Study of Critical Success Factors in Adopting Knowledge Management Systems for the Libyan Public Oil Sector

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ABSTRACT

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In the modern era, the developments in information technology have been dramatically shaping the ways people live as well as the ways in which organisations handle business in their professional domains. Implementing various kinds of information system, such as Enterprises Resource Planning (ERP) systems, Decision Support Systems (DSS) and Knowledge Management Systems (KMS), has been recognised as one of the necessary tasks organisations have to perform in order to survive (Alavi 2001). Despite the tremendous effort companies worldwide have devoted to the implementation of knowledge management systems, organisations in Libya are still suffering from the failure of Knowledge Management (KM) implementation. The purpose of this study is to provide a comprehensive investigation of factors that can help organisations to understand the context of KMS implementation. With accurate assessments, this can in turn help them to develop effective strategies or policies to maximise the probability of success in implementing KMS. Therefore, this research will address the development of a KM adoption framework to fill this gap and develop a model that serves as an instrument in adopting KMS in general and the Libyan oil sector in particular.

DECLARATION

I hereby declare that no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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LIST OF ABBREVIATIONS

AT	Activity Theory
APQC	American Productivity and Quality Centre
BP	British Petroleum
CKO	Chief Knowledge Officer
CEO	Chief Executive Officer
CSFs	Critical Success Factors
CVF	Competing Values Framework
DSS	Decision Support Systems
DV	Dependent Variables
EIA	U.S. Energy Information Administration
EIS	Executive Information System
ERP	Enterprises Resource Planning
FTSE	Financial Times Stock Exchange
GAI	General Authority for Information
GDP	Gross Domestic Product
ICT	Information and Communication Technology
IMF	International Monetary Fund
IS	Information Systems
IT	Information Technology
ITI	Information Technology Infrastructure
IV	Independent Variables
KMS	Knowledge Management Systems
KM	Knowledge Management
KMT	Knowledge Management team
LOS	Libyan Oil Sector
MIS	Management Information System
MMR	Mixed Methods Research
NGN	Next Generation Network
NOC	National Oil Corporation
OCAI	Organisational Culture Assessment Instrument
OPEC	Petroleum Exporting Countries
SIPM	Social Information Processing Model
SCT	Social Cognitive Theory
UN	United Nations
TAM	Technology Acceptance Model
TQM	Total Quality Management
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behaviour
TTF	Task- Technology Fit
VT	Virtual Team-working
WAN	Wide Area Network

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In the name of Allah, the most Compassionate, the most Merciful

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DEDICATION

To my Mum, Om Alsaad, my brothers and sisters. Special dedication to my brothers and sister **Abdulbast** and **Abdulrahman**, **Fatima** and my father-in-Law **Atia** who died during the course of my PhD. To my wife **Mona** and my children, **Jana, Esmail and Abdulrahman**, for their years of patience and support during my PhD study.

Chapter 1: Introduction

1.1 Background

In the modern era, developments in information technology have been dramatically shaping the way people live, as well as the ways organisations operate (Wang, 2005). Implementing various kinds of information system, such as Enterprise Resource Planning (ERP) systems, Decision Support Systems (DSS) and Knowledge Management Systems (KMS), has been recognised as one of the key tasks organisations have to perform in order to survive (Alavi 2001). Despite the tremendous amount of effort organisations worldwide have devoted to the implementation of KMS, in Libya organisations are suffering from the absence of Knowledge Management (KM) implementation (Kridan, 2006). The purpose of this study is to provide a comprehensive investigation of the factors that can help organisations to understand the context behind KMS implementation. By providing accurate assessments, a framework is proposed to assist organisations to develop effective strategies or policies to maximise the probability of success in implementing KMS.

The last few years have witnessed the continuing growth of developments in KMS to capture the information flows within organisations, and turn them into exploitable management information systems, contributing to the improved working practices and thus gaining competitive advantage. During this period there has been a broad interest in exploiting knowledge to enhance business practice. However, such developments in KMS and frameworks do not necessarily take into account the specific nature of organisations, particularly when considering the acceptance of these systems, and the factors that influence this acceptance.

Therefore, this research will address the development of a knowledge management adoption framework, and will develop a model that will serve as an instrument to assist the adoption of KMS in general and in the Libyan oil sector in particular.

1.2 Area and Motivation for the Research

This research focuses on the acceptance of KMS and the factors that affect their adoption and acceptance in the information systems domain. In some places in this theses the researcher using IT as substitute of KMS because most of litterateur consider KMS as part of information technologies and rely on them.

Previous studies have shown that system acceptance and usage is increasingly viewed as an important element of the measurement of the success of information systems (Hossain and de Silva 2009). In the IS domain there have been two distinct approaches to the study of attitudes towards new technology and its acceptance: the Technology Acceptance Model (TAM) (Davis 1989; Davis and Davis 1990; Davis 1996; Venkatesh and Davis 2000; Venkatesh, Morris et al. 2003); and the Social Information-Processing Model (SIPM). There are also other theories regarding technology usage, such as Task-Technology Fit (TTF) and Activity Theory (AT).

This research is concerned with KMS adoption in the Libyan oil sector. It will focus exclusively on the identification of critical factors that influence acceptance and adoption of KM systems. These factors have been identified from a study of the literature on knowledge management and its technologies, which will be discussed more broadly in Chapter Two. Many scholars from around the world have undertaken studies on the critical success factors (CSFs) that affect knowledge management initiatives in both developed and developing countries (Davenport, De Long et al. 1998; Liebowitz 1999; Alavi 2001; Kankanhalli, Tanudidjaja et al. 2003; Liebowitz

and Megbolugbe 2003; Al-Mabrouk 2006; Jennex, Smolnik et al. 2008; Conley 2011; Mas-Machuca and Costa 2012).

1.3 Motivation for the Research

Motivation for focusing this study on Libya and the Libyan oil sector

Knowledge management is an innovation in Libya, and oil companies are a worthwhile topic to study, with the hope of improving productivity in the Libyan oil sector in the future. Knowledge management has been widely studied in developed countries, but comparatively few studies have been undertaken in developing countries, with scant investigation in Libya. This is despite the fact that the Libyan government encourages studies that could potentially improve people's lives, through the acceptance of new technology. The researcher has ready access to data in Libya, particularly within the organisations that would like to adopt KMS. However, there is a lack of experience from both individuals and organisations about the usefulness KMS, especially using TAM in the Libyan context.

Motivation for choosing KMS combined with its acceptance based on TAM

KMS provide an innovative tool to conduct organisational change and to enhance knowledge flows within an organisation (Yang, Bernard et al. 2011). The Libyan oil sector is keen to adopt new technologies, including KMS. However, this technology requires a large amount of investment, and consequently organisations have to make careful preparations for successful implementation; this study will provide a tool that will assist both employees and companies to accept and work positively with this new technology. To measure acceptance, the research will use the Technology Acceptance Model (TAM) as the theoretical framework to define critical success factors (CSFs) that may affect this adoption. TAM has been chosen because it is one of the most successful

models in the study of technology acceptance, and has been widely tested over the past 20 years (Hsiao and Yang 2011).

Personal motivations for conducting this study

As a member of the academic staff at Sebha University in south Libya, the researcher wishes to expand his experience in the information systems domain in general, and knowledge management systems in particular. Holding a PhD degree in information systems will enhance his academic career and provide the opportunity to transfer the latest knowledge and research methods in information systems (IS) to future students in Libya. The researcher has used the opportunities afforded by workshops and seminars, and discussions with supervisors to discover how to use the theories of information systems and their application to develop the work environment of organisations in Libya.

1.4 Justification for Research

KMS is modern technology in the business world, and because the oil industry relies heavily on modern technologies, the Libyan oil sector must adopt and apply it.

Previous studies (Al-Busaidi, 2005; 2007) reveal that in the Arab world, and in Libya in particular, the application of IS and KMS is still at an early stage. Twati (2006) stated that there is a major weakness in the effective adoption of modern IS and technology in Libya, when compared to its counterparts in the Arabian Gulf region, such as the UAE and Saudi Arabia. This study wishes to help the Libyan oil sector bridge this technological gap, which results from years of delay in implementing modern techniques of business administration, after the many years of UN economic sanctions which particularly affected the oil industry.

The survey conducted by the researcher, which included a small sample of workers in the oil sector, and previous studies on technology in Libya, show that there is

widespread consensus about the factors that have affected organisational change in the country. As a result, the researcher has devised a set of questions that form the beginning of a research plan, along with consideration of which IS theories would be most appropriate to use to study this area.

1.5 Research Questions

The study aims to answer the following research questions:

- **Research Question 1:**

Which factors influence the adoption of KMS and its acceptance in the Libyan oil sector?

- **Research Question 2:**

How can the traditional Technology Acceptance Model (TAM) be used to study these factors in the Libyan oil sector?

- **Research Question 3:**

What is the role of organisational culture, training, education and IT infrastructure in the adoption of KMS by the Libyan oil sector?

1.6 Research Aim

The aim of this research is to develop an extension of the Technology Acceptance Model for a specific use, and to investigate the acceptance of KMS in the Libyan oil sector. This model will focus exclusively on the identification of critical factors that influence the acceptance of these systems.

1.7 Research Objectives

The objectives of this research are as follows:

1. To investigate the adoption of knowledge management systems by both individuals and organisations in Libya.

2. To identify the problems that individuals and organisations in Libya encounter whilst adopting or using these new systems.
3. To quantify constructs concerning the current state of organisations' beliefs and attitudes toward KMS adoption, and to develop and validate the relationships between the factors that drive the adoption and acceptance of such systems.

1.8 Overview of Theoretical Framework

Technology adoption in developing countries encounters many barriers and issues. This research will rely primarily on the Technology Acceptance Model (TAM) as its theoretical base. According to Hsiao and Yang (2011), TAM has come to be one of the most widely used models for describing an individual's acceptance of information systems. It was originally developed by Davis, Bagozzi and Warshaw (1989), and has been viewed as one of the most influential extensions of the Theory of Reasoned Action (TRA), to determine the factors that influence technology acceptance (Wu & Li 2007; Ham, Kim et al. 2008; Paris, Lee et al. 2010). To adopt this model as the theoretical base for this research, the researcher has extended it by adding external variables that may influence the acceptance of KMS within the Libyan oil sector. These variables were not included in the original model introduced by Davis (1989). The suggested addition is shown in Figure 1.1. The main constructs used to measure technology acceptance inside TAM are the perceived ease of use and perceived usefulness, and their effects on a user's behaviour. These factors have been examined and supported extensively in the IT/IS literature (Venkatesh and Davis 1996; Al-Gahtani and King 1999; Horton et al. 2001; Kim and Garrison 2009). Findings from these studies have revealed perceived ease of use as having a direct effect on perceived usefulness and having a positive relationship with a user's behavioural intention, both directly and

indirectly via its impact on perceived usefulness (Davis et al. 1989; Kim and Garrison 2009). Most of the prior studies show that perceived usefulness is a strong determinant of user acceptance and usage behaviour (Agarwal and Prasad 1999; (Kim and Garrison 2009). Most previous research has used TAM as the theoretical model or has extended it by including additional constructs (Zhang, Zhao et al. 2008; Hossain and de Silva 2009; Paris, Lee et al. 2010).

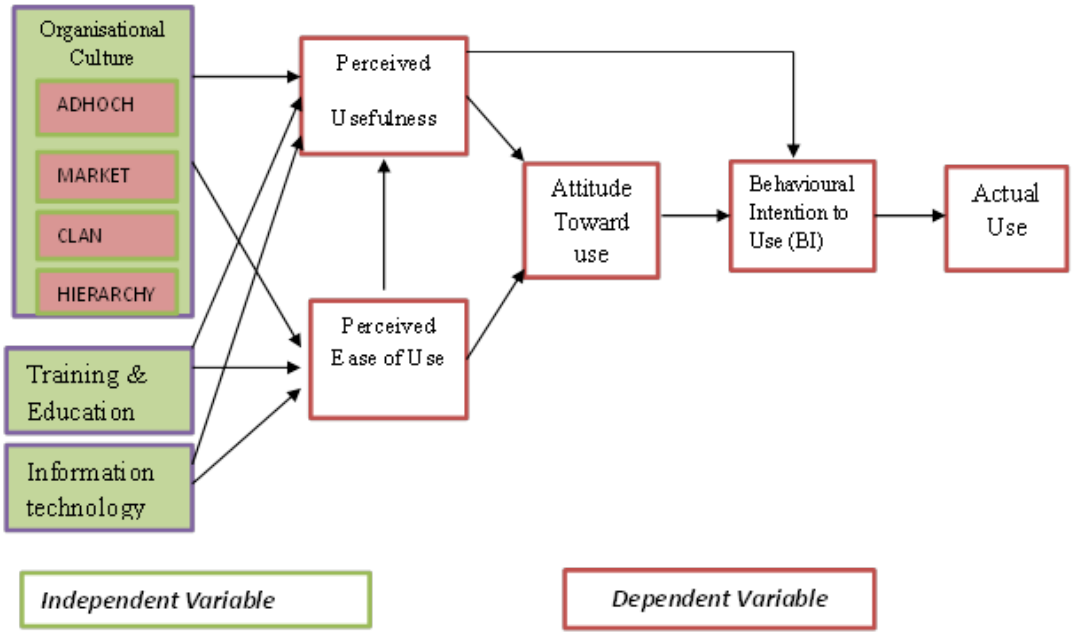

Figure 1.1 Proposed Theoretical Framework for Study

1.9 The Relationship between Research Questions, Theoretical Framework and Research Methodology

The adoption of technology in developing countries encounters many barriers and issues. To provide links between TAM as the theoretical model and the research questions that are designed to meet the research objectives involves devising research questions regarding how TAM will be used to investigate the critical success factors of the adoption of KMS in the Libyan oil sector. These factors have been added as

external variables to extend the original TAM. Due to the nature of the research questions, and the nature of TAM constructs, a quantitative approach will be adopted to map the relationships between internal and external factors. Nearly all previous studies using TAM have used Likert scales to measure the model's constructs (Chin, Johnson et al. 2008), based on quantitative data, and tested statistically (Lee, Kozar et al. 2003; Chu and Chu 2011); however, the factors outlined in the research questions, such as training and education, need to be investigated using qualitative data, in order to gain a greater understanding of the factors that may secure the acceptance of KMS in the Libyan oil sector. Therefore, a mixed methods approach has been adopted for this study. The importance of combining quantitative and qualitative research has been demonstrated to increase the quality of data collected (Bouma and Ling 2004). The relationship between the research questions and methodology will be further discussed in Chapter 4, with the theoretical framework outlined in Chapter 3.

1.10 Research Contributions

This research provide three key contributions:

1. To contribute to knowledge and theory by designing an expansion of the technology acceptance model (TAM) with knowledge management systems (KMS) as new information technology (IT).
2. To make a methodological contribution by using mixed methods research to answer research questions and validate findings. There are currently few studies using mixed methods research in the information systems field.
3. To provide a practical contribution to organisations and managers, by offering a tool that enables the Libyan oil sector to plan KM systems adoption both effectively and successfully, to improve performance, competitive advantage, and to enhance their work.

1.11 Thesis Structure

The thesis structure is illustrated in Figure 1.2.

Chapter 1 presents an overview of the research, providing the background for the study of KMS in Libya. The chapter also discusses the research questions and outlines the aims and objectives, along with the expected contribution of the research.

Chapter 2 presents a wide-ranging discussion of KM from several perspectives. It also outlines the concept of KM and KMS, along with the factors that influence KM. This chapter also provides a case study about KM in the oil sector and the lessons learned from the project; and information about Libya.

Chapter 3 presents a review of the theoretical perspectives in information systems, and also the theoretical framework for this study.

Chapter 4 presents the research methodology including a discussion of research paradigms in the context of mixed methods research. It also reviews research methodologies, and provides a wide review of mixed method research as a study method.

Chapter 5 presents the results of analysis of the quantitative data, including reliability analysis, sample analysis, an organisational culture profile based on the Organisational Culture Assessment Instrument (OCAI) and the testing of the research hypotheses. It presents results of the analysis of qualitative data, including reliability and validity analysis of interviews, and the structure and protocol for interviews.

Chapter 6: presents the discussion of research findings drawn from both qualitative and quantitative results and links them with the literature.

Chapter 7 presents a summary of the research findings, and relates them to the research questions; it discusses the implications and contributions of the research, its limitations and suggestions for future study.

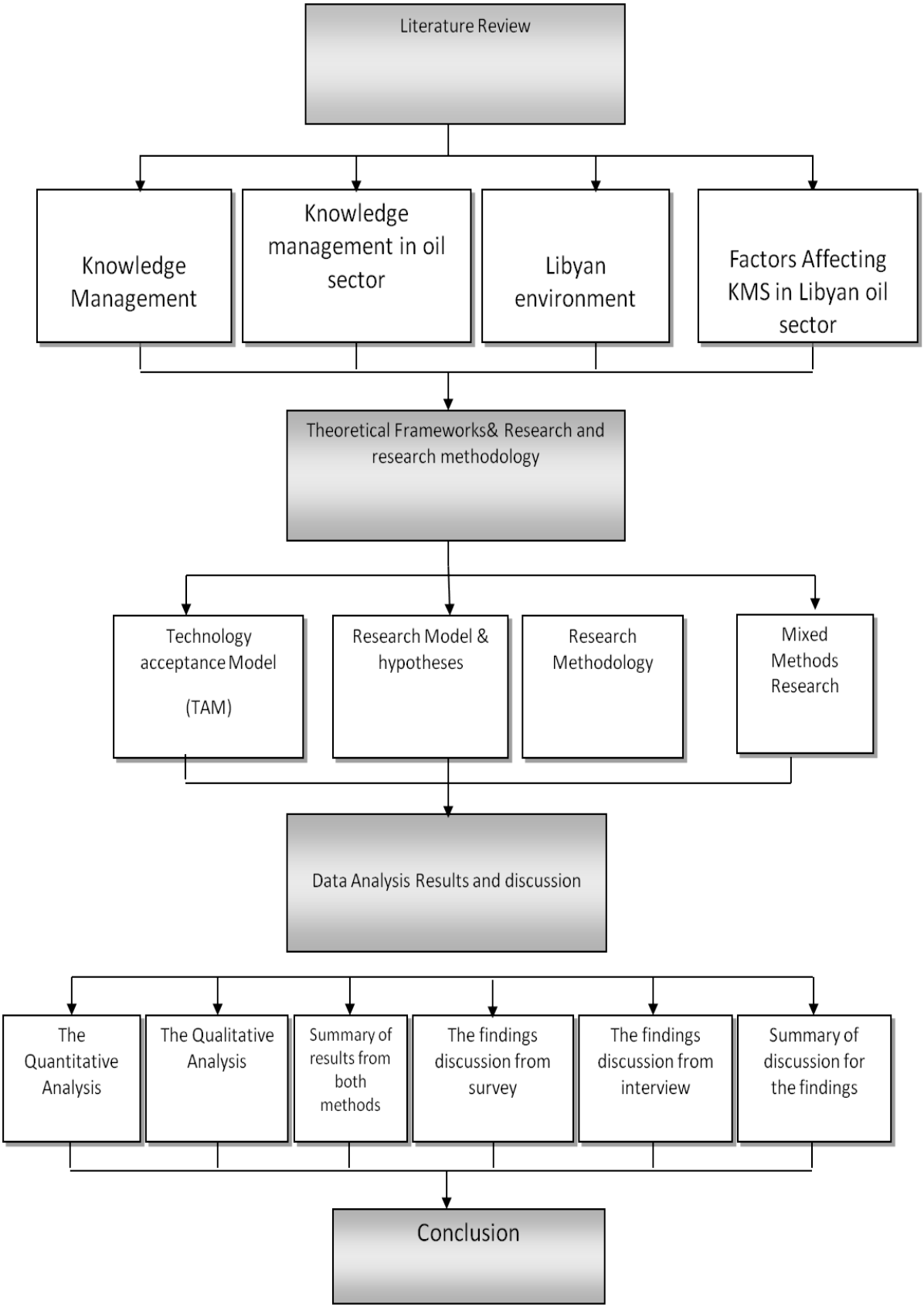

Figure 1.2 Thesis Structure

2 Chapter 2: Literature Review

2.1 Knowledge Management

2.1.1 Background

During the past century many developments have emerged, both in the information systems domain, and in wider management science. This has stimulated much debate about knowledge, from the point of view of economics (Hayek, 1945; Arrow, 1962) and organisational theory (March and Simon, 1958; Polanyi, 1966). One key development is the emergence of Knowledge Management as an approach to enhance the work of organisations. This new approach has seen several improvements over the past 20 years (Crawford 2005).

Knowledge is seen as being at the centre of global economic transformation (Bell 1976; 1996), improving the competitive advantage of organisations (Mayo & Lank, 1994) and driving the shift from 'info-war' to 'k-warfare' (knowledge warfare) (Baurmard, 1996).

2.1.2 Definition of Knowledge

Attempting a definition of knowledge has attracted the interest of practitioners and ,academics in many disciplines, including IT and IS. Such a definition may explain the meaning of knowledge from several aspects (Boone et al., 2008; Nonaka & Von Krogh, 2009). For example, one aspect deals with knowledge by distinguishing between data, information and knowledge. Knowledge is defined as information combined with experience, context, interpretation and reflection (Davenport & Prusak, 1998; Kebede, 2010). Data consists of raw numbers and facts, information is processed data, and knowledge is authenticated information (Kettinger, 1997; Li, 2010). In order to fulfil the research objectives it is necessary to find robust arguments about concepts of knowledge, as offered by Alavi and Leidner (2001). Nonaka, and Von Krogh (2009) state that knowledge can be viewed from the following perspectives:

1. A state of mind
2. An objective
3. A process
4. A condition of having access to information
5. Capability

The perspective of knowledge as a state of mind focuses on enabling individuals to expand their personal knowledge, and apply it to the organisation's needs. A second view defines knowledge as an object (Carlsson et al., 1996; McQueen, 1998; Zack, 1998); this perspective suggests that knowledge can be viewed as an entity to be stored and manipulated. Alternatively, knowledge can be viewed as a process of simultaneously knowing and acting (Carlsson et al., 1996; McQueen, 1998; Zack, 1998; Ahmad and Daghfous, 2010). The process perspective focuses on the application of expertise (Zack, 1998). The fourth standpoint views knowledge as a condition of access to information (McQueen, 1998). According to this view, organisational knowledge must be organised to facilitate access to and retrieval of content. This view may be thought of as an extension of the view of knowledge as an object, with a special emphasis on the accessibility of the objects of knowledge. Finally, knowledge can be viewed as a capability, with the potential for influencing future action (Ahmad and Daghfous, 2010; Watson, 2008). The capability view suggests that knowledge is not so much a capacity for specification, but more a capacity to use information. Meanwhile, learning and experience result in an ability to interpret information, and to ascertain what information is necessary in decision making.

