CON	1.000			
con3	<---	CON	1.093	.104	10.470	***
con4	<---	CON	1.102	.100	10.991	***
con5	<---	CON	1.137	.098	11.563	***
con6	<---	CON	1.233	.111	11.155	***
con7	<---	CON	1.215	.105	11.532	***
con8	<---	CON	1.148	.099	11.592	***
inv1	<---	INV	1.000			
inv2	<---	INV	1.451	.184	7.885	***
inv3	<---	INV	1.220	.153	7.964	***
inv4	<---	INV	1.407	.171	8.217	***
inv5	<---	INV	1.209	.168	7.210	***
adp3	<---	ADP	.918	.064	14.358	***
adp5	<---	ADP	.842	.069	12.182	***
adp6	<---	ADP	.711	.064	11.170	***
adp7	<---	ADP	.960	.079	12.122	***
adp8	<---	ADP	.918	.074	12.354	***
mis1	<---	MIS	1.000			

			Estimate	S.E.	C.R.	P
mis2	<---	MIS	1.052	.070	14.927	***
mis3	<---	MIS	1.360	.084	16.187	***
mis4	<---	MIS	1.227	.081	15.146	***
mis5	<---	MIS	1.135	.085	13.424	***
mis6	<---	MIS	1.139	.078	14.609	***
mis8	<---	MIS	1.093	.085	12.790	***
pe1	<---	PRE	1.000			
pe2	<---	PRE	.938	.049	19.051	***
pe3	<---	PRE	.995	.050	19.716	***
pe4	<---	PRE	.940	.053	17.772	***
pe5	<---	PRE	.928	.050	18.563	***
pe6	<---	PRE	.998	.046	21.837	***
pu1	<---	PRU	1.000			
pu3	<---	PRU	.986	.068	14.510	***
pu4	<---	PRU	.966	.063	15.223	***
pu5	<---	PRU	1.050	.067	15.690	***
pu6	<---	PRU	1.010	.062	16.250	***
KMS1	<---	KMS	1.000			
KMS2	<---	KMS	1.000			
ks1	<---	KS	1.000			
ks2	<---	KS	.932	.043	21.628	***
ks3	<---	KS	.534	.055	9.695	***
ks4	<---	KS	.759	.059	12.901	***
dma3	<---	DMA	1.005	.066	15.239	***
dma2	<---	DMA	.944	.065	14.421	***
dma1	<---	DMA	1.000			
dma4	<---	DMA	1.073	.065	16.501	***
dms3	<---	DMS	.900	.045	20.024	***
dms2	<---	DMS	1.008	.023	43.519	***
dms1	<---	DMS	1.000			
pis3	<---	PIS	.905	.040	22.610	***
pis2	<---	PIS	.829	.039	21.230	***
pis1	<---	PIS	1.000			
oe1	<---	OE	1.000			
oe4	<---	OE	.769	.063	12.182	***
oe3	<---	OE	.982	.062	15.880	***
oe2	<---	OE	.947	.059	16.168	***
adp1	<---	ADP	1.000			

Structural Model - Standardised Regression Weights: (Group number 1 - Default model)

			Estimate
PRU	<---	PRE	.538
KMS	<---	OC	.242
KMS	<---	PRU	.223
KMS	<---	PRE	.206
KS	<---	OC	.430
KS	<---	KMS	.233
DMP	<---	OC	.192
DMP	<---	KMS	.203
DMP	<---	KS	.282
ADP	<---	OC	.853
MIS	<---	OC	.788
CON	<---	OC	.897
INV	<---	OC	.596
OE	<---	DMP	.353
OE	<---	PRU	.189
PIS	<---	DMP	.908
OE	<---	OC	.263
DMS	<---	DMP	.958
DMA	<---	DMP	.828
con1	<---	CON	.697
con3	<---	CON	.747
con4	<---	CON	.786
con5	<---	CON	.829
con6	<---	CON	.798
con7	<---	CON	.827
con8	<---	CON	.831
inv1	<---	INV	.565
inv2	<---	INV	.748
inv3	<---	INV	.762
inv4	<---	INV	.811
inv5	<---	INV	.645
adp3	<---	ADP	.846
adp5	<---	ADP	.748
adp6	<---	ADP	.699
adp7	<---	ADP	.745
adp8	<---	ADP	.756
mis1	<---	MIS	.799