Perspectives		Implications for Knowledge Management	Implications for Knowledge Management Systems
Knowledge vis-à-vis data and information	Data is facts, raw numbers; Information is processed/interpreted data; Knowledge is personalised information.	KM focuses on exposing individuals to potentially useful information and facilitating the assimilation of information	KMS will not appear radically different from existing IS, but will be extended towards helping user assimilation of information
State of mind	Knowledge is the state of knowing and understanding.	KM involves enhancing an individual's learning and understanding through provision of information	Role of IT is to provide access to sources of knowledge rather than knowledge itself
Object	Knowledge is an object to be stored and manipulated.	Key KM issue is building and managing knowledge stocks	Role of IT involves gathering, storing, and transferring knowledge
Process	Knowledge is a process of applying expertise.	KM focus is on knowledge flows and the process of creation, sharing, and distributing knowledge	Role of IT is to provide a link among sources of knowledge to create a wider breadth and depth of knowledge flows
Access to information	Knowledge is a condition of access to information.	KM focus is organised access to and retrieval of content	Role of IT is to provide effective search and retrieval mechanisms for locating relevant information

Capability	Knowledge is the potential to influence action.	KM is about building core competencies and understanding know-how	Role of IT is to enhance intellectual capital by supporting development of individual and organisational competencies

Table 2.1 Knowledge Perspectives and their Implications (adapted fromAlavi and Leidner, 2001)

These different views of knowledge represent the factors that must be included in any KM programme and KMS. Table 2.1 summarises the various views of knowledge and their implications for KM and KMS.

2.1.3 Types of Knowledge

Many types of knowledge are discussed in the literature of IT and IS, but the most common taxonomy is presented by Polanyi (1960;1967), Nonaka (1994), Spender (1992; 1995; 1996) and Anand, Ward et al. (2010), who identify two dimensions of knowledge in organisations.

Explicit and tacit knowledge rely heavily on the tacit-explicit and individual-collective knowledge distinction, without presenting a well-rounded explanation of the interrelationships among the various types of knowledge. Alavi and Leidner (2001) state that the problem with the interpretation of this classification is the assumption that tacit knowledge is more valuable than explicit knowledge, thus disregarding the value of explicit knowledge. According to Bohn (1994) and Jelavic et al. (2011), explicit knowledge is more valuable than tacit knowledge, thus contradicting most researchers in IS, who claim that tacit knowledge is the more valuable. According to Janicot and Mignon (2012), IT plays a major role in enabling the KM process (storing, sharing and enhancing an organisation's work) by relying on explicit knowledge.

The distinction between tacit and explicit knowledge leads to their identification as two main types of knowledge, as shown in Figure 2.1.

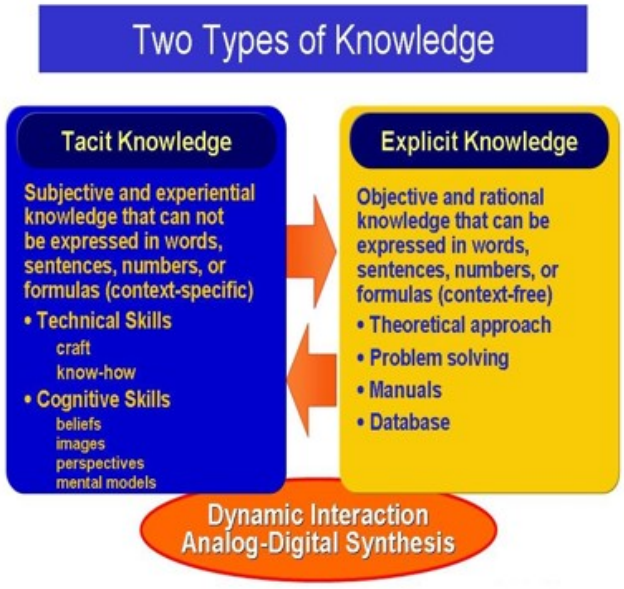

Figure 2.1 The Two Main Types of Knowledge

The tacit-explicit knowledge classification is now widely accepted; however, various other knowledge classifications exist, to avoid the tacit-explicit dimension (Alavi & Leidner 2001).

2.1.3.1 Explicit Knowledge

Explicit knowledge can be expressed in formal and systematic language, and shared in data, scientific formulas and manuals. It can be processed, transmitted and stored relatively easily (Nonaka & Teece, 2001), so as to enable organisations to capture knowledge in its different forms by using KMS. In contrast, Cohen and Bacdayan (1994) and Alavi and Leidner (2001) argue that explicit knowledge can be divided into several types.

The pragmatic approach to classifying knowledge simply attempts to identify the types of knowledge that are useful to organisations. Examples include knowledge about customers, products, processes and competitors; which can include best practice,

know-how and heuristic rules, patterns, software code, business processes and models, architectures, technology and business frameworks; and project experiences (proposals, work plans and reports).

Declarative knowledge focuses on describing something, e.g. a shared, explicit understanding of concepts, categories, and descriptors lay the foundation for effective communication and knowledge-sharing in companies.

Procedural knowledge describes how something occurs or is performed. Shared explicit procedural knowledge lays a foundation for efficiently co-ordinated action in companies.

A pragmatic approach to classifying knowledge attempts to identify the types of knowledge that are useful to organisations; examples include knowledge about customers, products, processes, and competitors, which can include best practice, know-how and heuristic rules, patterns, software codes, business processes, and models; architectures, technology, and business frameworks; project experiences (proposals, work plans, and reports); and tools used to implement a process such as checklists and surveys (KPMG, 1998).

Causal knowledge outlines why something occurs. Shared explicit causal knowledge, often in the form of organisational stories, enables organisations to co-ordinate strategies for achieving goals or outcomes. Meso and Smith (2000) identified the three types of explicit knowledge management resident in any organisation as cognitive knowledge; advanced system skills; and systems understanding. Cognitive knowledge, also called ‘know-what’, is the “basic mastery of a discipline that professionals achieve through extensive training and certification” (Quinn, Anderson et al. 1996; Desroches 2009; Smith 2009). Advanced skills or ‘know–how’ refers to the “ability to apply rules of a discipline to complex real world problems” (Quinn, Anderson et al.

1996). Systems understanding, also termed ‘know-why’, is the deep understanding of the cause-and-effect relationships underlying a particular discipline (Quinn et al., 1996; Nanoka, 1991).

2.1.3.2 Tacit Knowledge

Tacit knowledge is highly subjective, and therefore is difficult to capture, making it hard to communicate and share with others (Nguyen & Mohamed 2011). Subjective insights, intuitions and hunches fall into this category of knowledge. Furthermore, tacit knowledge is deeply rooted in an individual’s actions and experiences as well as in the ideals, values or emotions he or she embraces (Takeuchi, 2001).

Takeuchi (2001) states that there are two dimensions to tacit knowledge. The first is the ‘technical’ dimension, which encompasses the kind of informal skills or crafts often captured by the term ‘know-how’, which are difficult to define. Master craftsmen or three-star chefs, for example, develop a wealth of expertise at their fingertips after years of experience, but they often have difficulty articulating the technical or scientific principles behind what they know. Tacit knowledge also contains a ‘cognitive’ dimension. It consists of beliefs, perceptions, ideals, values, emotions and mental models so embedded that we take them for granted. Though they cannot be easily articulated, this dimension of tacit knowledge shapes the way we perceive the world around us. The most complex definition of tacit knowledge derives from an extensive study of the concept as it relates to success factors for leadership in the US military (Horvath et al. 1994). Tacit knowledge is knowledge that is generally acquired from one’s own personal experience rather than through instructions. People may not know they possess and/or may find it difficult to articulate tacit knowledge (Nonaka & Krogh, 2009). It can be developed from work-related practical knowledge learned informally on the job (Wagner and Gooding, 1987). Moreover, it is knowledge

that guides behaviour without being readily available to conscious introspection. Clearly, the implicit quality of tacit knowledge is the feature that gives the construct its name (Horvath et al., 1996). It resides unnoticed within the human mind and body (Polanyi, 1966). In brief, tacit knowledge is action-oriented knowledge, which has a practical value to the individual (Horvath et al., 1996). It exists within the individual and is difficult to express in words. Every employee has a wealth of tacit knowledge deeply rooted in their actions and commitment to a "particular craft or profession, or particular technology, product market, or the activities of a work group or team". (Nonaka & Takeuchi 1995). In most organisations, tacit knowledge is rarely shared or communicated. Therefore, it is often lost when the individual possessing it leaves the organisation (Nanaka, 1998). However, the question of whether tacit or explicit knowledge is the more valuable may indeed miss the point. The two are not dichotomous states of knowledge, but instead are mutually dependent and reinforcing qualities of knowledge: tacit knowledge forms the background necessary for assigning the structure to develop and interpret explicit knowledge (Polyani, 1975). Essentially, tacit knowledge should not be considered remote from explicit knowledge, as there is a tacit dimension in all forms of knowledge (Polanyi, 1966). Table 2.2 shows the main differences between the two types of knowledge.

Tacit knowledge **(Subject)**	**Explicit knowledge** **(Objective)**
Knowledge of experience (Body)	Knowledge in rationality (Mind)
Simultaneous knowledge (Here and now)	Sequential knowledge (There and then)
Analogue knowledge (Practice)	Digital knowledge (Theory)

Table 2.2 The Two Types of Knowledge (Nonaka and Takeuchi, 1995)

2.1.4 The Concept of Knowledge Management

Knowledge Management is traditionally rooted in the study of knowledge, which has been a deeply controversial issue (Drucker, 1993; Turban & Aronson, 2001). However, KM as a field of study in itself is a relatively new concept, which emerged in the early 1990s (Drucker, 1993; Metaxiotis & Prusak, 2001; Ergazakis & Psarras, 2005). The term Knowledge Management appears at first glance to be a misnomer, especially to people dealing with different programmes like organisational learning and information management, over a long period of time.

Recently, Knowledge Management has received substantial attention in scholarly and practitioner-oriented literature, professional service firms, and business organisations of all industrial sectors. Due to the large demand for concepts and theories to support the systematic intervention into the way an organisation handles knowledge, the field has attracted researchers from different disciplines, and has absorbed a wide array of research questions and approaches to solve these questions (Maier, 2002; Peinl & Maier 2011).

At a time when firms need to "know what they know" and must use that knowledge effectively, the size and geographical dispersion of many of them make it especially

difficult to locate existing knowledge and get it to where it is required (Davenport & Prusak, 1998). If an employee leaves an organisation, it can be difficult to retain the knowledge that has been built up over years of work and experience, thus adversely affecting the company's competitive advantage. Such issues make it necessary for firms to find the means to overcome these challenges. KM can assist in helping to find a solution to these issues. It is still gaining a more comprehensive understanding among practitioners and academics, whilst generating wide interest as a new resource for organisations. It is rapidly becoming an integral business activity for organisations, who have realised that competitiveness revolves around the effective management of knowledge (Grover & Davenport, 2001). Different definitions of KM have emerged in the literature of IS. KM can be comprehensively defined as "an emerging set of organisational design and operational principles, processes, organisational structures, applications and technologies that helps knowledge workers dramatically leverage their creativity and ability to deliver business value" (Gurteen, 1998; Wong &Aspinwall 2005,p64). KM can be viewed as a system designed to capture, store, retrieve, reuse, create, transfer and share knowledge assets within an organisation in a measurable way, completely integrated in its operational and business goals, in order to maximise innovation and competitive advantage (Dayan & Evans, 2006). Further perspectives of KM see it as a conscious strategy for getting the right knowledge to the right people at the right time, and helping people to share and put information into action in ways that strive to improve organisational performance (APQC, 1999).

Wulff and Suomi (2003) and Anand and Singh (2011) define Knowledge Management as the "systematic, explicit, deliberate, building, renewal, and application of knowledge to maximise an enterprise's knowledge-related effectiveness and to get a return from its knowledge assets".

In brief, Knowledge Management can be defined as the management function responsible for the regular selection and implementation of an organisation's way of handling internal and external knowledge, in order to improve the organisation's performance. The implementation of knowledge strategies comprises all person-oriented, organisational and technological instruments which are deemed suitable for dynamically optimising the organisation-wide level of competencies, education and ability to learn about the organisation as well as to develop collective intelligence (Maier, 2003). More definitions of KM can be added to illustrate its nature, and to provide different aspects through which it can be viewed. Knowledge Management is the formalisation of and access to experience, knowledge and expertise that create new capabilities; it enables superior performance, encourages innovation and enhances customer value (Beckman, 1997).

Bock (2001) defined KM as a management programme which manages and diffuses a set of activities of knowledge-resource acquisition, creation, and sharing in order to improve organisational performance and maintain a competitive advantage. Nonaka and Krogh (2009) defined knowledge as a dynamic human process for identifying personal belief in relation to truth. They consider KM as a knowledge conversion activity for knowledge creation. Alavi (1999) and Wasko et al. (2009) state that knowledge management refers to organising and communicating both tacit and explicit knowledge of employees to other employees in order to improve efficiency and productivity at work. KM is the management of information, knowledge and experience available to an organisation, its creation, capture, storage, availability and utilisation in order that organisational activities build on what is already known and extend it further (Mayo, 1998; Yang 2010; Wei, Choy et al. 2011). A common characteristic among all these definitions of KM is that the concept provides a

framework for building on past experience and for creating new mechanisms for exchanging and creating knowledge. The most famous definitions in the literature refer to the same basic ideas, that KM can incorporate any or all of the following four items:

(1) Information technologies;

(2) Business processes;

(3) Knowledge repositories; and

(4) Individual behaviours (Lytras, 2002, p. 42).

From this review of definitions and concepts of KM it can be seen that there are two approaches: human- and technology-oriented. The human/process-oriented approach has an organisational learning background, while the technological/structural organisational learning approach has an MIS or computer science/artificial intelligence background. However, many of the concepts fail to integrate the two approaches. Most holistic approaches appear to focus on the human-oriented side, and merely mention technology as one of the enabling or implementing factors, as will be illustrated in the section concerning the factors affecting KM (Section 2.1.6**)**. KM is based on definitions focusing on a life cycle of knowledge tasks, functions or processes, strategy or management-oriented definitions, technology-oriented definitions, and multiple definitions (Maeir, 2002).

2.1.5 Knowledge Management Systems (KMS)

KMS have emerged as technological tools to manage organisational knowledge, although there remains a considerable variance in the literature and business practices about what exactly KMS are. Many researchers and practitioners believe that IT is the most important factor or vehicle for the implementation of KM initiatives. KMS are multi-faceted, and involve far more than just technology, encompassing broad cultural

and organisational issues. They can help to overcome the shortcomings of current practices of business engineering in regard to organisational performance (Maier, 2002; Taticchi, Tonelli, et al., 2009).

Information technologies designed to assist managerial and professional workers have evolved over several decades. They have progressed from systems that process and disseminate vast amounts of information to an organisation's managers (Management Information Systems: MIS), to systems that provide specific decision makers with tools for ad hoc decision analysis (Decision Support Systems: DSS), and systems designed to provide updated, often real-time, relevant information to senior and middle managers (Executive Informaion Systems: EIS). These systems have each contributed to individual and organisational improvements to varying degrees, and continue to be important components of organisations' information technology investment. An emerging line of systems targets professional and managerial activities, by focusing on creating, gathering, organising, and disseminating an organisation's knowledge as opposed to information or data. These systems are referred to as Knowledge Management Systems (KMS) (Alavi, 1999; Kuo et al., 2011). A wide range of terminology has emerged in the literature to refer to KMS, such as 'information and communication technology' (Borghoff & Pareschi, 1998; Schultz & Boland, 2000), and 'knowledge-based information system'. Knowledge Management Systems refers to a class of systems developed to support the processes of knowledge creation, storage/retrieval, transfer and application (Alavi & Leidner, 2001), such as Intranet infrastructures, document and content management systems, workflow management systems, artificial intelligence technologies, business intelligence tools, visualisation tools, groupware, and e-learning systems (Maier, 2002; Taticchi et al., 2009). Recently, the market for KMS has become a very dynamic one

and many vendors of, for example, document management systems, content management systems, e-learning systems, groupware and web server systems as well as business intelligence tools, have attempted to build KMS functions into these systems. Additionally, several vendors offer KM tools, such as knowledge visualisation tools, profiling, personalisation and recommendation tools and new integrative systems, such as enterprise portals (Maier, 2002).

2.1.6 Critical Success Factors (CSFs) Affecting Knowledge Management

Given the importance of KM in achieving competitive advantage, in order to build and adopt KM there are many factors that influence the success of projects. Many researchers have studied the critical success factors (CSFs) inherent in KM (Skyrme & Amidon, 1997; Hasanali 2002; Chourides 2003; Hung 2005; Khalid 2006; Conley & Zheng 2009; Egbu, Wood et al. 2010; Conley 2011; Mas-Machuca & Costa 2012).

Seven CSFs have been identified in an international study of practice and experience of leading organisations in KM. These are knowledge leadership, a knowledge creating and sharing culture, advanced technology infrastructure, strong links to a business imperative, compelling vision and architecture, systematic organisational knowledge processes, and continuous learning. Moreover, Davenport et al. (1998) examined the practices of 31 KM projects in 24 companies in order to determine the factors linked to their effectiveness. Of these projects, 18 were classified as successful, from which eight CSFs were identified to have contributed to their effectiveness. These eight CSFs linked KM to senior management support, knowledge-friendly culture, technical and organisational infrastructure, standard and flexible knowledge structure, clear purpose and language, economic performance or industry value, multiple channels for knowledge transfer, and change in motivational practices. However, the authors commented that linking the identified factors to the success of

KM should be viewed as assumptions only. Baldanza and Stankosky (1999) designed a model for KM with four pillars, or four critical success factors to adopting KM in a beneficial way. The four pillars are leadership, organisation, technology and organisational learning. Additional taxonomies for CSFs have been introduced by other researchers; for instance, Liebowitz (1999) presented six factors that embody the need for a KM strategy: support from senior management, a chief knowledge officer (CKO) or equivalent, and KM infrastructure, knowledge ontologies and repositories, KM systems and tools, the need for incentives to encourage knowledge sharing and a supportive culture. The author devised these factors from important lessons learnt from organisations who had implemented knowledge management.

Researchers around the globe have suggested additional factors. For example, Choi (2000) conducted an empirical study at Nebraska University and found that three CSFs in particular influence the successful implementation of KM: information technology, top management leadership/commitment, and information systems. Similar studies conducted to discover CSFs in KM include that of Hasanli (2002), who identified five CSFs: leadership, culture, structure, roles and responsibilities, information technology infrastructure and measurement. In an expanded study, Chourides et al. (2003) surveyed 100 companies using a survey of the Financial Times Stock Exchange (FTSE). They also conducted a longitudinal study with six organisations, where they showed a range of CSFs affecting KM adoption in five organisational function areas: strategy, human resource management, information technology, total quality management, and marketing. Hung et al. (2005) carried out a study to determine the relationship between CSFs and implementation of KMS in terms of enhancing a firm's competitiveness whilst keeping costs to a minimum. Using statistical analysis, this study identified seven CSFs: a benchmarking strategy and knowledge structure, the

organisational culture, information technology, employee involvement and training, leadership and the commitment of senior management, a learning environment and resource control, and evaluation of professional training and teamwork.

From the literature review, it is possible to discern that most CSFs for adopting KM and KMS revolve around leadership and management, culture, information technology, strategy, human resources, training and education, marketing and measurements. Table 2.3 summarises studies that have investigated CSFs.

General Factors / The Authors	Management Leadership	Culture	Information Technology	Organisational Strategy	Measurement	Organisational Infrastructure	Processes & Activities	Motivation Aids	Resources	Training & Education	Human resources Management	Marketing
Skyrme & Amidon (1997)	√	√	√	√			√	√	√			
Davenport et al (1998)	√	√	√	√	√	√	√					
(Liebowitz 1999)	√	√	√	√		√		√				
APQC (1999)	√	√	√	√	√							
Zack (1999)				√								
Ahmed et al (1999)					√							
Holsapple & Joshi (2000)	√				√		√		√		√	
Choi (2000)	√		√						√			
McDermott & O'Dell (2001)		√										
Alavi & Leidner (2001)			√									
Hauschild (2001)								√				
Horak (2001)										√		
Hasanali (2002)	√	√	√		√	√						
Yahiya and Goh (2002)								√		√	√	
Chourides (2003)			√	√							√	√
Wong & Aspinwall (2004)							√		√		√	
Hung et al. (2005)	√	√	√				√		√	√		
Wong (2005)	√	√	√	√	√	√	√	√		√	√	
Al-Mabrouk (2006)	√	√	√	√	√	√	√	√		√	√	
Conley and Zheng (2009)	√	√	√	√		√	√			√	√	
Egbu, Wood, et al. (2010)	√	√	√		√	√	√	√		√	√	
Machuca & Costa(2012)		√	√	√								

Table 2.3 Summary of Literature Review that Identifies CSFs Affecting KM Adoption in Organisations

2.2 KM Initiatives in the Oil Sector

The oil sector was one of the first fields to implement KM. This section will outline the role of British Petroleum (BP) as a pioneer in implementing KM systems in the oil industry.

2.2.1 BP's KM Project

Since the emergence of KM as a driver of organisational performance, and one of the most important resources for enhancing competitive advantage, many companies around the world have conducted projects exploring it. One of the most famous initiatives in the oil sector was the KM project conducted by BP. BP is known as a world-class leader in knowledge management, having developed a robust and systematic framework for performance through learning. The company has featured as a winner in the listing of the Most Admired Knowledge Enterprise Award (http://www.knowledgebusiness.com) for each of the five years that the award has been given. Internally, BP recognises that "knowledge is one of its most important assets and potentially our greatest source of sustainable competitive advantage" (Prokesch, 1997, p.102). BP initiated its KM implementation programme in 1997, as a catalyst to accelerate and strengthen continuous change efforts that began in 1990. Towards the end of this decade of radical change, BP had a flat organisational structure, entrepreneurial business units, and a web of alliances that well-positioned them to face the challenges common to all companies in the global information age, to use knowledge more effectively than their competitors. Lord John Browne, the CEO, had recognised very early on the need to align a knowledge strategy within the overall business strategy, and he drove BP's KM programme.

In 1997, BP set up a central Knowledge Management Team (KMT) with a budget, objectives, and vision, and a remit to develop a KM solution for the organisation. The

KMT developed a three-stage implementation programme to raise awareness, demonstrate success through pilots, and embed the methodology in the organisation. The team's duration and success were determined by their accomplishment against these objectives and were evaluated annually by the managing directors.

2.2.1.1 Previous Knowledge Management in BP

In 1990, BP understood that a programme of both continual and radical change was required in order for the company to survive in the competitive energy industry. The fundamental goal was to change the way individuals and teams within BP behaved, in order to increase performance and distinguish them from the competition. The philosophy for implementing this programme was not to tell anyone how to change, but instead to ask each major business division to develop its own way of implementing a continuous change programme. BP used a myriad of tools to learn how to manage change; the first level of change was an emphasis on performance results and teamwork, and encouraging open behaviour. The tools were a combination of change initiatives, total quality management (TQM), business process re-engineering, breakthrough thinking, and teamwork, supported by numerous consultants.

In 1995, a significant organisational change occurred in BP's structure, when it went from a traditional hierarchy to a federal organisation. The federal structure has a small central core with large semi-autonomous business units outside the core. The leadership in the central core provides an enterprise-wide vision for all units. For each unit in the federation, separate performance contracts are negotiated to drive strategy and operating tactics.

2.2.1.2 Virtual Team Working

To encourage the cross-business unit teamwork and open communication essential to the federal structure, the virtual team-working (VT) project was initiated. This project

aimed to facilitate the creation of virtual teams, with geographically separated members, brought together by desktop videoconferencing. The model for this initiative aimed to address people, process, and technology issues simultaneously. Thus the project deliverables consisted of a technological solution plus a coaching process that facilitated people's efforts to communicate with each other from disparate locations, using PC videoconferencing. The virtual team project won a Smithsonian Award. It contributed to the enhancement of the Common Operating Environment (COE) initiative that created a standard technology platform and a set of tools, which led to standard PC functionality and Intranet use at BP. This empowered employees to access information from anywhere.

In addition to the federal structure and technology platform already implemented, BP modified the federal structure in 1996 to add Peer Groups, a structure for encouraging networking, cooperation, and communication across the business units.

Peer Groups are groupings of the leaders of separate business units that face similar challenges (for example, the Peer Group of offshore oil fields or the Peer Group of chemical refinery business units). Although the business units had individual performance contracts, the Peer Groups were required to accept additional challenges (performance contract items) from the BP Group corporate centre. These items would be difficult or impossible to deliver without collaboration and the sharing of knowledge across business units.

As the VT project rolled out, the team shared information about successful implementations. A concrete measure of the VT project's success was Peer Groups paying for VT capability (equipment and coaching) from their budgets, the added value of the VT project (Gorelick, Milton et al. 2004)

2.2.1.3 Knowledge Management Team

In 1997, BP set up the central KMT devoting a budget, defining the objectives, and formulating a vision, which would enable the team to develop solutions to any future problems, faced by the firm. This project was developed in three stages:

1. Raising awareness
2. Demonstrating success through pilots
3. Embedding the methodology in the organisation

Once the KMT was formally announced, the next step was to create the team and then to develop a vision, mission, and objectives. The vision was for BP to acknowledge what it knows, learn what it needs to learn, and use this knowledge to create a vast sustainable advantage. The strategy to achieve this mission was to focus on people, process, and technology to create the right conditions, the right means, and the right actions.

The team continued the efforts begun by the KM taskforce of looking outside BP for KM tools and practices. As a result, the team adopted the term “Knowledge Asset” to indicate knowledge that had been made accessible to add value to the business. They narrowed the focus to a three-element framework, with an emphasis on reusing knowledge to deliver current performance. This focus quickly became the KMT doctrine. The three-element framework was:

1. Getting the organisation ready for KM: raising awareness, learning, and engagement;
2. Managing knowledge in the form of assets;
3. Leveraging knowledge and expertise.

The team monitored their development with quarterly progress reviews. By mid-1997, progress was already evident. Awareness of the value of reusing knowledge, by demonstrating that if you reused knowledge, you could deliver performance better,

cheaper, and faster, had been firmly created. The team also recognised that people responded when it was obvious that they would gain personally by participating in a knowledge effort. For example, the shift workers in a refinery became keen advocates when they realised that sharing and reusing knowledge would make their job easier and safer.

With awareness raised and the three-step process established, the team focused on engaging the organisation, with the intention of identifying pilot projects.

2.2.2 Lessons Learned

Through this review of the KM initiative in BP, it is possible to identify the factors contributing to the successful implementation of KM . The company is cited in the literature as a totally successful firm in implementing KM. Such success is attributed to the following factors:

1. Leadership management support.
2. Creating the right environment to support KM (the clutter).
3. Information technology infrastructure.
4. Building teamwork that relies extensively on people's ability to collaborate.

2.3 The Libyan Environment

Officially known as the Libyan state, Libya is a developing economy. Islamic ideals and beliefs provide the conservative foundation of the country's customs, laws, and practices. Geographically, Libya lies between longitude 9-25 degrees east and latitude 18-33 degrees north. It borders Chad on the south, Egypt and Sudan on the east, and Tunisia and Algeria on the west (see Figure 2.2). Libya is at the heart of the North African states, and at the crossroads between Europe and the middle of Africa, which gives it a considerable advantage over many other countries, as a potential location for investment and for manufacturing enterprises by multinational companies.

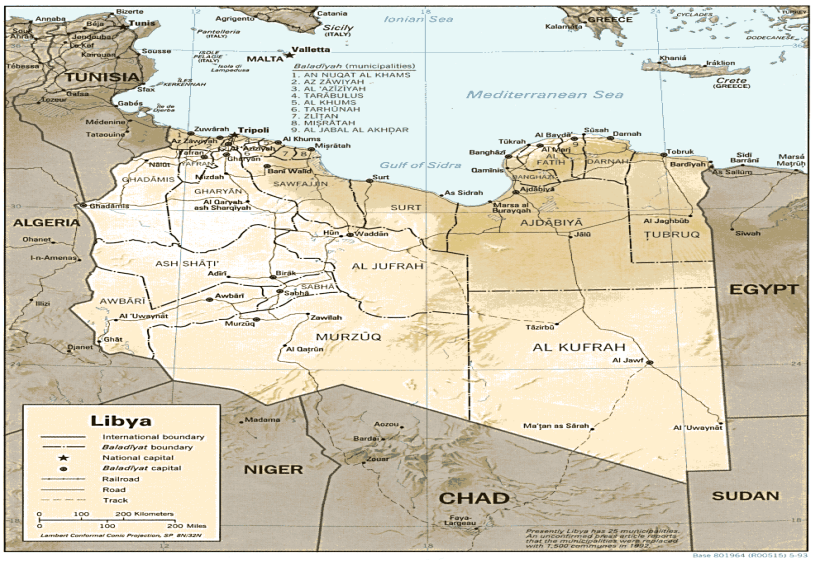

Figure 2.2 Map of Libya

Libya has a total area of 1,775,500 square kilometres, making it the fourth largest country in Africa. Its size equals the combined size of Germany, France, Holland and the Scandinavian countries (www.Libyaconnected.com, 2007). The terrain provides a range of landscapes and climates; the country has a long coastline of nearly 1,900 km, facing the Mediterranean Sea, comprising mostly virgin beaches with outstanding natural environments, making it a productive area for water sports, diving and all kinds of beach activities. The Libyan desert lies in the southern part of the country (making up nearly 80% of the country's area), with significant tourist sites that could play a key role in making Libya one of the most important desert tourist destinations in the world (Brookes, 2001).

2.3.1 Libya's Population

Libya's population is small compared to most other countries in Africa and the Middle East. Indeed, it is one of the most sparsely populated countries in the world, with the current population estimated at five and half million. According to the General Information Authority Census (2008), the highest percentage of the population live in

Tripoli, the capital city, with over a million inhabitants; and Benghazi, the second largest city. However, the population is not equally distributed throughout the country, with about 80% concentrated in a narrow strip along the coastline, where the main industrial, commercial and other activities are located (General Authority for Information, 2008).

2.3.2 The Libyan Economy

The Libyan economy depends on the exploitation of oil, which represents some 95% of the country's globally traded currency earnings, 60% of public sector wages, and about 25% of GDP. Non-oil sectors represent over 20% of GDP, developed from processing agricultural products, as well as the production of petrochemicals, iron, steel, and aluminium. According to the International Monetary Fund (IMF) (2009), preliminary data and short-term forecasts suggest that these figures will remain relatively stable until 2014. The Oil and Gas Journal (2011) revealed that Libya holds around 44 billion barrels of oil reserves, the largest in Africa, and more than 54 trillion cubic feet (tcf) of natural gas reserves. Revenues from the oil sector, coupled with a small population, give Libya one of the highest per capita GDPs in Africa (Index Mundi, 2007). In 2009, oil production (crude plus liquids) totalled 1.8 million barrels per day (bbl/d). The Libyan government plans to increase its oil reserves and production capacity, and to develop the natural gas sector in the medium term, as the country continues to recover from over a decade of international sanctions. The United Nations and the United States lifted sanctions on Libya in 2003 and 2004 respectively. In 2006, the United States rescinded Libya's designation as a state sponsor of terrorism. As a result, international oil companies have increased their investments in hydrocarbons.

In response to international pressure, and in conjunction with the lifting of the UN sanctions, Libya adopted economic reforms, acknowledging the increasing potential of

the oil sector. At present, Libya is working to transform its socialist-oriented economy into a more market-based model by applying for WTO membership, reducing subsidies, and implementing a privatisation policy. It is evident that Libya is diversifying its financial resources by developing the non-oil manufacturing and construction sectors, especially in activities related to tourism.

2.3.3 Oil Sector

Libya is an active member of the Organisation of Petroleum Exporting Countries (OPEC). The country's economy relies heavily on hydrocarbon exports which, according to the IMF, account for over 95% of export earnings and an estimated 80% of fiscal revenues; these figures are anticipated to remain relatively stable through 2011. See Figure 2.3.

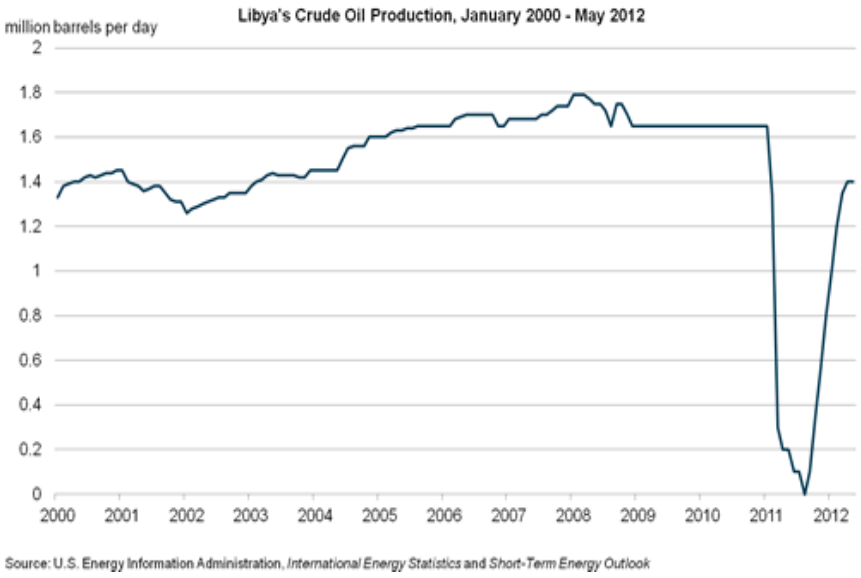

Figure 2.3 Libya's Crude Oil Production, January 2000 – May 2012 (Adopted from (EIA,2012)

Following various government plans to increase production capacity, international oil companies have stepped up investments in hydrocarbon exploration and production despite some degree of regulatory uncertainty. Libya's energy consumption mix has remained relatively constant throughout the decade, with around 74% of energy demand covered by oil and 26% by natural gas. However, with electricity demand

rising, the government is planning to expand the use of natural gas to meet domestic needs, while also exploiting solar and wind potential in more rural areas. Natural gas currently represents about 45% of generated electricity. Although Libya has the largest proven oil reserves in Africa, most analysts agree the country is still underexplored. As previously mentioned, Libya had proven oil reserves of 47 billion barrels in total, as of January 2012 (see Figure 2.4), which are the largest reserves in Africa, followed by Nigeria and Algeria. Some 80% of Libya's proven oil reserves are located in the Sirt Basin, which is responsible for most of the country's oil production.

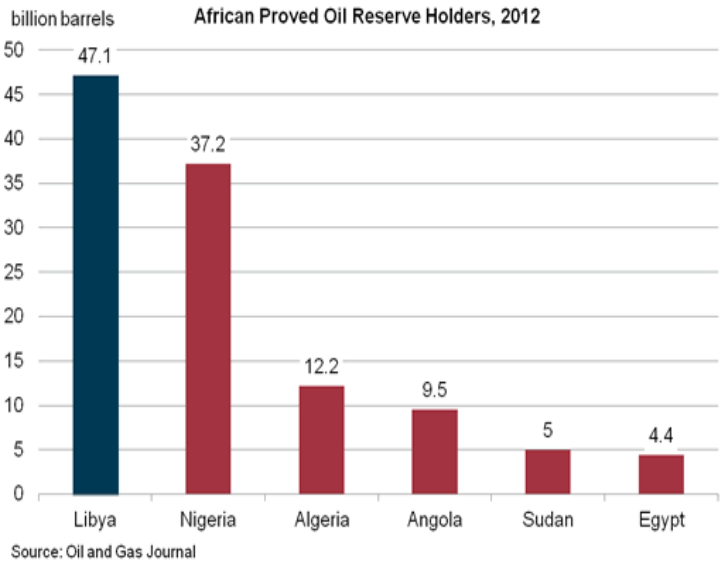

Figure 2.4: African Proven Oil Holders 2012

2.3.4 Information Technology in the Libyan Oil Sector

Libya's oil and gas industry is operated by the state-owned National Oil Corporation (NOC), which was established under Law No. 24 of 1970, replacing the General Libyan Petroleum Corporation established under Law No. 13 in 1968. This enabled the NOC to address the enormous and rapid development in the oil and gas industry in a more flexible manner, and to keep up to date with changes in the international industry, along with smaller subsidiary companies, which, when combined, accounted for around half of the country's oil output. Of the NOC's subsidiaries, the largest public-sector oil

producers include Berega Oil Company, Ras Lanuf Oil Company, Waha Oil Company, Zueitina Oil Company, Sirt Oil Company, and Arab Gulf Oil Company. Several international oil companies are engaged in exploration/production agreements with NOC, such as VIBA, Oasis, Conoco, Marathon, and Amerada Hess (Gasandoil.com, 2002). The oil and gas sector in Libya is divided into three sub-sectors:

(1) The government sector, which is operated by the

NOC;

(2) The public sector, which is operated by companies owned by the NOC; and

(3) The private sector, which operates on the basis of partnership with foreign international companies.

Differences in technological innovation are clearly seen in the use of computer technology in these different sectors. As such, the Libyan oil sector now has an opportunity to adopt KMS initiatives. As Libya aims to diversify its income, this goal will be more effectively achieved by using information technologies such as KMS, particularly given the increasing interest from foreign and domestic oil companies.

Despite the fact that the Libyan Oil Sector and its fully owned companies are operating computers and related Internet technologies, the idea of engagement in KMS is not totally understood, and is still in its early stages of development, making it a difficult proposition for the sector to accept and adopt. As a result, the sector needs to change the attitudes and perceptions of managers concerning the Internet and KMS technology. KMS adoption presents a great challenge for the future of the Libyan oil sector, in order for it to contribute as much as possible to the economic potential of the Libyan oil industry, as KMS could hold the key to reforming the entire industry.

2.3.5 Telecommunication Technologies Infrastructure

International oil exploring/production companies introduced computers in the early 1960s. Initially, computers they used for processing financial transactions; over time, other systems were developed to manage other activities. Currently, some public organisations such as the Zueitina Oil Company and the Arabic Gulf Company have several online systems that use databases. Computers in these companies are found on all sites.

These companies have been cultivating a computer culture for over three decades. The Zueitina Company, for example, has more than 120 online mainframe users distributed across the company, and several client-server applications connected to a wide area network (WAN). The use of computers in these companies is essential to the daily work of most of their employees.

2008 saw an increase in the telecoms sector within the oil industry. The implementation of infrastructure projects in the field of communications, and the acquisition and use of modern, 'high tech' technology improves the quality of telecommunication services and ensures the flow of information related to the oil operations of the NOC and its affiliated companies. It also helps to achieve the economic operation of the facilities of oil and increase the level of performance and development of national cadres, as well as aiding the decision- making process.

However, there are many barriers facing the adoption of new technology in the Libyan oil sector. Barriers to technology include a lack of technical and KM skills, and a poor information technology infrastructure. Lack of understanding and experience of KMS inhibits the Libyan oil sector's development and productivity, and productivity largely depends on the strength of managerial and organisational skills to co-ordinate the industry.

Although the Libyan oil sector is keen to use KMS to improve their services and productivity, they believe that they are constrained by a lack of proper technical support for KMS technology, and an inability to establish and manage the required technical infrastructure.

However, the Libyan oil sector will be able to implement a variety of projects to deliver telecommunications services to different fields and oil sites through their staff and affiliations in coordination with the Libyan Company for Post and Communications and Information Technology, within the strategic projects carried out in this area. These projects include:

- Implementation of a fibre optic cable system within the project of the next generation network (NGN) to deliver communications services to the oilfields of the Sirte Basin.
- Delivery of mobile services to a number of the Sirte Basin oilfields. This will be linked to a number of other oilfields in the near future.

The NOC has implemented a project to link the company with the headquarters of oil companies using techniques of modern communication (e.g. voice, data, VoIP, videoconferencing), which enable rapid communication and handling of information electronically between different companies, such as images of maps or meetings with photographers through direct broadcasting. The first stage of this project, linking the headquarters of the company with its corporate headquarters (Herog - Zwaitna - Eni Oil), was due to be completed during the second half of 2009 (Gorelick, Milton et al. 2004).

2.4 CSFs Affecting KM in the Libyan Oil Sector

Many factors may influence the implementation of new technologies in the Libyan oil sector, especially IS and KMS. In the next section the factors with the greatest influence on KM implementation in the Libyan oil sector are discussed.

2.4.1 Organisational Culture (OC)

One of the most important elements contributing to the successful implementation of the KM initiative is organisational culture (OC). This refers to the unique configuration of norms, values, beliefs and ways of behaving that characterise the way groups and individuals combine to get things done (Eldrige & Crombi, 1974). OC can also be defined as the values, attitudes, beliefs and behaviours that represent an organisation's working environment, organisational objective, and vision (Hofstede, 1984). It is generally regarded as a moderating factor in accepting and adopting IS and KM (Abdul Rashid et al., 2004; Chai & Pavlou, 2004; Fey & Denison, 2003; Frotaine & Richardson, 2003). OC can have a vital impact on many initiatives and projects, and may ultimately have an influence on the failures and successes of IS, KM, and on other projects aiming to engender change within organisations. A number of authors (Cameron & Quinn, 1999; 2011;McDermott & O'Dell 2001) conducted studies on five companies in the USA, looking at the impact of organisational culture on knowledge sharing. The results showed that culture plays a significant role in the success of KM efforts. In particular, the approach, tools and structures for supporting knowledge sharing have to match the style of the organisation, and the networks for sharing knowledge have to be built on top of the existing networks which people use in their day-to-day activities. Cabrera and Bonache (1999) proposed a framework for ensuring consistency between organisational culture (i.e. the way of performing things in an organisation) and CSFs, in order to create an effective formula for achieving success

within organisations. One important aspect of culture is the extent of collaboration between employees. Collaboration has been empirically shown to be a significant contributor to knowledge creation (Lee & Choi, 2003).

OC within KM places a great value on knowledge, and encourages its creation, sharing and application. In fact, most KM efforts are devoted to enhancing these elements in a culture, making it a major challenge for an organisation.

2.4.1.1 The Measurement of Organisational Culture

A number of researchers have been involved in studies to measure and characterise organisational culture (Hofstede, 1980; Cameron & Quinn, 1999; 2005; Jingjit & Fotaki, 2010; Cameron & Quinn 2011). Hofstede (1980, 1991) was mainly interested in national and social culture, and suggested some differences between these two, based upon the role that each plays in the environment. He presented six dimensions to help researchers understand the various types of organisational culture. These dimensions are process versus results, employee- versus job-oriented, parochial versus professional, open versus closed system, loose versus tight control, and normative versus pragmatic. In 2010, Jingjit and Fotaki introduced seven dimensions that can be used to measure OC:

1. Dominant characteristics of the organisation
2. Leadership style
3. Management of employees
4. Organisational cohesion
5. Organisational strategic emphasis
6. Organisational success criteria
7. Organisational reward in the form of promotion.

These elements are based on the Competing Values Framework (CVF) created by Quinn & Rohrbaugh (1981). The framework was applied in an empirical study of the

effectiveness of organisations (Rohrbaugh, 1983), and is a useful tool for studying many different organisational phenomena, as shown in Figure 2.5.