			Estimate
mis2	<---	MIS	.858
mis3	<---	MIS	.907
mis4	<---	MIS	.867
mis5	<---	MIS	.795
mis6	<---	MIS	.845
mis8	<---	MIS	.767
pe1	<---	PRE	.889
pe2	<---	PRE	.876
pe3	<---	PRE	.889
pe4	<---	PRE	.848
pe5	<---	PRE	.865
pe6	<---	PRE	.927
pu1	<---	PRU	.775
pu3	<---	PRU	.867
pu4	<---	PRU	.899
pu5	<---	PRU	.920
pu6	<---	PRU	.944
KMS1	<---	KMS	.841
KMS2	<---	KMS	.871
ks1	<---	KS	.930
ks2	<---	KS	.931
ks3	<---	KS	.579
ks4	<---	KS	.702
dma3	<---	DMA	.872
dma2	<---	DMA	.839
dma1	<---	DMA	.804
dma4	<---	DMA	.923
dms3	<---	DMS	.823
dms2	<---	DMS	.978
dms1	<---	DMS	.974
pis3	<---	PIS	.905
pis2	<---	PIS	.884
pis1	<---	PIS	.931
oe1	<---	OE	.851
oe4	<---	OE	.723
oe3	<---	OE	.864
oe2	<---	OE	.875
adp1	<---	ADP	.809

Structural Model - Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P
OC	.181	.057	3.158	.002
PRE	1.594	.190	8.386	***
e52	.638	.096	6.677	***
e55	2.311	.278	8.303	***
e60	1.307	.157	8.323	***
e80	1.055	.185	5.689	***
e36	.378	.065	5.849	***
e37	.170	.047	3.608	***
e38	.328	.080	4.113	***
e39	.439	.093	4.733	***
e71	.215	.079	2.712	.007
e72	.663	.112	5.916	***
e73	.395	.081	4.882	***
e81	1.235	.169	7.303	***
e1	.923	.094	9.776	***
e3	.830	.087	9.540	***
e4	.659	.071	9.272	***
e5	.514	.058	8.826	***
e6	.758	.083	9.164	***
e7	.598	.068	8.856	***
e8	.516	.059	8.796	***
e9	1.086	.112	9.686	***
e10	.845	.102	8.268	***
e11	.549	.068	8.067	***
e12	.523	.074	7.114	***
e13	1.042	.113	9.258	***
e18	.849	.099	8.610	***
e20	.541	.068	7.999	***
e22	.899	.097	9.238	***
e23	.853	.089	9.550	***
e24	1.189	.128	9.260	***
e25	1.017	.111	9.174	***
e26	.564	.059	9.500	***
e27	.396	.044	8.924	***
e28	.399	.051	7.885	***
e29	.498	.057	8.794	***
e30	.748	.078	9.528	***

	Estimate	S.E.	C.R.	P
e31	.519	.057	9.088	***
e33	.834	.086	9.691	***
e40	.425	.049	8.737	***
e41	.426	.048	8.956	***
e42	.418	.048	8.727	***
e43	.551	.059	9.302	***
e44	.460	.051	9.101	***
e45	.258	.034	7.611	***
e46	.595	.061	9.789	***
e48	.287	.032	9.059	***
e49	.199	.023	8.478	***
e50	.181	.023	7.848	***
e51	.111	.017	6.557	***
e53	1.191	.195	6.099	***
e54	.918	.181	5.063	***
e56	.288	.060	4.821	***
e57	.243	.052	4.722	***
e58	1.037	.102	10.128	***
e59	1.088	.111	9.784	***
e61	.669	.082	8.125	***
e62	.788	.090	8.746	***
e63	1.150	.126	9.162	***
e64	.418	.067	6.239	***
e65	1.024	.102	10.007	***
e66	.120	.028	4.292	***
e67	.143	.029	4.996	***
e68	.408	.053	7.635	***
e69	.432	.052	8.259	***
e70	.345	.054	6.400	***
e74	.684	.089	7.679	***
e75	.493	.071	6.981	***
e76	.589	.080	7.327	***
e77	.972	.104	9.355	***

Structural Model - Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
PRU	.290
KMS	.200
KS	.287
DMP	.268
OE	.312
PIS	.824
DMS	.919
DMA	.685
MIS	.621
ADP	.728
INV	.355
CON	.805
oe4	.522
oe3	.746
oe2	.766
oe1	.724
pis1	.867
pis2	.782
pis3	.819
dms1	.949
dms2	.957
dms3	.677
dma4	.853
dma1	.646
dma2	.704
dma3	.760
ks4	.493
ks3	.335
ks2	.867
ks1	.864
KMS2	.759
KMS1	.708
pu6	.892
pu5	.846
pu4	.808
pu3	.752

	Estimate
pu1	.601
pe6	.860
pe5	.749
pe4	.719
pe3	.790
pe2	.767
pe1	.790
mis8	.588
mis6	.714
mis5	.632
mis4	.751
mis3	.822
mis2	.736
mis1	.639
adp8	.572
adp7	.556
adp6	.489
adp5	.560
adp3	.716
adp1	.655
inv5	.417
inv4	.658
inv3	.580
inv2	.559
inv1	.319
con8	.691
con7	.683
con6	.637
con5	.687
con4	.617
con3	.557
con1	.486