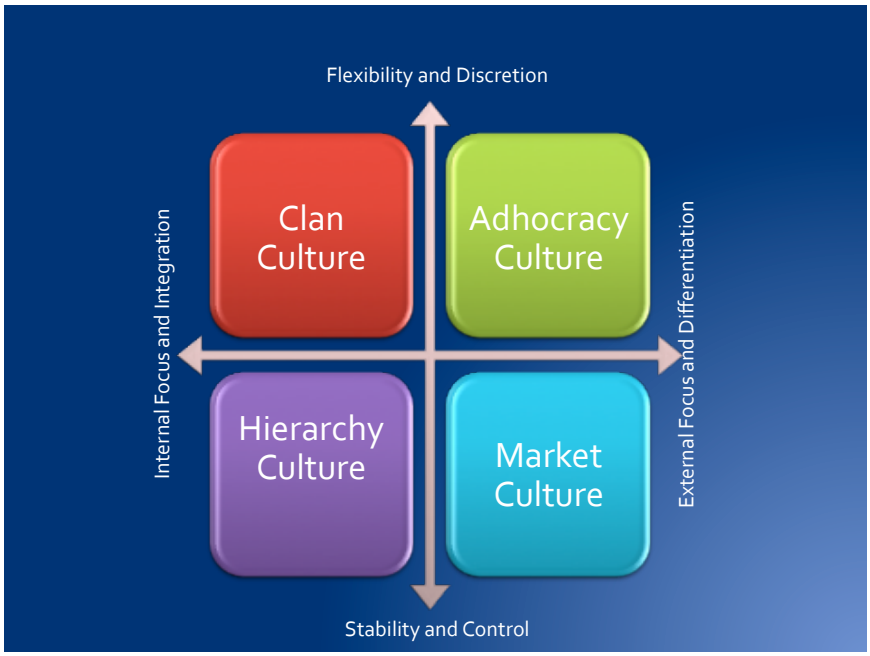

Figure 2.5: Competing Values Framework (adapted from Cameron and Quinn, 1999; 2005; 2011)

In Figure 2.5, the relationships between the four main clusters are presented on a horizontal and vertical axis. The horizontal axis starts with an internal organisational focus on the left and ends with an external focus to the right. However, the vertical axis starts with flexibility and ends with control at the bottom. Each model includes one of the four quadrants, each of which represents a type of culture.

The upper-left quadrant represents the human relations model that emphasises participation, openness, morale and commitment; this quadrant corresponds to a clan culture. The upper-right quadrant represents the open systems model that emphasises innovation, adaptation, growth, and resource acquisition; it corresponds to an 'adhocracy' culture. The lower-left quadrant represents the internal process model that emphasises documentation, information management, stability, cohesion, and control, and corresponds to a hierarchy culture. Finally, the lower-right quadrant represents the

rational goal model that emphasises direction, goal clarity, productivity, and accomplishment, and corresponds to a market culture.

All of these types of culture form the foundation of the Organisational Culture Instrument (OCI) (Cameron & Quinn, 1999; 2005; 2011) that can be used to measure organisational culture in the Libyan oil sector, and its usefulness in terms of exploring ways of adopting KMS.

2.4.1.2 The Organisational Culture Assessment Instrument

The importance of organisational culture, as a critical factor for the long-term success of organisations and organisational change, lies in finding the appropriate tools to measure and identify types of organisational culture.

The Organisational Culture Assessment Instrument (OCAI) developed by Cameron and Quinn in 1999 and reviewed in 2005 and 2011, which is based on the CVF model, has been adopted to identify the types of culture within organisations. Cameron and Quinn (1999; 2005; 2011) suggest two key dimensions, divided into four main quadrants showing types of culture. Figure 2.5 illustrates these four quadrants and demonstrates the characteristics of competing values.

These dimensions focus on:

1. Flexibility and discretion;
2. Stability and control;
3. Internal focus and integration;
4. External focus and differentiation

The hierarchy culture is based on a bureaucratic and official process and values tradition, emphasising stability, teamwork, and agreement. It focuses more on internal than external issues and values steadiness and control over flexibility. The hierarchy culture is characterised by a formalised and structured place of work. Procedures are in

place to control what employees do, and successful leaders are good coordinators and organisers (Cameron & Quinn, 1999; 2005; 2011). Such organisational culture is dominant in large organisations and government agencies (Cameron & Quinn, 2005; 2011), focusing on efficiency, where the organisational environment is stable and simple. The maintenance of efficient, consistent, speedy and steady flows of products and services is of increasing importance in the hierarchy culture (Cameron & Quinn, 2005).

The clan culture can be described as an extended family, with shared values, beliefs, goals, unity and participation (Cameron & Quinn, 2005). The main characteristics of clan culture include cooperation, coordination, teamwork, employee involvement, rewards, fewer management levels, and harmony. It focuses on internal issues and values flexibility and carefulness. The clan culture is characterised by a friendly place of work where people share many things.

The market culture term is not synonymous with the marketing function; neither does it involve consumers in the marketplace. It refers instead to a type of organisation which functions as a market in itself (Cameron & Quinn, 2005). Moreover, it values steadiness and control, and focuses on external environments rather than internal issues. In the market culture, organisations thrive through a strong emphasis on external positioning and control (Cameron & Quinn, 2005).

The 'adhocracy' culture focuses on external issues, and values flexibility and carefulness rather than stability and control. It is characterised by originality, creativity, risk taking, entrepreneurial focus, and a self-motivated, entrepreneurial and creative workplace (Cameron & Quinn, 1999). Organisational charts and formal structures are not emphasised or are non-existent. Job roles and physical space are also considered to be flexible.

These four types of culture represent the theoretical base of the OCAI. This instrument has been tested in hundreds of organisations around the world and is characterised as a strong tool for predicting organisational performance. It encompasses six main enquiries where each enquiry includes four optional answers, representing the four culture types. The OCAI can be used as a tool to determine the dominant culture based on these four main culture types.

The OCAI has been chosen to measure the types of organisational culture in the Libyan oil sector, because it will help to investigate the creative and innovative aspects of organisational points of strength.

2.4.2 Information Technology

Information technology (IT) is different from KM, although it is a key enabler in adopting successful KM. In addition, it is considered the most effective means of capturing, storing, transforming and disseminating information (Syed-Ikhsan & Rowland, 2004). According to Mathi (2004), IT infrastructure is one of the most important factors for enabling the adoption of KMS associated with organisational culture. IT assists in the search process and facilitates access and retrieval of information, and can support collaboration and communication between organisational employees. In essence, it can play a variety of roles in enhancing an organisation's KM processes (Alavi & Leidner, 2001). In a modern organisation an essential part of the KM infrastructure is an IT system that not only collects, organises and disseminates data, but also aids and facilitates the exchange of ideas, creativity and innovation. Ruggles (1997) and Mas-Machuca & Costa (2012) supported this viewpoint through a study suggesting that in practice many KM programmes are being led from an IT perspective. This explains the important role that IT infrastructure is playing in developing KMS.

In a study of the relationship between organisational elements and performance of knowledge transfer, Syed-Ikhsan and Rowland (2004) showed that technology plays a number of major roles in managing knowledge in organisations, and that it is considered to be an effective tool in capturing, storing, transforming and disseminating information. Even though IT is not the only factor necessary in ensuring the successful implementation of KM, the IT infrastructure does enable individuals in organisations to create and share knowledge effectively, and to contribute to the performance of knowledge transfer. IT can be grouped into one or more of the following categories: business intelligence, knowledge base, collaboration, content and document management, portals, customer relationship management, data mining, workflow, search, and e-learning (Luan & Serban, 2002). According to Maier (2002, p.15) "[t]he ever-increasing pace of innovation in the field of information and communication technology (ICT) has provided numerous instruments ready to be applied in organisations to support KM approaches". Examples of ICT that are related to KM are:

- Intranet infrastructures that provide basic functionality for communication – e-mail, teleconferencing – as well as storing, exchanging, search and retrieval of data and documents.
- Document and content management systems that handle electronic documents or Web content respectively throughout their entire life cycle.
- Workflow management systems that support well-structured organisational processes and handle the execution of workflows.
- Artificial intelligence technologies that support, for example, search and retrieval, user profiling and matching of profiles, text and Web mining.
- Business intelligence tools that support the analytic process that transforms fragmented organisational and competitive data into goal-oriented 'knowledge' and require an integrated data basis that is usually provided by a data warehouse.

- Visualisation tools that help to organise relationships between knowledge, people and processes.
- Groupware support, e.g., time management, discussions, meetings or creative workshops of work groups and teams.
- E-learning systems that offer specified learning content to employees in an interactive way and thus support the teaching and/or learning process. (Maier (2002, p.15)

All these technologies need to be considered in the development of KM systems.

2.4.3 Training and Education

Training and education is another important factor that needs to be considered in adopting successful KMS. Training is usually provided for employees, to enhance their understanding of the concept of KM (Moffett, 2003). It can also provide a common language and perception of how employees might define and think about knowledge (Wong, 2005). Moreover, employees could be trained and educated to use the KM systems and other techniques for managing knowledge, thus ensuring that they utilise the full potential and capabilities offered by these technologies. Horak (2001) suggested communication, soft networking, peer learning, team building, collaboration and creative thinking as basic areas for effective KM and skills development.

2.5 Summary

This chapter reviewed the literature relating to knowledge management and knowledge management systems. The chapter opened by providing a definition of knowledge, before moving on to discuss types of knowledge, the concept of KM and KMS. It has sought to provide an overview of the factors that affect KM; and the successful KM initiative by BP was outlined. The chapter also provided a brief summary of Libya, including demographic information, the economy, and the Libyan oil sector and its contribution to the Libyan economy; with an overview of the information technology in the sector and how it is related to KMS adoption. The chapter finished with a discussion of the factors that might affect KM in the Libyan oil sector.

3 Chapter 3: Theoretical Frameworks and the Conceptual Model

3.1 Introduction

There are many factors that can affect the adoption of new technology and KMS. The literature review outlined a number of these, but this study will investigate three key elements that influence organisational change in Libya particularly. This chapter presents the conceptual framework for the study, together with the hypotheses, linking both to the research questions.

3.2 Theoretical Framework

The framework that will be used in the study has been constructed by analysing the work of a number of researchers, who have studied different aspects of individual reactions to IT from a variety of theoretical perspectives. These include the Technology Acceptance Model (TAM), which is an adaptation of the Theory of Reasoned Action (TRA) (Davis, 1996; 1993; 1989; Davis et al., 1989; 1992; Adams et al., 1992; Venkatesh and Davis, 2000; 1996; Venkatesh, 1999; Venkatesh & Morris, 2003); the Theory of Planned Behaviour (TPB) (Ajzen, 1985); Social Cognitive Theory (SCT) (Hill et al., 1986; 1987); and Activity Theory, among which are the Task Technology Fit Model (Dishaw and Strong, 1998); Institutional Theory; Coordination Theory; and the Organisational Complexity Model.

The contribution of these theories has been acknowledged in the IS literature, as they enable researchers to gain useful insights into the reactions of people towards IT, and the factors that produce such reactions. For instance, Activity Theory aims to explain the connection between human psychology and computer interface design in a social work environment (Hasan & Gould, 2001), which helps to enhance individuals' information processing, establishing the relationship between human computer interaction and computer interface design by taking into account the work environment (Verenikina &

Gould, 1997). The Task Technology Fit Model aims to match the capability of the technology to the demands placed upon it in the work environment (Dishaw & Strong, 1998; 1997). Table 3.1 summarises the models and theories of individual acceptance.

Models and Theories of Individual Acceptance		
Theory of Reasoned Action (TRA)	**Core Constructs**	**Definitions**
Drawn from social psychology, TRA is one of the most fundamental and influential theories of human behaviour. It has been used to predict a wide range of behaviours (see Sheppard et al. 1988 for a review). Davis et al. (1989) applied TRA to individual acceptance of technology and found that the variance explained was largely consistent with studies that had employed TRA in the context of other behaviours	Attitude Toward Behaviour	"An individual's positive or negative feelings (evaluative affect) about performing the target behaviour" (Fishbein and Ajzen 1975, p. 216).
	Subjective Norm	The person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein and Ajzen 1975, p. 302).
Technology Acceptance Model (TAM)		
TAM is tailored to IS contexts, and was designed to predict information technology acceptance and usage on the job. Unlike TRA, the final conceptualisation of TAM excludes the attitude construct in order to better explain intention parsimoniously. TAM2 extended TAM by including subjective norm as an additional predictor of intention in the case of mandatory settings (Venkatesh and Davis 2000). TAM has been widely applied to a diverse set of technologies and users.	Perceived Usefulness	"The degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p. 320).
	Perceived Ease of Use	"The degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320).
	Subjective Norm	Adapted from TRA/TPB. Included in TAM2 only.
Motivational Model (MM)		
A significant body of research in psychology has supported general motivation theory as an explanation for behaviour. Several studies have examined motivational theory and adapted it for specific contexts. Vallerand (1997) presents an excellent review of the fundamental tenets of this theoretical base. Within the information systems domain, Davis et al. (1992) applied motivational theory to understand new technology adoption and use (see also Venkatesh and Speier 1999).	Extrinsic Motivation	The perception that users will want to perform an activity "because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions" (Davis et al. 1992, p. 1112).
	Intrinsic Motivation	The perception that users will want to perform an activity "for no apparent reinforcement other than the process of performing the activity per se" (Davis et al. 1992, p. 1112).
Theory of Planned Behaviour (TPB)	**Core Constructs**	**Definitions**
TPB extended TRA by adding the construct of perceived behavioural control. In TPB, perceived behavioural	Attitude Toward Behaviour	Adapted from TRA.
Determinant of intention and behaviour. Ajzen (1991) presented a review of several studies that successfully used TPB to predict intention and behaviour in a wide variety of settings. TPB has been successfully	Subjective Norm	Adapted from TRA.
applied to the understanding of individual acceptance and usage of many different technologies (Harrison et al. 1997; Mathieson 1991; Taylor and Todd 1995b). A related model is the Decomposed Theory of Planned Behaviour (DTPB). In	Perceived Behavioural Control	The perceived ease or difficulty of performing the behaviour" (Ajzen 1991, p. 188). In the context of IS research, "perceptions of internal and external constraints on behaviour" (Taylor and Todd 1995b, p. 149).

terms of predicting intention, DTPB is identical to TPB. In contrast to TPB but similar to TAM, DTPB "decomposes" attitude, subjective norm, and perceived behavioural control into its the underlying belief structure within technology adoption contexts.		
Combined TAM and TPB (C-TAM-TPB)		
This model combines the predictors of TPB with perceived usefulness from TAM to provide a hybrid model (Taylor and Todd 1995a	Attitude Toward Behaviour	Adapted from TRA/TPB.
	Subjective Norm	Adapted from TRA/TPB.
	Perceived Behavioural Control	Adapted from TRA/TPB.
	Perceived Usefulness	Adapted from TAM

Models and Theories of Individual Acceptance (Continued)		
Model of PC Utilisation (MPCU)	**Core Constructs**	**Definitions**
Derived largely from Triandis' (1977) theory of human behaviour, this model presents a competing perspective to that proposed by TRA and TPB. Thompson et al. (1991) adapted and refined Triandis' model for IS contexts and used the model to predict PC utilisation. However, the nature of the model makes it particularly suited to predict individual acceptance and use of a range of information technologies. Thompson et al. (1991) sought to predict usage behaviour rather than intention; however, in keeping with the theory's roots, the current research will examine the effect of these determinants on intention. Also, such an examination is important to ensure a fair comparison of the different models.	Job-fit	The extent to which an individual believes that using [a technology] can enhance the performance of his or her job" (Thompson et al. 1991, p. 129).
	Complexity	Based on Rogers and Shoemaker (1971), "the degree to which an innovation is perceived as relatively difficult to understand and use" (Thompson et al. 1991, p. 128).
	Long-term Consequences	Outcomes that have a pay-off in the future" (Thompson et al. 1991, p. 129).
	Affect Towards Use	Based on Triandis, affect toward use is "feelings of joy, elation, or pleasure, or depression, disgust, displeasure, or hate associated by an individual with a particular act" (Thompson et al. 1991, p. 127).
	Social Factors	Derived from Triandis, social factors are "the individual's internalisation of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" (Thompson et al. 1991, p. 126).
	Facilitating Conditions	Objective factors in the environment that observers agree make an act easy to accomplish. For example, returning items purchased online is facilitated when no fee is charged to return the item. In an IS context, "provision of support for users of PCs may be one type of facilitating condition that can influence system utilisation" (Thompson et al. 1991, p. 129).
Social Cognitive Theory (SCT)	**Core Constructs**	**Definitions**
One of the most powerful theories of human behaviour is social cognitive theory (see Bandura 1986). Compeau and Higgins (1995b) applied and extended SCT to the context of	Outcome Expectations—Performance	The performance-related consequences of the behaviour. Specifically, performance expectations deal with job-related outcomes (Compeau and Higgins 1995b).

computer utilisation (see also Compeau et al. 1999); while Compeau and Higgins (1995a) also employed SCT, it was to study performance and thus is outside the goal of the current research. Compeau and Higgins' (1995b) model studied computer use but the nature of the model and the underlying theory allow it to be extended to acceptance and use of information technology in general. The original model of Compeau and Higgins (1995b) used usage as a dependent variable but in keeping with the spirit of predicting individual acceptance, we will examine the predictive validity of the model in the context of intention and usage to allow a fair comparison of the models.	Outcome Expectations — Personal	The personal consequences of the behaviour. Specifically, personal expectations deal with the individual esteem and sense of accomplishment (Compeau and Higgins 1995b).
	Self-efficacy	Judgment of one's ability to use a technology (e.g. computer) to accomplish a particular job or task.
	Affect	An individual likes for a particular behaviour (e.g. computer use).
	Anxiety	Evoking anxious or emotional reactions when it comes to performing a behaviour (e.g., using a computer).
Models and Theories of Individual Acceptance (Continued)		
Innovation Diffusion Theory (IDT)	**Core Constructs**	**Definitions**
Grounded in sociology, IDT (Rogers 1995) has been used since the 1960s to study a variety of innovations, ranging from agricultural tools to organisational innovation (Tornatzky and Klein 1982). Within information systems, Moore and Benbasat (1991) adapted the characteristics of innovations presented in Rogers and refined a set of constructs that could be used to study individual technology acceptance. Moore and Benbasat (1996) found support for the predictive validity of these innovation characteristics (see also Agarwal and Prasad 1997, 1998; Karahanna et al. 1999; Plouffe et al. 2001).	Relative Advantage	"the degree to which an innovation is perceived as being better than its precursor" (Moore and Benbasat 1991, p. 195).
	Ease of Use	"the degree to which an innovation is perceived as being difficult to use" (Moore and Benbasat 1991, p. 195).
	Image	"The degree to which use of an innovation is perceived to enhance one's image or status in one's social system" (Moore and Benbasat 1991, p. 195).
	Visibility	The degree to which one can see others using the system in the organisation (adapted from Moore and Benbasat 1991).
	Compatibility	"The degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters" (Moore and Benbasat 1991, p. 195).
	Results Demon-strability	"The tangibility of the results of using the innovation, including their observability and communicability" (Moore and Benbasat 1991, p. 203).
	Voluntariness of Use	"The degree to which use of the innovation is perceived as being voluntary, or of free will" (Moore and Benbasat 1991, p. 195).

Table 3.1: A Summary of the Models and Theories of Individual Acceptance (Venkatesh et al., 2003, p.427-437)

The Technology Acceptance Model (TAM) (Davis, 1993; 1992; 1989), whose basis is the Theory of Reason Action (Fishbein and Ajzen, 1975), is most suited to this study, offering the opportunity to study these phenomena by using external variables: organisational culture; training and education; and IT infrastructure technology.

3.3 Technology Acceptance Model (TAM)

TAM was initially developed and tested at the end of the 1980s (Davis, 1986; 1989; Davis et al., 1989). The model has subsequently been comprehensively validated and subjected to theoretical extensions across a variety of settings (Venkatesh and Davis, 2000; Venkatesh et al., 2003; Davis et al., 1989; Venkatesh and Morris, 2000). Davis et al. (1989) developed TAM as a theoretical basis to explain human computer usage behaviour, based upon generic TRA (Fishbein and Ajzen, 1975). They state that the objective of TAM is to provide an explanation for the determinants of computer acceptance, that is generally capable of explaining the behaviour of users across a broad range of end-user computing technologies and user populations; while simultaneously being both parsimonious and theoretically justified.

In devising TAM, Davis et al. (1989) used TRA to specify the causal linkage between the following relevant sets of constructs: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), User Attitude Toward Using (ATU), Behavioural Intention (BI) and Actual Computer Usage Behaviour (AU). Davis defined PU as the user's subjective probability that using a specific application system will increase his or her job performance within an organisational context. PEOU was defined as the degree to which an individual believes that using a particular system would be free of physical and mental effort (Davis, 1993). PU and PEOU variables in the TAM model predict an individual's attitude towards using a computer system. While PU and PEOU will influence the individual, ATU will influence the BI, and in turn, AU; AU can be predicted by the individual's BI (Davis, 1986). See Figure 3.1.

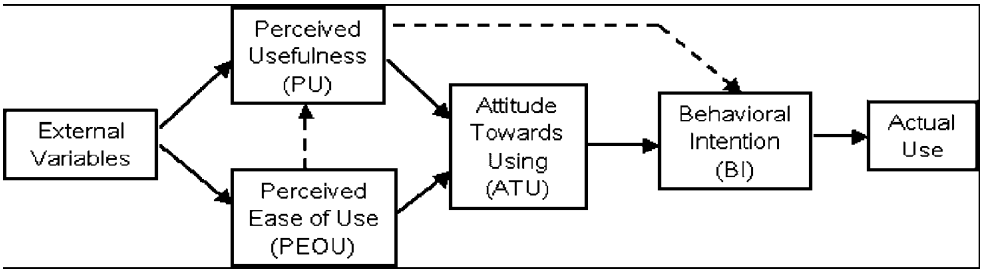

Figure 3.1 Technology Acceptance Model (TAM) (based on Davis et al., 1989)

3.4 The Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) is a famous theory that was developed and tested successfully during the 1970s as a model to predict consumer behaviour. It was established in 1967 and revised and developed in 1975 and 1979 by Ajzen and Fishbein. TRA suggests that in order to understand attitudes and their relationship to intentions, it is important to understand consumers' subjective norms, i.e. the reference group influences on consumer decision making, regarding a particular action.

The TRA as the basis for TAM is based on the assumption that human beings are rational animals that systematically utilise or process the information available to them. Although TRA is concerned with the determinants of human consciously intended behaviour, it is a widely studied model in social psychology. In this theory, an individual's performance of a specific behaviour is determined by their behavioural intention (BI) to perform the behaviour. The BI is determined by an individual's perception of personal factors, such as attitude (A) towards the behaviour and subjective norm (SN). SN can simply be defined as what the consumer believes other people would think of the behaviour being performed, defined as the social pressure of the behaviour in question.

According to the TRA, attitudes are a function of beliefs. The belief that performing an act would lead to a positive outcome makes individuals want to hold a positive attitude towards performing the behaviour; while a person who believes that performing the

behaviour would lead to mostly negative outcomes will hold an unfavourable attitude. The belief that underlies individual attitudes towards the behaviour is described as behavioural belief.

Subjective norms are the function of beliefs. That is, an individual believes that specific individuals or a group thinks that they should or should not perform the behaviour. If the person believes that most others think they should perform the behaviour, the perceived social pressure to perform increases the more they are motivated to comply. Conversely, if an individual believes that most people are opposed to their performing the behaviour, their perception of social pressure not to perform the behaviour will increase with the motivation to comply. Thus, the motivation underlying a person's beliefs is termed as the normative belief. Arrows in Figure 3.2 indicate the direction of the influence.

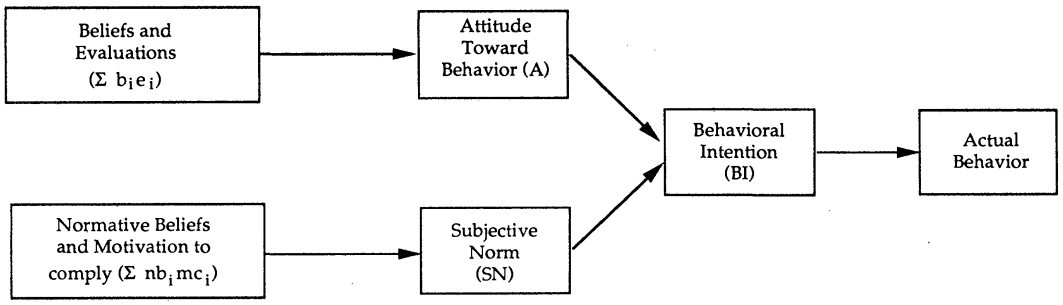

Figure 3.2: The Theory of Reasoned Action (TRA) (Davis et al., 1989)

The TRA can be explained as follows:

B ~ BI = (AB) W1 + (SN) W2

Where B = a specific behaviour, I = consumer's intention to perform the behaviour B, AB = consumer's attitude toward performing behaviour B, SN = subjective norm regarding whether other people want the consumer to engage in that behaviour, and W1 and W2 = empirically determined weights that reflect the relative influence of the AB and SN and components of BI. The TRA has been used in various behavioural science disciplines in order to predict and understand consumer behaviour.

3.5 The Conceptual Model

In order to research the theoretical base, this study will rely on TAM as its conceptual framework. Most of the research using TAM has been conducted in North America and other developed countries (Wang, 2005; Saadé et al., 2007; Straub, & Keil, 1997). Because of this limitation, it is necessary to examine its suitability for research into the adoption of new technologies, such as KMS, in developing countries, such as Libya. There is little evidence that it could be successfully applied in developing countries without some modification.

Nonetheless, TAM has been shown to be among the most effective IS models for predicting user acceptance and usage behaviour. The original tool for measuring such beliefs was developed and validated by Davis (1986; 1989; 1993) and Davis et al. (1989); and replicated by Adams, Nelson and Todd (1992); Mathieson (1991); Hendrickson, Massey, and Cronan (1993); Segars and Grover (1993); Chin, Johnson et al. (2008); Zhang, Zhao et al. (2008); and Sudarsan and Uchenna Cyril (2009).

The TAM Model is suggested as a practical tool for testing early user acceptance, and the Libyan oil sector is currently in the initial stage of accepting new technology, such as KMS. TAM can also provide diagnostic measures to help organisations to identify and evaluate strategies for enhancing user acceptance and capitalising on technological investment (Al-Gahtani, 2001; 2011).

As Straub (1997) has implied, despite the broad application of TAM in North America and some other developed countries, it must be considered whether it is fully fit for application to other cultures. This study will try to respond to such concerns by testing TAM in Libya as a developing country; and also testing whether TAM is an appropriate model to use when studying the adoption of KMS within the Libyan oil sector.

Based on the literature and research results, this study will aim to discover whether it is possible to make some modifications to the model in order to fit the context in Libya, as a developing country.

By using TAM, researchers and specialists can test any system for the relations between the internal components of the model, and also study the relationship between external factors such as organisational culture, education and training and the IT infrastructure. From this, it is possible to conclude that:

- A review of the literature on IS acceptance and usage suggests that TAM has emerged as one of the most influential models in this type of research (Davis, 1989; Davis et al., 1989; (Hsiao and Yang 2011).
- While TAM emphasises system design characteristics, it also presents an essential theoretical contribution to understanding IS usage and acceptance behaviour (Davis et al, 1989).
- TAM could provide a broader picture of human behaviours towards the acceptance and use of KMS in the Libyan oil sector.

3.6 The Expanded TAM for Use in KM Adoption

This research will investigate the appropriateness of the TAM model for the study of KMS in the Libyan context. The literature review suggests that models of information technology adoption and use in developed countries may not be totally applicable to developing countries. Therefore, this study will modify the TAM to make it more applicable for researching the Libyan context.

This research will investigate the factors that can affect the success and effectiveness of KMS in the Libyan oil sector context. Some of these factors may not have been identified in the existing literature on IT adoption, as most of this research has been conducted in developed countries for which the technology was originally created. A review of the

literature in the Libyan context (Twati, 2006, 2008) suggests that while TAM, which is the basis of much research into IT diffusion, may be useful, it may need to be extended to include specific issues of organisational culture, training and education and information technology infrastructure. This is shown in Figure 3.3.

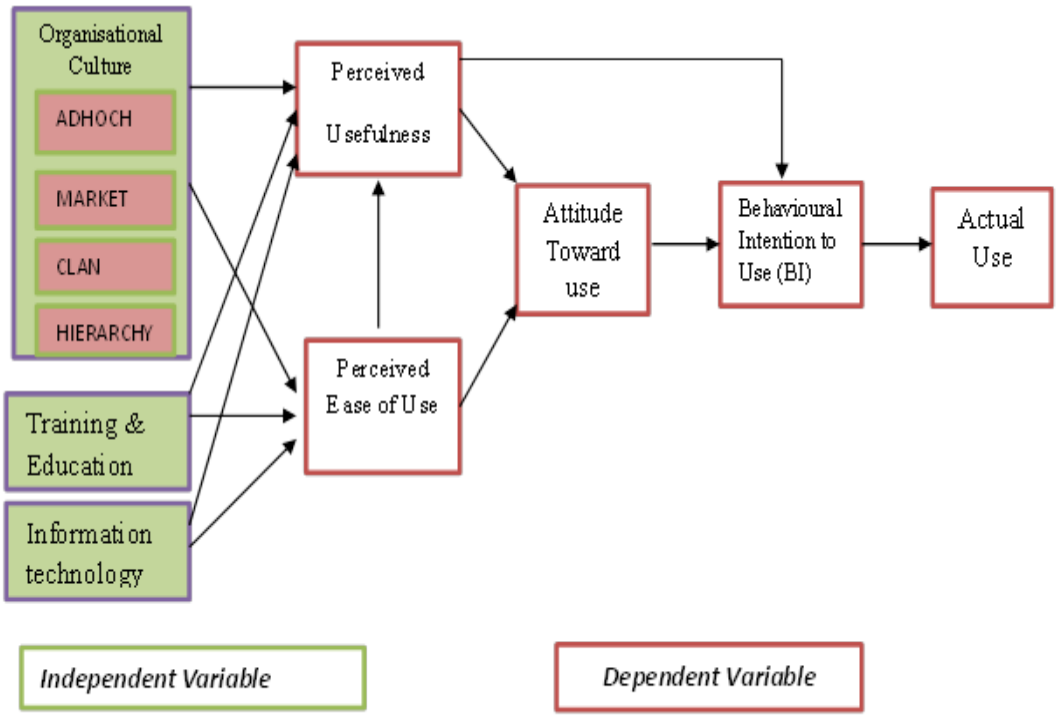

Figure 3.3 The Expanded TAM for Use in Knowledge Management System Adoption

3.7 Definitions of Independent and Dependent Variables

Based on the expanded model shown in Figure 3.3, the expanded variables are defined as follows:

- **Organisational Culture**

"Refers to the unique configuration of norms, value, beliefs, and ways of behaving and so that characterise the manner in which groups and individual combine to get things done" (Eldrige & Crombi, 1974; Bawua, 2012, p.27). Organisational culture can also be defined as the values, attitudes, beliefs and behaviours that represent an organisation's working environment, organisational objective, and vision (Hofstede,

1984). Organisational culture is generally regarded as a moderating factor in accepting and adopting IS and KM (Rashid, Sambasivan et al. 2004; Chai & Pavlou, 2004; Fey & Denison, 2003; Frotaine & Richardson, 2003). Organisational culture can have a key impact on many initiatives and projects, and may ultimately have an influence on the failures and successes of IS and KMS.

- **Training and Education**

Another important factor that needs to be considered when adopting KMS is the degree of education of employees, and their ability to deal with information technology and IS. Training is usually provided for employees, and through such training they will gain a better understanding of the concept of KM (Moffett, 2003). Training and education also provide a common language and perception about how employees can define and think about knowledge (Wong, 2005). Moreover, employees can be trained and educated in using the KM system and other techniques for managing knowledge. This ensures that they can fully utilise the potential and capabilities offered by these techniques. Horak (2001) suggested that communication, soft networking, peer learning, team building, collaboration and creative thinking are basic areas for effective KM and skills development.

- **Information Technology (IT)**

IT is a key enabler in adopting successful KM. It is considered the most effective means of capturing, storing, transforming and disseminating information (Syed-Ikhsan and Rowland, 2004). According to Mathi (2004), the IT infrastructure is one of the most important factors that enables the adoption of KMS associated with organisational culture and other factors, such as measurement and strategy. IT helps the search process and facilitates the access and retrieval of information, and can support collaboration and communication between an organisation and its employees.

- **Perceived Usefulness (PU)**

PU is defined as the degree to which a person believes that using IT would improve their job performance (Davis, 1989; 1993; Davis et al., 1989).

- **Perceived Ease of Use (PEOU)**

PEOU is the degree to which a person believes that using IT would be free of effort (Davis et al., 1992; Adams et al., 1992; Davis, 1989; 1993).

- **Attitude Toward Use (ATU)**

ATU is a function of beliefs, positively or negatively, towards behaviour (Ajzen and Fishbein, 1975; Fishbein, 1979; Davis, 1993; Davis et al., 1992; Yogesh and Dennis, 1999; Taylor and Todd, 1995).

- **Behavioural Intention to Use (BI)**

Fishbein and Ajzen (1975) defined Behavioural Intentions (BI) as the "strength of one's intention to perform a specified behaviour".

- **Actual Use (AU)**

Actual use applies to an individual's behaviour. The TRA (Fishbein and Ajzen, 1975) provides a sound foundation for understanding behaviour, based on intention, attitudes, and beliefs that lead to actual technology use (Davis, 1989; 1993; Davis, et. al., 1989).

3.8 Development of Hypotheses based on Theoretical Framework

3.8.1 Hypotheses Related to External Variables

- **H1**: There is a positive relationship between organisational culture and the perceived usefulness of KMS in the Libyan oil sector, based on the dominant culture.

- **H1**1: '**Adhocracy' Culture**

According to Cameron & Quinn (2005; 2011), the 'adhocracy' culture profile matches organisations that focus on external issues and who value flexibility and carefulness.

Rather than looking for stability and control, they value creativity and risk taking. Such organisations have an informal organisational structure.

Adhocracy culture is characterised by an active, entrepreneurial, and creative workplace. People are enthusiastic about taking risks. The relationship that keeps the organisation together is an enthusiasm to innovate, and the emphasis is on being at the leading edge of new knowledge, technology, products, willingness to change and accepting that new challenges are important for success, Hence, it is hypothesised that:

H1$_1$: There is a direct and positive relationship between the ADHOCRACY dimension and the perceived usefulness of KMS in the Libyan oil sector.

- **H1$_2$: Market Culture**

Market culture is a type of organisational culture that fits very well with organisations that focus on the market, product diversity and taking advantage of opportunities in the market environment. The organisations in this type of culture are also oriented towards the external environment instead of internal relations. They focus on making a profit, product improvement, the strength of their market position, and customer product bases are the main goals of these organisations (Cameron & Quinn, 2005; 2011) Consequently, the hypothesis is:

H1$_2$: There is a direct and positive relationship between the MARKET dimension and the perceived usefulness of KMS in the Libyan oil sector.

- **H1$_3$: Hierarchy Culture**

Hierarchy culture exists in bureaucratic organisations where the organisation is well established, and where most people are helpful to one another and work as a team. Hierarchy culture is characterised by the desire to increase, improve, and standardise existing models, techniques, products, processes, services, and technologies for task or business related use (Jordan et al., 2004). Organisations dominated by a hierarchy

culture are characterised as a very formalised and structured place to work, where procedures govern what people do. A hierarchy culture is typical in governmental and well-established organisations with many levels of structure and large numbers of employees (Cameron & Quinn, 2005; 2011)

The technological aim of this type of culture is to increase and differentiate the efficiency of a technology or manufacturing process or to lower its cost. Their large size, large number of employees, financial support, and expenditure on facilities characterise organisations in this culture. Well-organised and well-managed internal processes, good technical management, and adequate staff and capital resources are significant drivers to the success of organisations dominated by this type of culture. The hypotheses related to hierarchy culture is:

H13: There is a direct and positive relationship between the HIERARCHY dimension and the perceived usefulness of KMS in the Libyan oil sector.

- **H1**4: **Clan Culture**

Organisations dominated by clan culture are supposed to reflect a family type organisation. The characteristics of this type of organisational culture are self-directed teamwork (collectivist); rewards and encouragements are received on the basis of that teamwork, and support for employees' ideas about how to improve the work and performance of the organisation (Cameron and Quinn, 2005; 2011). Moreover, according to Cooper & Quinn (1993), KMS in IS can be highly active in this type of culture, by enhancing interpersonal communication and collaboration, as although this could work against the personnel aspects, any technology has to be user friendly. Consequently, it is hypothesised that:

- *H14: There is a direct and positive relationship between the CLAN dimension and the perceived usefulness of KMS in the Libyan oil sector.*

- **H2**: There is a positive relationship between organisational culture and the perceived ease of use of KMS in the Libyan oil sector, based on the dominant culture.
- *H21: There is a direct and positive relationship between the ADHOCRACY dimension and the perceived ease of use of KMS in the Libyan oil sector.*
- *H22: There is a direct and positive relationship between the MARKET dimension and the perceived ease of use of KMS in the Libyan oil sector.*
- *H23: There is a direct and positive relationship between the HIERARCHY dimension and the perceived ease of use of KMS in the Libyan oil sector.*
- *H24: There is a direct and positive relationship between the CLAN dimension and the perceived ease of use of KMS in the Libyan oil sector.*
- **H3:** There is a positive relationship between education and training levels achieved and the perceived usefulness of KMS in the Libyan oil sector.
- **H4:** There is a positive relationship between education and training and the perceived ease of use of KMS in the Libyan oil sector.
- **H5:** There is a positive relationship between IT infrastructure and the perceived usefulness of KMS in the Libyan oil sector.
- **H6:** There is a positive relationship between IT infrastructure and the perceived ease of use of KMS in the Libyan oil sector.

3.8.2 Hypotheses Related to Internal Variables

Evidence has proven TAM to be among the most effective models within information systems for predicting user acceptance and behaviour. The original tool for measuring these beliefs was developed and validated by Davis (1986; 1989; 1993); and Davis et al. (1989); and replicated by Adams et al. (1992); Mathieson (1991); Hendrickson, Massey, and Cronan (1993); Segars &Grover (1993); Chin, Johnson et al. 2008; Zhang, Zhao et al. 2008; and Sudarsan and Uchenna Cyril (2009). According to Davis (1989), TAM

relies upon perceived usefulness and perceived ease of use as the principal motivational variables for accepting and using new technologies. Perceived usefulness is the degree to which a person believes that the use of technology will produce better results. Usefulness indicates the ability to be used productively. Much empirical research has validated the relationship between PU and user acceptance of information technology in general (Chu and Chu 2011) and KMS in particular (Ritchie, Drew et al. 2011). Perceived ease of use refers to the perception of the degree of effort needed to use a particular system. In this study, ease is hypothesised as "freedom from difficulty or great effort" (Davis 1989; Edmunds, Thorpe et al. 2012).

- **H7:** There is a positive relationship between Perceived Usefulness and Perceived Ease of Use and attitudes towards using KMS in the Libyan oil sector.

PU has been shown to influence attitudes towards information technology adoption in causal ways; it has a direct effect on attitudes towards using systems (Sukkar & Hasan 2005). According to the TAM, PEOU influences behavioural intentions both directly and indirectly, through influences on attitude towards behaviour and perceived usefulness. These effects receive strong empirical support (Davis et al., 1989; Agarwal & Karahanna, 2000; Venkatesh, 2000; Venkatesh & Davis, 2000; Bhattacherjee, 2001; King and He, 2006; Hu, Chen et al. 2011; Edmunds, Thorpe et al. 2012).

- **H8:** There is a positive relationship between Perceived Ease of Use and Perceived Usefulness towards using KMS in the Libyan oil sector.

According to several sources (Davis, 1986, 1989; Al-Gahtani and King 1999; Venkatesh and Davis 2000; Lee, Kozar et al. 2003; McKechnie, Winkihofer et al. 2006; Chin, Johnson et al. 2008; Kim and Garrison 2009; Holden and Rada 2011; Edmunds, Thorpe et al. 2012), PEOU is related to both system usage and PU, and PEOU is directly and indirectly related to behaviour and usage through its effect on

PU. These effects have been tested and found to be significant (Davis et al., 1989; Adams et al., 1992; Liao and Wong 2008; Straub 2009). Thus, it is proposed that PEOU is related to PU and system usage. It is also proposed that PEOU will have both direct and indirect effects on usage through its impact on PU. PU and PEOU have been studied as key determinants of technology acceptance and usage (Davis, 1989; Adams et al., 1992; Venkatesh and Davis, 2000; Venkatesh and Morris, 2000; Liao and Wong 2008; Breward, 2009). Earlier research has shown that PU is an important direct determinant of technology acceptance and that there is a positive relationship between both variables (Breward , 2009).

- **H9***:* There is a positive relationship between Perceived Usefulness and Behavioural Intentions to use KMS in the Libyan oil sector.

This hypothesis will investigate cognitive beliefs (PU) and effects influencing Behavioural Intentions to continue using KMS. Research indicates that PU is a key factor and predictor of Behavioural Intentions to use KMS in the Libyan oil sector.

- **H10:** There is a positive relationship between Attitude and Behavioural Intentions towards the use of KMS in the Libyan oil sector.

This hypothesis will investigate the relationship between attitudes towards KMS in Libya, and Behavioural Intention. The literature suggests that there is a positive and significant relationship between attitude toward and behavioural intention (Davis 1993; Chau 1996; Kleijnen, Wetzels et al. 2004; Sukkar &Hasan 2005; Hossain & de Silva 2009; Sudarsan & Uchenna 2009; Edmunds et al. 2012).

- **H11:** There is a positive relationship between Behavioural Intentions and Actual Use of KMS in the Libyan oil sector.

This hypothesis will examine the relationship between the behavioural intention to use KMS in the Libyan oil sector, and the actual usage or acceptance of the new

technology. The TAM suggests that an individual's actual use of a new technology depends on their intentions (Davis et al., 1989). Such behavioural intentions fully mediate the impact of other variables on the actual use of technology. Previous studies suggest that behavioural intention explains 40-60% of the variance in actual technology use (Venkatesh & Davis, 2000). This study assumes that the factors that influence oil sector employees' intentions to use KMS also affect their actual use of this technology (Edmunds, et al. 2012).

All eleven main hypotheses stated above are summarised in Table 3.2. The first six are for the external TAM variables (outside TAM); and the last five for the TAM internal variables. The first two hypotheses also have sub-hypotheses.

Research Hypothesis
H1. There is a positive relationship between organisational culture and the perceived usefulness of KMS in the Libyan oil sector, based on the dominant culture. ***H11*** : There is a direct and positive relationship between the ADHOCRACY dimension and the perceived usefulness of KMS in the Libyan oil sector. ***H12*** : There is a direct and positive relationship between the MARKET dimension and the perceived usefulness of KMS in the Libyan oil sector. ***H13***: There is a direct and positive relationship between the HIERARCHY dimension and the perceived usefulness of KMS in the Libyan oil sector. ***H14***: There is a direct and positive relationship between the CLAN dimension and the perceived usefulness of KMS in the Libyan oil sector.
H2. There is a positive relationship between organisational culture and the perceived ease of use of KMS in the Libyan oil sector, based on the dominant culture. ***H21***: There is a direct and positive relationship between the ADHOCRACY dimension and the perceived ease of use of KMS in the Libyan oil sector. **H22**: There is a direct and positive relationship between the MARKET dimension and the perceived ease of use of KMS in the Libyan oil sector. **H23**: There is a direct and positive relationship between the HIERARCHY dimension and the perceived ease of use of KMS in the Libyan oil sector. **H24**: There is a direct and positive relationship between the CLAN dimension and the perceived ease of use of KMS in the Libyan oil sector.
H3. There is a positive relationship between education and training levels and the perceived usefulness of KMS in the Libyan oil sector**.**
H4. There is a positive relationship between education and training and the perceived ease of use of KMS in the Libyan oil sector.
H5. There is a positive relationship between IT infrastructure and the perceived usefulness of KMS in the Libyan oil sector.
H6. There is a positive relationship between IT infrastructure and the perceived ease of use of KMS in the Libyan oil sector.
H7. There is a positive relationship between Perceived Usefulness and Perceived Ease of Use vs. Attitude towards using KMS in the Libyan oil sector
H8. There is a positive relationship between Perceived Ease of Use and Perceived Usefulness towards using KMS in the Libyan oil sector.
H9. There is a positive relationship between Perceived Usefulness and Behavioural Intentions to use KMS in the Libyan oil sector.
H10. There is a positive relationship between Attitudes towards use and Behavioural Intentions.
H11. There is a positive relationship between Behavioural Intentions and Actual Use of KMS in the Libyan oil sector

Table 3.2: Summary of the Research Hypotheses

3.9 Summary

This chapter has presented a review of theoretical perspectives in IS related to how individuals accept technology, and the factors that influence such acceptance. It has also shown the advantages and disadvantages of each perspective regarding technology acceptance, including an overview of the Technology Acceptance Model (TAM), which is an adaptation of the Theory of Reasoned Action (TRA), and the Theory of Planned Behaviour (TPB), Social Cognitive Theory (SCT), and the Activity Theory. Among these theories are the Task Technology Fit Model, Institutional Theory, the Coordination Theory, and the Organisational Complexity Model.

The chapter has also presented the theoretical framework for this research, which is based on the Technology Acceptance Model. This theoretical model has been extended to build a research model combined with other selected variables, drawn from a review of the literature of knowledge management, including organisational culture, training and education, and information technology infrastructure.

4 Chapter 4: Research Methodology

4.1 Introduction

This chapter outlines the design and methodology that will be used in this research. The purpose of this study is to draw a comprehensive picture of the factors that will enable the oil companies in Libya to adopt the knowledge management systems required for dealing with new technology, in order to enhance their work and to create competitive advantage. There are several factors that influence KMS implementation, and enhance KM efforts. This research investigates the adoption of KMS in Libya, and aims to develop a framework detailing the variety of factors that are likely to be involved in its acceptance. It will describe how the research is to be carried out, including which research methodology will be adopted, and how data will be collected. It will also provide justifications for why the research will rely on a mixed methods approach, using both quantitative and qualitative methods.

4.2 Research Paradigms

One of the most important things that a researcher should decide before commencing research is the use of a definitive paradigm that will frame the study (Miles & Huberman, 1994). Determining the paradigm presents the epistemological perspective of the researcher. In order to decide this, it is useful to discuss what constitutes a paradigm, and what types of paradigm exist in IS research.

Many studies have attempted to define a paradigm. Kuhn (1970, p. 175) describes a paradigm as "a set of values and techniques which is shared by members of a scientific community, which acts as a guide or map, dictating the kinds problems scientists should address and the types of explanations that are acceptable to them". According to Patton (1990), a paradigm is a set of propositions that explain how the world is perceived, and contains a world view, a way of breaking down the complexity of the

real world, telling researchers and social scientists in general what is important, what is legitimate, and what is reasonable". In addition, Oates (2006) defines a research paradigm as a set of shared assumptions or ways of thinking about some aspect of the world.

The main benefit to the researcher of determining the research paradigm is that it allows for the identification of the relationship between variables, and the appropriate methods for conducting the research (Guba & Lincoln, 1994; Lincoln & Guba, 2000). The end of the twentieth century saw the emergence of a taxonomy of paradigms in IS research and wider social science. For instance, Lincoln and Guba (2000) and Guba and Lincoln (1994) mention five types of paradigm for social science research: positivism, realism, post-positivism, critical theory and constructivism; while Kaplan and Duchon (1988) identify two main paradigms: the positivist perspective and the interpretive perspective.

The basic principles of paradigms are methodology, epistemology and ontology. Ontology is a theory of being, and is concerned with what exists, and the form and nature of the world. It is about what kinds of things do and can exist, the condition of their existence, and the way they are related. Epistemology is a theory of knowing, or how people obtain knowledge of external reality. It is concerned with origin, nature and limits of human knowledge, and how things can be made known. Methodology concerns how the reality of an issue is investigated. These principles are usually interconnected (Guba & Lincoln, 1994). Table 4.1 shows the paradigms and criteria contained in the IS literature:

Author	Criteria	IS Research Paradigms
Burrel& Morgan (1979)	Ontology, epistemology, and methodology.	Functionalism, interpretivism, radical humanism and radical structuralism
Lee (1991); Chen&Hirschheim (2004)	Ontology, and epistemology.	Positivism, interpretivism
Fitzgerald&Howcroft (1998)	Ontology, epistemology, and truth (p.160).	Positivism, interpretivism
Monod (2003)	Epistemology I: object of knowledge, Epistemology II: origin of knowledge.	Diverse IS research paradigms and philosophical trends, e.g. functionalism, constructivism, critical realism
Weber (2004)	Diverse. Including e.g. ontology, epistemology, research object, method, theory of truth, etc.…	Positivism, interpretivism

Table 4.1: Epistemological Perspectives on IS Research: A Framework for Analysing and Systematising Epistemological Assumptions

(Adopted from Becker & Niehaves, 2009)

Saunders et al. (2009) posit research as a multi-stage process that can be done in many ways, as shown in the 'research onion' in Figure 4.1. This shows the possible ways in which the choice of research philosophy, research approach, research strategy, research choice, research time horizon, and research techniques and procedures are interrelated.

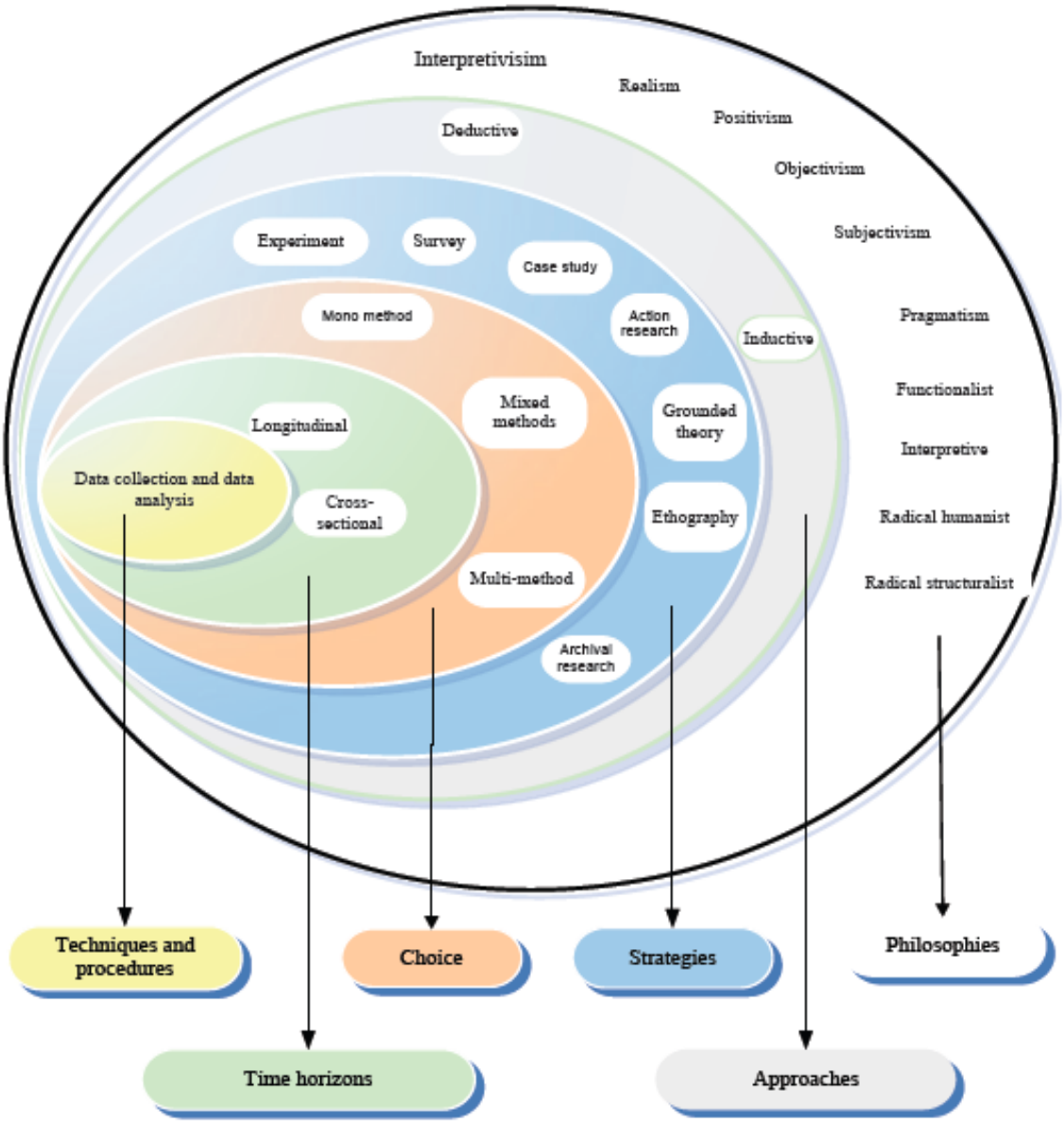

Figure 4.1 The Research Onion Resource (Saunders et al., 2009)

Figure 4.2 Research Method Framework Source (Saunders et al., 2009)

From the taxonomy of paradigms mentioned above it is possible to conclude that the paradigms are divided as follows (see Figure 4.2):

Positivism forms the basis of natural science and has influenced researchers of management as a logical system. The positivism paradigm assumes that universal laws and truths drive one reality. Researchers adopting this paradigm aim to be objective and independent. Problem solving under this paradigm begins with creating hypotheses that are subjected to empirical testing through quantitative methods (Buttery, 1991). Moreover, Orlikowski & Baroudi (1991) and (Rohde et al. 2009) state that, ontologically, positivist information systems researchers assume the existence of an objective physical and social world, that exists independently of humans, and whose nature can be relatively un-problematically apprehended, characterised and measured. Thus, organisations, for example, are understood to have a structure and reality that exists beyond the actions of their members. The role of the researcher is to discover this objective physical and social reality, by crafting precise measures that will detect and gauge those dimensions of reality that interest them.

Interpretivist studies suppose that people create and combine their own subjective and inter-subjective meanings as they interact with the world around them. Interpretive researchers thus attempt to understand phenomena through accessing the meanings that participants assign to them (Orlikowski and Baroudi, 1991; Trauth 2009).

Critical Paradigm studies aim to critique status (Orlikowski & Baroudi, 1991). Critical theory assumes a reality formulated over time by social, political, cultural, economic, ethnic, and gender forces (Mulaik & James, 1995).

Constructivism is a philosophy of learning, founded on the premise that, by reflecting on experience, we construct our own understanding of the world we live in. In another words, it assumes that the realities established by the researcher and the respondents are under investigation (Crabtree et al., 1993). As such, the researcher is required to participate in the world being investigated, to explore the research respondents' perception of reality**.**

Post-Positivism is another paradigm often present in the social sciences. It was developed to overcome the major weaknesses of the Positivist and Interpretive paradigms (Guba and Lincoln, 1994), by arguing instead that despite the existence of the real world that needs to be discovered, the world is independent of researchers and open to different perceptions (Easton, 1998). These perceptions are not reality *per se*, but are merely windows to obtaining a better picture of that particular reality. In other words, Post-Positivism emphasises the importance of multiple measures and observations, each of which may possess different types of errors. Triangulation needs to be applied across these multiple erroneous sources to obtain a clearer picture of what is happening in reality (Godfrey and Hill, 1995). Using the Post-Positivist paradigm, researchers tend to emphasise deductive logic in which research is influenced by theory or hypothesis and reflected in a predominantly formal writing

style (Onwuegbuzie, 2002), as utilised in this research. This paradigm also emphasises the objectivity of the researcher by triangulating across multiple imperfect perspectives, while acknowledging the probability of bias (Guba and Lincoln, 1994).

Pragmatism

This research has adopted the pragmatism paradigm, using a mixed methods approach. This paradigm is widely accepted in the social sciences (Tashakori and Teddlie, 1998; 2003; 2009; Macy, 2003; Johnson and Onwuegbuzie, 2004; Biesta 2010; Morrison 2012).

The purpose of this paradigm comes from the pragmatism philosophical movement, begun during the latter decades of the 19th century by the American philosopher Charles Sanders Pierce (1839-1914); and adopted by William James (1842-1910), Johan Dewey (1859-1952); and George Herbert Mead (1863-1913).

Pragmatism supports the use of both qualitative and quantitative research methods in a single study and within multiple stages of research. It rejects the incompatibility thesis. Pragmatism considers the research questions to be more important than either the methods being used or the paradigm that underlies the method (see Figure 4.3), and specific decisions regarding the use of mixed methods or qualitative or quantitative methods rely heavily on the research questions and the research stage. Pragmatism presents a very practical and applied research philosophy, tending to eschew the use of the metaphysical concepts of instance (truth, reality) that indulge in much endless (and, arguably, useless) discussion and debate. Pragmatism also rejects the forced choice between post-positivism and constructivism based on logic, epistemology, and other paradigm components. In each case, pragmatism rejects the incompatibility thesis, and instead embraces features associated with both points of view (post-positivism/positivism, constructivism).

Pragmatist scholars recognise that they can choose to use both inductive and deductive logic to address their research questions (see Table 4.2).

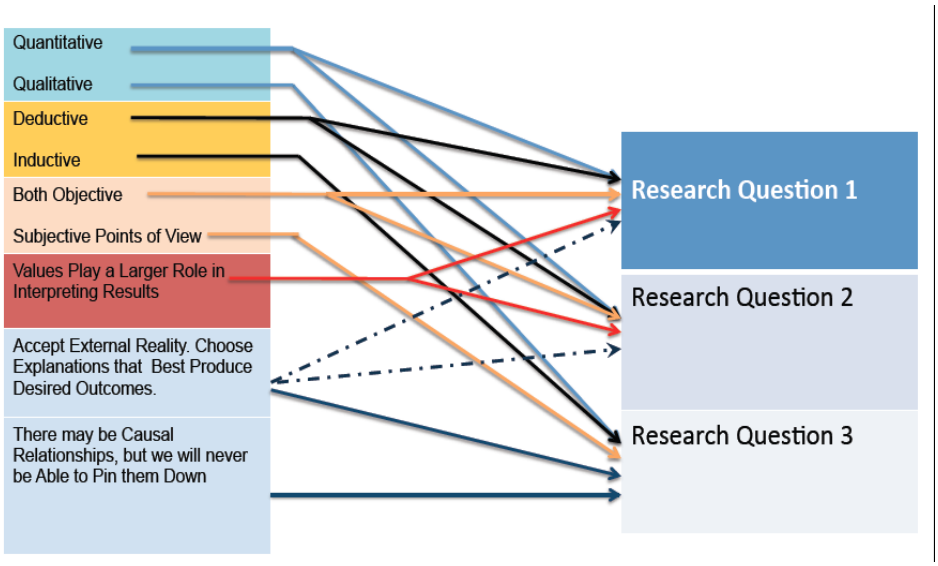

Figure 4.4.3 Relationship Between the Research Paradigm (Pragmatism) and the Research Questions

Paradigm	Positivism	Post-positivism	Pragmatism	Constructivism
Methods	Quantitative	Primarily quantitative	Quantitative and qualitative	Qualitative
Logic	Deductive	Primarily deductive	Deductive and inductive	Inductive
Epistemology	Objective point of view, knower and known are dualism	Modified dualism. Findings probably objectively 'true'	Both objective and subjective points of view	Subjective point of view, knower and known are inseparable
Axiology	Inquiry is value free	Inquiry involves values, but it may be controlled	Values play a larger role in interpreting results	Inquiry is value bound
Ontology	Naive realism	Critical or transcendental realism	Accept external reality. Choose explanations that best produce desired outcomes.	Relativism
Causal Linkages	Real causes temporally precedent to or simultaneous with effects	There are some reasonable stable, lawful relationships among social phenomena. These may be known imperfectly. Causes are identifiable in a probabilistic sense that changes over time	There may be causal relationships, but we will never be able to pin them down.	All entities simultaneously shaping each other. It is impossible to distinguish causes from effects

Table 4.2 Overview of Research Paradigms (Teddlie & Tashakkori, 2009)

4.3 Research Approaches

4.3.1 Qualitative Research

Qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena. Examples of qualitative methods are action research, case study research and ethnography. Qualitative data sources include observation and participant observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher's impressions and reactions (Myers & Avison, 2002). Qualitative research is advantageous when little is known about a phenomenon. It can also be effective when the investigator suspects that present knowledge or theories may be biased, or when the research question pertains to understanding or describing a particular phenomenon or event about which little is known. This research approach is holistic. Understanding, explaining, and developing theory is inductive through documenting, describing and identifying relationships between concepts. This enables the creation of theoretical explanations that explain reality, and which lead to theory development using rich description, data synthesis, and abstraction (Morse, 1995; Morse and Field 1995; Creswell 2012). Qualitative research may be divided into the four methods outlined below.

4.3.1.1 Action Research

Action research aims to solve current practical problems while expanding scientific knowledge. Unlike other research methods, where the researcher seeks to study organisational phenomena but not to change them, this method enables researchers to participate inside an organisation in order to understand and resolve the problems that may occur, and which typically takes a long time to explore and improve.

There are various definitions of action research. One of the most widely cited is that of Myers (2009); this suggests that action research aims to contribute both to the practical

concerns of people in an immediate situation, and to the wider goals of social science by joint collaboration within a mutually acceptable ethical framework.

Avison et al. (1999) listed four types of action research: action research that concentrates on change and reflection; a second type, which occurs when "action science attempts to solve the disagreement of" espoused and applied theories; participatory action research, which emphasises participant collaboration; and action learning, which is used for programmed instruction and experiential learning.

Action research can be related to three main paradigms of research: it can be positivist or interpretive or it can take critical forms (Myers, 2009). There are a number of advantages and disadvantages to using action research. One of the main advantages is that it helps to guarantee that business research will be practically relevant, as it does not focus on theoretical issues, preferring instead to tackle actual problems. Action research involves people in the field, thereby touching on practical procedures inside organisations.

One of the main disadvantages of the action research approach is that it is potentially very difficult to combine action and research, as it is difficult to conduct research to solve practical business problems during working hours, or to produce validated research-based articles that are publishable in academic journals, meaning that most action research articles tend to appear in more practitioner-oriented publications. In addition, action research tends to overemphasise the importance of intervention in organisations and the value of its contributions to academic research (Oates, 2006).

4.3.1.2 Case Study Research

Case study research is the most common qualitative method used in information systems (Orlikowski and Baroudi, 1991). It can be positivist, interpretive or critical, according to the philosophical assumption of the author. For example, the positivist

view assumes that theories can be measurably tested, whereas from an interpretive viewpoint, the emphasis is on social constructs and the understanding of phenomena. The critical position tends to reflect social critique, focusing on opposition, conflicts and contradictions in society. Consequently, this research methodology embraces qualitative and quantitative approaches using a case study, as advocated by Walsham (1993). Oates (2006) states that the case study is designed to investigate or study all aspects of a single chosen phenomenon by applying various tools of data collection.

The case study approach mainly relies on interviews and documents to collect data.

4.3.1.3 Ethnography

Ethnographic research is one of the most in-depth research methods possible, as the researcher is present for a reasonable amount of time and sees what people are doing, as well as what they say they are doing. Ethnography is well suited to providing researchers with rich insights into the human, social and organisational aspects of business organisations. Ethnographic study provides a researcher with the opportunity to get close to 'where the action is' (Myers 1999).

Creswell (2009) defined the ethnographic approach as "a qualitative strategy in which the researcher studies an intact cultural group in a natural setting over a long period of time by collecting primary observational and interview data". Oates (2006) defined it as a narrative of "people and culture". A researcher undertaking this type of research will be doing observations and writing detailed notes of what can be described as "culture and people" (Oates, 2006). Thus, researchers will arguably be able to describe and provide useful results related to the culture and, perhaps, human behaviour which can be related back to their analysis of various sources from literature reviews, while their observations in the research field can be recorded through extensive notes (Tedlock, 2000).

According to Myers (2009) and Oates (2006), ethnographic research has both advantages and disadvantages. The most valuable aspect is its in-depth approach, derived from the extensive period of research. Researchers tend to spend a long time in the field in order to observe and record their interpretations as they participate in the social and cultural setting. This enables the field researcher to develop an intimate familiarity with the dilemmas, frustrations, routines, relationships and risks that are part of everyday life. Natural settings research usually takes place where there is personal interaction between the researchers (observers) and the participants of the research study. Oates (2006) argues that this kind of research cannot be taken into a scientific laboratory.

Researchers using qualitative research instruments can accomplish the research assignment by employing some or all of the qualitative data collection strategies such as observations, interviews, and documents.

Social Representation researchers are able to describe people and their culture in an extensive way in order to understand the context deeply, while researchers adopting a holistic descriptive approach attempt to provide the reader with a holistic presentation of people and their culture.

The main disadvantages of the ethnographic research approach are that it can take up a long period of time, both in the field and in analysis and writing up, when compared to other approaches.

The ethnographic research approach also has little coverage. Unlike a survey, the researcher usually studies just one organisation and consequently one culture, meaning that it is impossible to develop a more general model from just one ethnographic study. It can also be very difficult to write up the research for publication in a peer-reviewed journal.

4.3.1.4 Grounded Theory

Grounded theory is defined as qualitative research, i.e. as a method that seeks to develop theory that is grounded in data systemically gathered and analysed. Creswell (2009, p.28) defined it as "a strategy of inquiry in which the researcher derives a general, abstract theory of a process action, or interaction grounded in the views of participants". Grounded theory is inductive in nature, and the main difference between grounded theory and other qualitative research methods lies in its specific approach to theory development, as grounded theory suggests that there should be a continuous interplay between data collection and analysis (Myers, 2009).

To perform grounded theory research, the researcher starts by specifying the research question and designs the preliminary theoretical framework, then identifies the empirical research site in terms of what type of data collection will take place during the field study. After that, data is collected and transcribed. The first stage of qualitative data analysis in grounded theory is open coding, which involves text analysis. After the open coding stage, the researcher begins to interpret categories and properties. The third stage is theoretical coding, which is involved in the formulation of a theory to enable the creation of inferential and predictive statements, usually in the form of hypotheses about a phenomenon (Urquhart et al., 2010). It is crucial to follow the grounded theory processes carefully, while at the same time trying to foster individual critical and creative interpretations (Myers, 2009).

4.3.2 Quantitative Research

"Quantitative research methods were originally developed in the natural sciences to study natural phenomena" Myers (2009, p.8).

Quantitative research is used mainly to test a theory using individual hypotheses. These hypotheses are attempts to establish relationships between variables and

concepts. The primary data collection methods include survey tools such as questionnaires and structured interviews, which are quantifiable. Data analysis using these method types, is undertaken by using statistical tool packages and expressions of the hypotheses is given in tables and charts, by linking them together (Neumann, 2002; Creswell, 2003). Data collection is performed using surveys and interviews.

4.3.2.1 Surveys

According to Fink (1995), a survey is a system of collecting information that can be used to describe, compare or explain knowledge, attitudes and behaviour. It is a way of collecting information about the characteristics, attitudes, actions or opinions of a large sample of people, cluster, organisation, or other units referred to as a population. Creswell (2009) states that the survey is intended to produce a measurable and quantifiable set of results or opinions of a population by studying a sample of that population. According to Mingers (2003), surveys are the most recognised research instrument in the area of information systems, especially within American journals, although they are not the only research instrument available to researchers: "Although questionnaires and surveys may be used as the only data collection methods, it is usually better to link them with other methods in a multiple-methods research design" (Saunders, 2009, p.362).

In this study the survey will be one of the main data collection tools used to meet the requirements of mixed-methods research.

4.3.2.2 Structured Interviews

When using structured interviews, the researcher will design the interview using standard questions based upon the research requirements as defined in the research questions. The same techniques are also required for in-depth and semi-structured interviews.

4.3.3 Justifications for the Research Methodology

4.3.3.1 The Rationale for Adopting the Pragmatism Paradigm

The chosen philosophy for this research is drawn from the various epistemological paradigms outlined in the first section of this chapter. It relies on the research questions, theoretical framework and research objectives outlined in section 1.5, with regard to the relationship between the theoretical framework, research methods and the research questions. As a consequence, the pragmatism paradigm has been chosen as the philosophical base for this research.

The pragmatism paradigm is widely accepted in social sciences (e.g. Tashakori and Teddlie, 1998; 2003; 2009; Maxcy, 2003; Johnson and Onwuegbuzie, 2004). Pragmatism is also deemed suitable for this study, because it supports the use of both qualitative and quantitative research methods in a single study and within multiple stages of research (Maxcy, 2003). According to Pansiri (2005), in terms of the mode of inquiry, pragmatism embraces the two extremes normally adopted by positivism and post-positivism, and those supported by interpretivists. The former emphasises quantitative methods as opposed to the interpretivists' qualitative approaches. Unsurprisingly, therefore, pragmatism has been hailed as the foundation of mixed-methods research. It also considers the research questions to be more important than either the methods being used or the paradigm that underlies the method. Moreover, pragmatist scholars explicitly recognise that they can choose to use both inductive and deductive logic to address their research questions (Tashakori and Teddlie, 2009).

4.3.3.2 The Rationale Behind Mixed-Methods Research

To understand the general nature of mixed-methods research it is necessary to go beyond the definition to explain the benefits that can be gained from using it.

The examination of problems using diverse paradigms and research methods establishes a firm foundation of knowledge. Research using the same assumptions and research methods can be easily challenged; however, a research problem that is examined via multiple perspectives and approaches can better withstand robust scrutiny. Thus, in this case, in order to achieve a better understanding of the effect of IS on organisations, the best approach is to adopt mixed-methods research, in which both quantitative and qualitative methods are used (Petter & Gallivan, 2004). "A mixed-methods approach can guide [the researcher] to new insights and modes of analysis, which are unlikely to occur if one method is used alone" (Kaplan & Duchon, 1988). Moreover, divergent results drawn from each method allow the researcher to develop more complex, and potentially novel, explanations of a phenomenon (Jick, 1979). In addition, mixed-methods research provides greater evidence for resolving a research problem than either quantitative or qualitative research alone, as researchers are able to use all of the tools of data collection available rather than being restricted to the types of data collection usually related to either quantitative or qualitative research (Creswell and Clark, 2011).

According to Erzberger and Prein (1997), using a mixed-methods approach will lead to one of three outcomes:

1. Results from quantitative and qualitative research are capable of converging; in this case results lead to the same conclusions.

2. Qualitative and quantitative results may relate to different objects or phenomena but may be complementary and can thus be used to supplement each other (Tashakkori, 2003).

3. Results from quantitative and qualitative research can be divergent or contradictory.

In light of these three possible outcomes, writers from around the world have developed procedures for mixing strategy methods in their studies (Creswell, 2009).

For the purpose of studying the behavioural aspects of and attitudes towards the adoption of new technologies in the Libyan oil sector, several types of data had to be obtained, in order to build a comprehensive picture. A multi-methods approach to evaluation can increase both the validity and reliability of evaluation data, and may also lead to the modification or expansion of the evaluation design and/or data collection methods (Patton, 1990). Given the exploratory nature of this research, the researcher chose multiple ways of collecting data in order to increase the coherence and rigour of the research.

A large-scale questionnaire survey was used, with sample respondents from oil-sector employees. The survey method was designed to provide comprehensive converging insights into the phenomenon. Meanwhile, a semi-structured interview method was used with IT managers in the oil sector, using qualitative research methods which were intended to explore the same issues in greater depth, to confirm the survey results. The structure of the research triangulation is illustrated in Figure 4.4

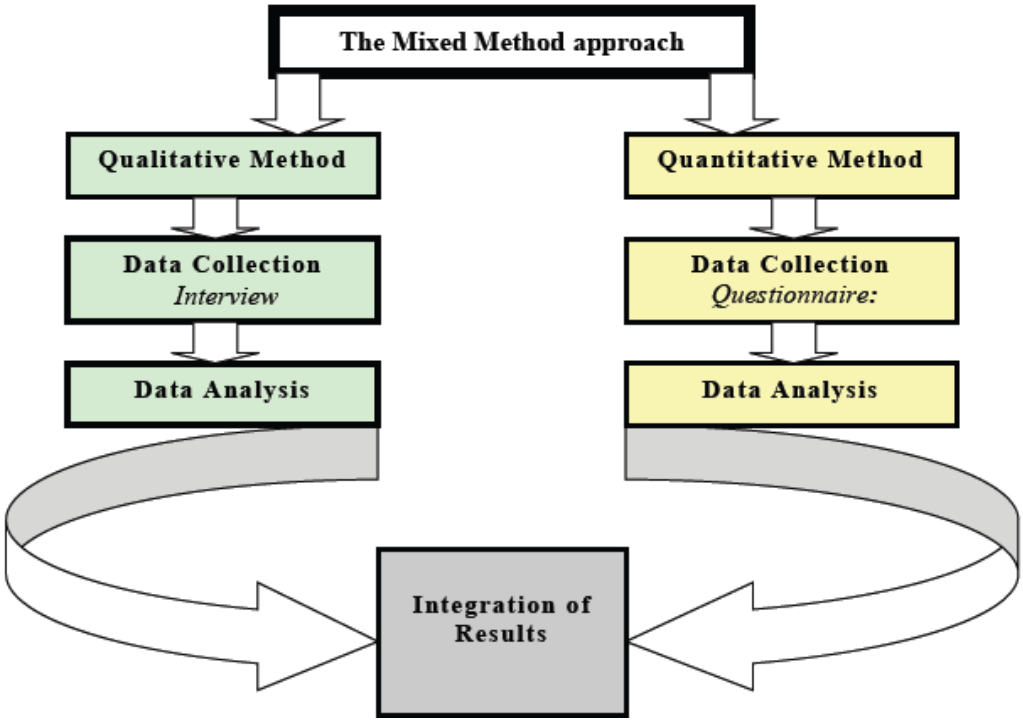

Figure 4.4 The Structure of the Mixed-Methods Research

4.4 Mixed-Methods Research

Since a mixed methods approach has been adopted for this study, it is helpful to further define it. The expressions mixed-method, multi-method, and triangulation all refer to one particular approach in the research community: to use more than one method when studying certain phenomena. The simplest definition of mixed-methods research (also known as multi-method research), is that it employs more than one research method in a study – which may include two quantitative methods or two qualitative methods (Mingers, 2001). Mixed-methods research has also been defined as an approach to the study of phenomena by using multiple data collection techniques to generate multiple datasets (Sawyer, 2000; 2001). Tashakkori and Teddlie (1998) defined mixed-methods research as the combination of qualitative and quantitative approaches in the methodology of a study. Moreover, Jonson, Onwuegbuzie and Turner (2007, p.123) concluded their detailed discussion of mixed-methods research with the composite

definition: “mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration”. Alternatively, mixed-methods research can be defined as “research in which the investigator collects and analyses data, integrates the findings and draws inferences, using both qualitative and quantitative approaches or methods in a single study or a program of inquiry” (Tashakkori & Creswell, 2007, p.4).

In conclusion, this discussion highlights that mixed-methods research collects and analyses persuasively and rigorously both qualitative and quantitative data (based on the research questions). See Figure 4.5. It integrates the two forms of data concurrently by combining them sequentially by having one build on the other or embedding one within the other. It gives priority to one or both forms of data (in terms of what the research emphasises); and it uses these procedures in a single study or in multiple phases of a programme of study, whilst framing these procedures within philosophical worldviews and theoretical lenses.

Mixed-methods research also combines procedures into specific research designs that direct the plan for conducting the study (Stake, 1995).

As Creswell and Plano (2011) state, these characteristics provide a comprehensive picture of the broad scope of mixed-methods research.

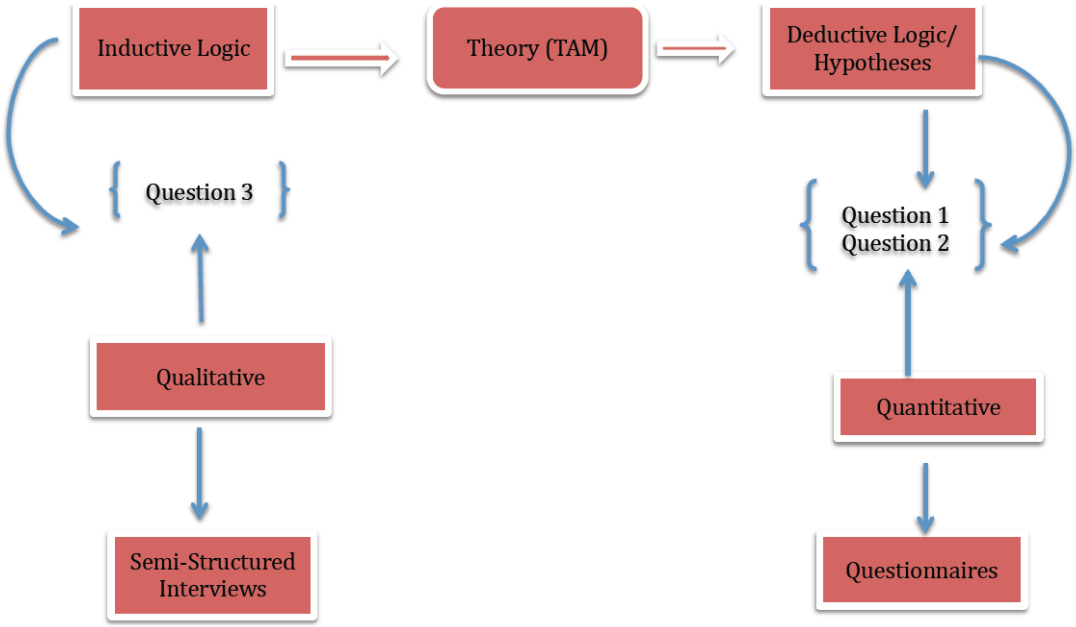

Figure 4.5 Relationship between the Research Questions and Mixed Methods Research

4.4.1 Strategies Within A Mixed-Methods Approach

There are six major strategies of inquiry to choose from when designing a research proposal. A proposal should contain a description of the strategy, along with a visual model of it, as well as providing the basic procedures that the investigator will use when implementing the strategy (Creswell, 2009). The six strategies are:

1. **The Convergent Design**

The convergent design (also referred to as the convergent parallel design) occurs when the researcher uses concurrent timing to implement the quantitative and qualitative research strands during the same phase of the research process; prioritises the methods equally; and keeps the strands independent during analysis before amalgamating the results during the overall interpretation, as shown at Figure 4.6.

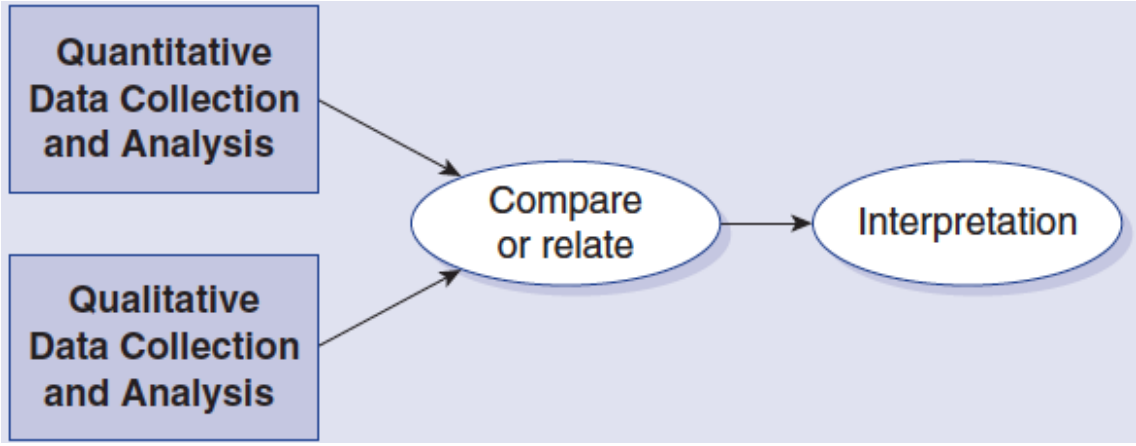

Figure 4.6 Convergent Designs (Adopted from Creswell & Plano, 2010)

2. Sequential Explanatory Strategy

A sequential explanatory design is usually used to explain and interpret quantitative results by collecting and analysing follow-up qualitative data. It can be especially useful when unexpected results arise from a quantitative study (Morse, 1991). In this case, the qualitative data collection that follows can be used to examine results in more detail. This strategy may or may not have a specific theoretical perspective. The direct nature of this design is one of its main strengths. It is easy to implement because the steps fall into clear, separate stages. In addition, this design feature makes it easy to describe and to report. The main weakness of this design is the length of time involved in data collection, given the two separate phases. This is especially problematic if the two phases are given equal priority.

The sequential explanatory strategy is a popular strategy for mixed methods design, and often appeals to researchers with strong quantitative leanings. It is characterised by the collection and analysis of quantitative data in a first phase of research, followed by the collection and analysis of qualitative data in a second phase that builds on the results of the initial quantitative results. Weight is typically given to the quantitative data, and the mixing of the data occurs when the initial quantitative results inform the

secondary qualitative data collection. Thus, the two forms of data are separate but connected. An explicit theory may or may not inform the overall procedure. The stages of this strategy are shown in Figure 4.7.

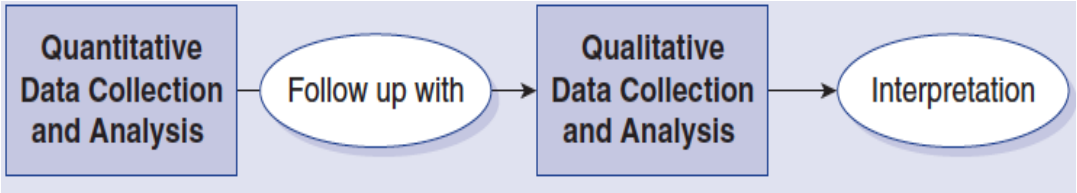

Figure 4.7: The Explanatory Sequential Design (Adopted from Creswell & Plano, 2010)

3. Sequential Exploratory Strategy

The sequential exploratory strategy involves a first phase of qualitative data collection and analysis, followed by a second phase of quantitative data collection and analysis, which builds upon the results of the first qualitative phase. Weight is generally placed on the first phase, and the data are mixed through being connected between the qualitative data analysis and the quantitative data collection. The design may or may not be implemented within an explicit theoretical perspective (Figure 4.8).

At the most basic level, the purpose of this strategy is to use quantitative data and results to assist in the interpretation of qualitative findings. Unlike the sequential explanatory approach, which is better suited to explaining and interpreting relationships, the primary focus of this model is to initially explore a phenomenon. Morgan (1998) suggested that this design is appropriate to use when testing elements of an emergent theory resulting from the qualitative phase, and that it can also be used to generalise qualitative findings to different samples. Similarly, Morse (1991) cited one purpose for selecting this approach: to determine the distribution of a phenomenon within a chosen population. Eventually, the sequential exploratory strategy is often

discussed as the procedure of choice, especially if a researcher needs to develop an instrument, because existing research instruments are inadequate or are unavailable. Using a three-phase approach, the researcher first gathers qualitative data and analyses it (Phase 1); and uses the analysis to develop an instrument (Phase 2); this is subsequently administered to a sample of a population (Phase 3) (Creswell & Plano, 2007). The sequential exploratory strategy has many advantages. Its two-phase approach (qualitative research followed by quantitative research) makes it easy to implement and straightforward to describe and report. It is useful to a researcher who wishes to explore a phenomenon but who also wants to increase their qualitative findings. This model is especially advantageous when a researcher is building a new instrument. In addition, this model could make a largely qualitative study more palatable to a research community well versed in quantitative research, but who may be unfamiliar with qualitative approaches. As with the sequential explanatory approach, the sequential exploratory model requires a substantial length of time to complete both data collection phases, which can be a weakness in some research situations. In addition, the researcher must make some key decisions about which findings from the initial qualitative phase will be focused on in the subsequent quantitative phase (e.g. one theme, comparisons among groups, multiple themes).

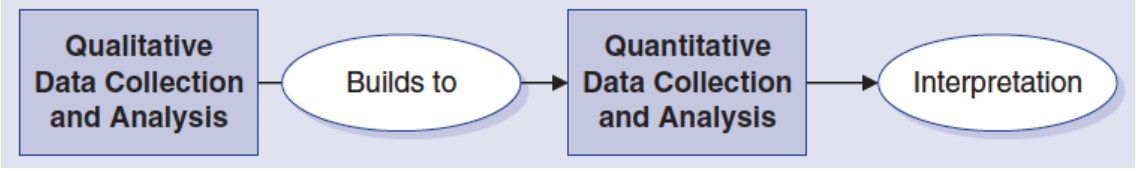

Figure 4.8 The Exploratory Sequential Design (Adopted from Creswell & Plano,2010)

4.4.2 Data Collection Methods

There are various means that can be used to collect research data. Yin (2009) suggested that these could be questionnaires, interviews, direct observations, participation, documentation, and audio and video records. None of these methods is perfect or has an overriding advantage over the others. The choice may depend on the research philosophy, the research approach (qualitative, quantitative or mixed methods), and research strategy (experiment, survey, case study), the research questions and the aims and objectives of the research.

Using more than one method to study the same phenomenon can strengthen the validity of the results. This approach is most often mentioned as the main advantage of the mixed-methods approach, as it uses improved instruments for all data collection approaches, and provides an incremental understanding of findings (Creswell & Clark 2010). A typical design might commence with a qualitative segment, such as an interview, which will alert the researcher to issues that should be explored in a survey of participants; followed by the survey; which in turn is followed by semi-structured interviews to clarify the survey findings.

In this research, it is expected that when investigating human behaviour and attitudes, the maximum benefit can be gained by using a variety of data collection methods, and different sources and methods at various points in the evaluation process. The evaluation can build on the strength of each type of data collection and minimise the weaknesses of any single approach. A mixed-methods approach to evaluation can increase both the validity and reliability of evaluation data, and may also lead evaluators to revise or expand the evaluation design and/or the data collection methods (Patton, 1990). One of the main advantages of mixed-methods research (Teddlie, Tashakori and Creswell, 2009; Creswell and Plano, 2010) is that it provides the research results with greater validity by improving the instruments of all the data

collection approaches and consequently increases understanding of the findings.

4.4.2.1 The Survey

4.4.2.1.1 Rationale for Conducting the Survey

According to Fink (1995; 2003, p.22), a survey is "a system for collecting information to describe, compare, or explain knowledge, attitudes, and behaviour". It provides a way of collecting information about the characteristics, attitudes, actions, or opinions of a large sample of people in a cluster or organisation, or any other similar unit that may be referred to as a population. "Although questionnaires, as the main tool for a survey, may be used as the only data collection method, it is usually better to link them with other methods in a multiple-methods research design" (Saunders, 2009, p.362). As this study relies on a mixed-methods approach, the survey will be used as one of the main data collection tools.

Meeting the study's requirements and objectives, in order to determine the factors (organisational culture, IT infrastructure and training and education) that have an influence on KMS and their adoption in the Libyan oil sector, can be achieved by surveying the acceptance of this advanced technology by employees within the sector.

4.4.2.2 The Interview

4.4.2.2.1 The Rationale for Using Semi-Structured Interviews

The interview has been designed in order to elicit data that will serve the purposes of mixed-methods research, and clarify the results obtained from the survey, thus helping to triangulate results. According to Hancock et al. (2009), the semi-structured interview is simple to organise, and it allows the researcher to change the order of questions to gain more understanding of an interviewee's statements. In addition, the

researcher may reorder the questions to gain more in-depth information from the interviewee (Oates, 2006).

4.4.2.3 The Documents

Documents provide another means of obtaining data to meet the research objectives. The researcher relies on many types of documents as secondary data, in addition to the primary data sources of surveys and interviews. Saunders et al. (2007) suggest that data introduced by governments and firms could be more important than other sources of data in order of quality, and that they play a key role in evaluating the generalisability of findings to determine if they are in accordance with the context. The documents consulted for this study include the 2009 Oil Sector Annual Report (regarding information technology developments), and the Libya Statistics Book, which was issued by the General Information Authority (GIA, 2008).

4.5 Summary

This chapter has presented the research methodology of this thesis, starting with providing a discussion of research paradigm types and the paradigm adopted by this particular study. It described 'pragmatism' as a research paradigm in the context of mixed-methods research, and research frameworks. The chapter continued with a review of research methodologies and their types, covering qualitative research, including case study, grounded theory, and action research; and quantitative research, including the survey and structured interview. It also provided a wide review of the mixed-methods approach as a research study method, with justifications for its use in this study. Finally, the structure of mixed-methods research and data collection methods were outlined.

5 Chapter 5: Fieldwork and Data Analysis

5.1 Types of Analysis

This chapter presents the results of the data collection and analysis, which both used a mixed-methods approach. Descriptive statistics were used for the quantitative analysis of the responses to the survey. Qualitative data was obtained through the use of semi-structured interviews. Both the quantitative and qualitative research were used to obtain an understanding of KMS adoption by individuals and companies in the Libyan oil sector. A concurrent triangulation research approach was used to confirm findings. See Table 5.1.

Stage 1: Quantitative Analysis	**Purpose**
Multiple Linear Regression	Predicting the relationship between external and internal factors
Simple Linear Regression	Predicting the relationship between the internal factors of the Model
One way ANOVA	Compare the differences between two groups: those using KMS and those not using KMS
Stage 2: Qualitative Analysis	
Qualitative data analysis model (Miles and Huberman, 1994)	Drawing conclusions about the real situation of KMS adoption in the oil sector

Table 5.1: Types of Data Analysis

5.2 The Field Work Environment

This fieldwork of research was conducted in the Libyan oil sector in the period between April 2008 and April 2009. The National Oil Corporation (NOC) is responsible for running this sector, along with smaller subsidiary companies, which when combined, account for around half the country's oil output. As explained in Chapter 2, the NOC was established in 1970, to manage oil sector operations. It was

later reorganised under Decision No. 10/1979 by the General Secretariat of the General People's Congress, with the intention of actualising the objectives of the development plan in the areas of petroleum; supporting the national economy through increasing, developing and exploiting the oil reserves; and operating and investing in those reserves, to realise optimum returns.

When carrying out its activities, the NOC may enter into participation agreements with other companies and corporations conducting similar activities. Thus, the NOC carries out exploration and production operations through its own affiliated companies, or in participation with other companies under service contracts, or other kinds of petroleum investment agreements. This is undertaken in addition to the marketing operations of oil and gas, both locally and abroad. The NOC has its own fully owned companies, which carry out exploration, development and production operations. It also has participation agreements with a number of specialised international companies. Such agreements have developed into exploration and production sharing agreements, in accordance with the development of the international oil and gas industry, and international petroleum marketing.

The NOC owns refineries and oil and gas processing companies; operating refineries include the Zawia and Ras Lanuf refineries, ammonia, urea and methanol plants, the Ras Lanuf petrochemical complex and the gas processing plant. To establish petrochemical industries, another stage of the development of the ethylene plant has been completed, as well as low- and high-density linear polyethylene plants (Oil Sector Annual Report, 2012).

The NOC also owns national service companies, which carry out oil well drilling and operations, providing all drilling materials and equipment; they install and maintain oil and gas pipelines, build and maintain oil and gas storage tanks, and carry out related

technical and economic studies. They also provide the sector with other services, such as catering, procurement of materials and equipment, and the employment and training of foreign employees.

Also affiliated to the NOC is a petroleum research centre that carries out technical research related to the oil industry, conducts technical analysis and tests for the different stages of exploration and production of oil and petroleum products, performs quality control tests, and issues certificates in this respect. It also evaluates patents and licences of exploitation and the fees and forms related to oil operations and petroleum products. It publishes the studies carried out by the research centre, as well as other local and international scientific publications.

In the area of manpower development, the NOC provides the oil industry with qualified individuals within a well-planned scheme, founded through educational and training institutions that are dedicated to producing qualified personnel in such areas as engineering, accounting and administration.

Training outside Libya is limited to those technical specialisations that are not available locally, in order to meet the demands of the rapid development of the industry. Technical training takes place at the training centres and institutions belonging to the NOC, in order to produce specialised technicians for the operation and maintenance of industrial facilities and plants.

The fieldwork in this study was conducted in the IT Departments of seven NOC-owned companies, which are considered to be part of the public oil sector. These companies were:

- NOC Headquarters in Tripoli.
- Sirte Oil Company for the Production and Processing of Oil and Gas, based in Marsa El-Barega City.

- Arabian Gulf Oil Company located in Benghazi City.
- Ras Lanuf Oil and Gas Processing Company, based in Ras Lanuf City
- Jowfe Oil Technology in Benghazi City.
- Waha Oil Company in Tripoli.
- Zueitina Oil Company in Tripoli.

Figure 5.1 shows the distribution of oil companies and oil wells in Libya.

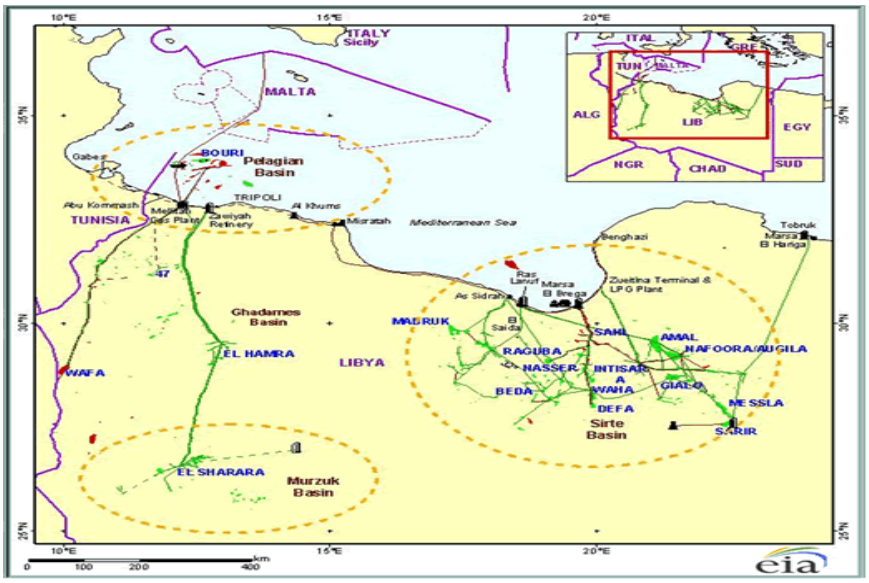

Figure 5.5.1: The Distributions of Oil Companies and Oil Wells in Libya (US Energy Information Administration (EIA))

5.3 The Survey

5.3.1 Survey Design and Organisation

The survey was conducted online by e-mailing the link to participants. It was designed using the survey gizmo website (http://www.surveygizmo.com/). In addition, the postal service and hand delivery were used in some institutions or departments. The most practical ways for survey researchers to collect data for analysis are by using self-administered questionnaires and interviews either in person or over the telephone. Researchers use both methods, depending on the objectives of the research. There are

important differences between using self-administered questionnaires and interviews, with advantages and disadvantages associated with each method.

Self-administered questionnaires are one of the most frequently used methods of collecting data in research studies (Babbie, 1998). With self-administered questionnaires, participants are given the questionnaire and asked to complete them in their own time, returning them by mail, e-mail, or to the researcher.

In this study, a survey instrument was developed, based on tools adopted from the literature on information systems and organisational culture. After the first section that collected demographic information, the second section addressed organisational culture, based on the Organisational Culture Assessment Instrument (OCAI) developed by Cameron and Quinn (1990; 2005). The OCAI section of the survey contained six questions rating organisational culture. Each question had four possible answers, and the participants were asked to divide 100 points proportionately among the four alternatives, depending on the degree to which each alternative most closely represented their organisation. They gave a higher number of points to the alternative that most suited their organisation, and the least number of points to the dimension that they thought least fitted their organisational culture. The OCAI has been validated and used in studies of thousands of organisations across North America and the rest of the world (Cameron and Quinn, 1990). The section related to this instrument in the questionnaire is contained in statements C1-C6 (see Appendix A).

The third section is related to KMS acceptance, drawing on the Technology Acceptance Model (TAM) (Davies 1989; 1993), as outlined in Chapter 3. 16 statements were devised to assess KMS acceptance: six to measure perceived usefulness, six to assess perceived ease of use, and four to assess the intention towards use and actual use. The respondents were asked to rate and respond to each statement

by choosing a number from the provided Likert scaling format. The scale ranged from Strongly Agree (coded 1) to Strongly Disagree (coded 5), numbered in the questionnaire as D1-D16 (Appendix A).

5.3.2 Population and Sample

The population for a research study is the group about whom the researcher wishes to draw conclusions. A representative group is targeted, as it is often not possible to study the whole population of interest. A sample is selected from among the population that can be collected and studied (Babbie, 2006). For the purposes of this study, the researcher selected a random sample drawn from the population of employees in IT departments, and the heads of managerial departments across the Libyan oil sector. The sample was not selected from volunteers, but was organised so that each employee in each oil sector could be randomly selected, in order to ensure that the results are more reliable and thus more representative of the population. There are rational justifications for choosing this type of sample. First, the employees in IT departments are more familiar with IT in the sector, enabling them to give a reasonable account of the usage and acceptance of IT in the oil sector. The second justification is that the managers of different departments, as decision makers, can provide useful information about the usage and acceptance of KMS across the oil sector. The sample described above was examined using survey instruments adopted from the literature review about organisational culture, and the TAM.

5.3.3 Survey Results

5.3.3.1 Overview

The collected data was analysed using the SPSS software package. The sample comprised 125 employees, all of whom were randomly selected. All participants were

aged 18 years and over. Of the 125 questionnaires that were distributed, 115 were returned – a response rate of 92%. All returned questionnaires were analysed.

5.3.3.2 Reliability Analysis

Reliability refers to how consistently a method measures the concepts it is designed to measure, enabling other researchers to repeat the study and obtain the same results (Sekaran, 2000). To measure reliability, Cronbach Alpha was used to determine the internal constancy of the research variables. The research methods examined in the literature review suggest that the acceptable level of Cronbach Alpha should be more than 0.7 (Pallant, 2005). In this research study, the reliability measures show that the Cronbach Alpha was between .664 and 1.000. This shows that this research study has a high reliability score. Table 5.2 shows the results of reliability for the variables in the study.

Variable	The Cases	The Items	Cronbach Alpha
IT Infrastructure	115	2	1.000
Education and Training	115	2	1.000
Perceived Usefulness	115	2	.813
Perceived Ease of Use	115	2	.813
Attitude Towards Use	115	3	.664
Behavioural Intention	115	3	.664

Table 5.2: Results of Reliability of all Model Variables

5.3.3.3 Descriptive Statistics

Table 5.3 shows the demographic structure for the research sample.

Variables	Group	Frequency	%
Gender	Male	108	93.9
	Female	7	6.1
Age	18 - 25	5	4.3
	26 - 35	29	25.2
	36 - 45	52	45.2
	46 - 55	17	14.8
	55+	12	10.4
Education level	High school	6	5.2
	College Degree	11	9.6
	Bachelor's degree	79	68.7
	Master's degree and above	19	16.5
Total		115	100

Table 5.3 The Demographic Structure

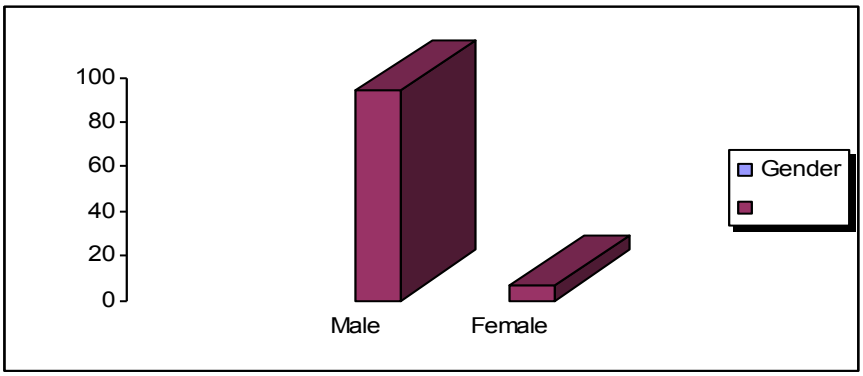

Figure 5.2 The Gender Distribution of the Sample

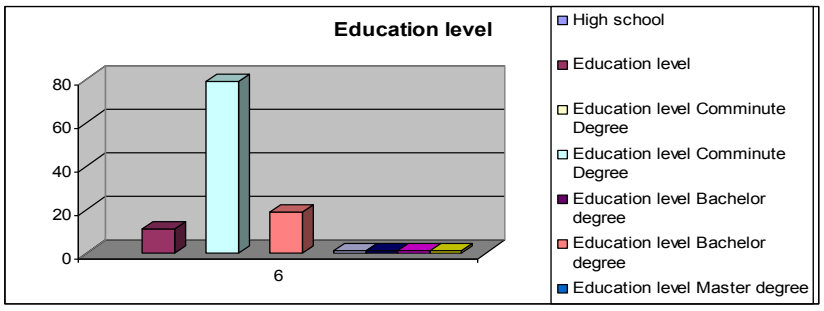

Figure 5.3 The Educational Level of Respondents

Based on an analysis of the demographics of the sample, it was found that the frequency and percentage for each variable was as follows:

Gender group: the majority of respondents were male (108, 93.9%) with 7 (6.1%) female respondents.

Age group: the majority of respondents were aged 36-45, which represents 45% (52 cases) of the respondents; followed by the age groups 26-35 (29 cases, 25.2%) and 46–55 (17, 14.8%). Meanwhile, the lowest numbers of respondents were to be found in groups 55+ (12, 10.4%) and 18 –25 (5 cases, 4.3%).

Educational level: the majority of respondents have Bachelor's degrees (79, 68.7%), representing a little over two-thirds of the study sample; followed by those holding a Master's degree or above (19, 16.5%). The Community College Degree (Diploma) came in third (11, 9.6%) and the lowest group was the high school leavers (6, 5.2%).

5.3.3.4 Sample Analysis

This section discusses the outcome of the sample analysis, revealing whether or not the education of the respondents is IT related, how long they have used IT, how long they have used the Internet, and whether they have received any IT training within their work in the Libyan oil sector, along with how long they have been working in the sector. See Table 5.4 .

Question	Response	Frequency	%
Was your education in Information Technology (IT) or a related area?	Yes	78	67.8
	No	37	32.2
How long you have been using IT in general? Please specify in years	1-5	21	18.3
	6-10	29	25.2
	11-15	36	31.3
	16-20	29	25.2
How many years have you been using the Internet? Please specify in years	1-5	46	40
	6-10	58	50.4
	10-15	11	9.6
Have you attended any training courses in IT during your work?	Yes	100	87
	No	15	13

How long have you been working in the oil sector? Please specify in years	1-5	27	23.5
	6-10	31	27
	11-15	31	27
	16-20	5	4.3
	More than 20 years	21	18.3

Table 5.4: Respondents Work Experience

Q4. Was your education in Information Technology (IT) or a related area?

The distribution of the sample population concerning the relationship between education and IT (or in IT) shows that the education of the majority in the sample was in IT or related to it (78 in all or 67.8%); while those whose education was not in IT or related to IT amounted to 37 or 32.2%, showing that the responses met the study objectives.

Q5. How long have you been using IT in general? Please specify in years.

The distribution of the sample population concerning experience of using IT shows that the majority of respondents had long experience, have been using the technology for 11-15 years (36 or 31.3%); followed by 6-10 years and 16-20 years (29 or 25.2%), and lastly 1-5 years (18.3%).

Q6. How many years have you been using the Internet? Please specify in years.

The distribution of the sample population concerning experience of using the Internet shows that the majority have experience of using the Internet. The highest percentage was in the group with 6 to 10 years' experience (58 or 50.4%), followed by the group with 1-5 years' experience (46.40%); and lastly the group with 10-15 years of experience (11 or 9.6%).

Q7. Have you attended any training courses in IT during your work?

The distribution of the sample population shows that the majority of the respondents had received training: 100 respondents answered YES (87%), while 15 answered NO (13%).

Q8. How long have you been working in the oil sector?

The majority of respondents had worked in the sector for between 6 and 10 years, and 11 and 15 years (31 or 27% for both groups); followed by the group with one to five years (23%); and those with more than 20 years (21 or 18.3%). Finally, the smallest group consisted of workers with 16-20 years experience (5 or 4.3%).

5.3.3.5 Categorisation of Variables in Research Model

Table 5.5 shows the categorisation of variables in the conceptual model:

External Variables	**Low**	**Neutral**	**High**	**Results**
Organisational culture				
ADHOC	116.7391	------	------	Low
MARKET	136.1304	------	------	Low
CLAN	-----	------	162.0870	High
HIERARCHY	-----	------	181.4783	High
Education and Training	45.2%	------	77.4%	High
Information technology infrastructure	29%	------	71%	High
Internal Variables	**Low < 3**	**Neutral =3**	**High >3**	**Results**
Perceived Usefulness (PU)	4%	------	96%	High
Perceived Ease Use (PEOU)	6%	4%	90%	High
Attitude Toward Use (ATU)	0.9%	29.6%	69.6%	High
Behavioural Intention (BI)	-------	16.5%	83.8%	High
Actual Use (AU)	3%	-------	97. %	High

Table 5.5: The Categorisation of Variables in the Conceptual Model

5.3.3.5.1 The External Variables in the Research Model

5.3.3.5.1.1 Organisational Culture

Organisational culture was measured using Cameron and Quinn's Organisational Culture Assessment Instrument (OCAI).

Table 5.6 shows that there is a high level of HIERARCHY profiles between the respondents in this study (with a score of 181.4783) and a low level of CLAN profiles (116.7391). However, there is a high level of MARKET profiles (162.0870) with a low level of ADHOC profiles (136.1304). Thus, it can be concluded that the dominant culture in the oil sector in Libya is HIERARCHY, with low CLAN culture.

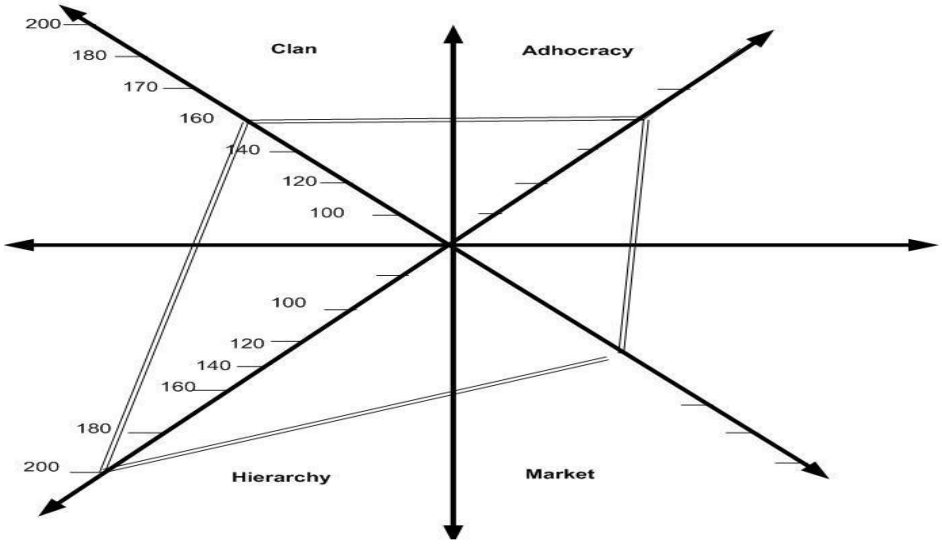

Figure 5.4 Oil Sector Organisational Culture Profile

Culture type	Mean	Std. Deviation	N
ADHOC Culture	116.7391	28.36977	115
MARKET Culture	136.1304	41.04480	115
CLAN Culture	162.0870	81.38597	115
HIERARCHY Culture	**181.4783**	**75.56505**	**115**

Table 5.6: Oil Sector Organisational Culture Profile

5.3.3.5.1.2 Education and Training

Table 5.5 shows a high level of education and training of the respondents in this study, with an average total score of 77.4%.

5.3.3.5.1.3 Information Technology Infrastructure

Table 5.5 shows that there is a high level of IT use by respondents (71% in total).

5.3.3.5.1.4 The Internal Variables in the Research Model

Table 5.6 shows that there is a high level of PU among respondents, with a score of 96%; and also a high level of PEOU, with a score of 90%. There is also a fairly high level of ATU (69%), while BI among respondents is high (with a score of 83%). Finally, AU is at a high level, of 97 %.

5.3.3.6 Analysis of the Survey

Three different approaches were used to analyse the survey results (see Table 5.7), based on the nature of the relationships between the variables and the statistical requirements to test the hypotheses. The first approach used multiple linear regressions to explain how the predictor variables were mixed to influence the dependent variable. Multiple regressions were used to explore the relationship between one continuous dependent variable and a number of independent variables or predictors in the first two stages. In the third stage, a simple linear regression was conducted to measure the relationship between the internal variables. For the final stage, a one-way analysis of variance (ANOVA) was used to make a comparison between the scores of different groups (Pallant, 2005).

Stage	Analysis Approach	Hypotheses		Independent Variable	Dependent Variable
		Main	Sub		
1	**Multiple Linear Regression**	H1	H11 H12 H13 H14	**Organisational Culture** • *ADHOCRACY* • *MARKET* • *HIERARCHY* • *CLAN*	**Perceived usefulness (PU)**
		H2	H11 H12 H13 H14	**Organisational Culture** • *ADHOCRACY* • *MARKET* • *HIERARCHY* • *CLAN*	**Perceived ease Of use (PEOU)**
		H3		**Education and Training**	**Perceived usefulness**
		H4		**Education and Training**	**Perceived ease**
		H5		**IT infrastructure**	**Perceived usefulness**
		H6		**IT infrastructure**	**Perceived ease of use**
		H7		Perceived usefulness (PU) Perceived ease of use (PEOU)	**Attitude toward using (ATU)**
2	**Simple Linear Regression**	H8		**Perceived usefulness (PU)**	**Perceived ease of use**
		H9		**Perceived usefulness (PU)**	**Behavioural intention (BI)**
		H10		**Attitude toward use (ATU)**	**Behavioural Intention (BI)**
3	**One-way ANOVA**	H11		**Behavioural intention (BI)**	**Actual use (AU)**

Table 5.7: Analysis Conducted in Each Stage

5.3.3.6.1 The Research Hypotheses

5.3.3.6.1.1 Assumptions for Multiple Regression Analysis

Multiple regression analysis is one of the most exacting of statistical techniques. It makes a number of assumptions about the data and it is not very forgiving if they are violated (Pallant, 2005). These assumptions include the following:

5.3.3.6.2 Multicollinearity

This refers to the strong relationship among the independent variables, which affects the internal validity of multiple regression analysis, because multiple regressions do not readily tolerate multicollinearity, inevitably contributing very little to the regression model. This study overcame this problem by undertaking analysis without violating the assumptions of multiple regression, by referring to the scores of the variable inflation factor (VIF), which were in the acceptable range of below 10 for all variables. See Table 5.8.

Dependent Variable	Independent Variable	Statistics Collinearity	
		Tolerance	VIF
PU	**Organisational culture**		
	ADHOC	.410	2.436
	MARKET	.191	5.233
	HIERARCHY	.413	7.188
	CLAN	.495	9.218
PEOU	**Organisational culture**		
	ADHOC	.410	2.436
	CLAN	.191	5.233
	MARKET	.413	7.188
	HIERARCHY	.495	9.218
PU	**Education and Training**	1.000	1.000
PEOU	**IT infrastructure**	1.000	1.000
AU	**PU**	.364	2.745
	PEOU	.364	2.745

Table 5.8: Multicollinearity Statistics of Predictors

5.3.3.6.3 Testing the Research Hypotheses

The main hypothesis referred to organisational culture and perceived usefulness:
H1. There is a positive relationship between organisational culture and the perceived usefulness of KMS in the Libyan oil sector, based on the type of dominant culture.

From the multiple regression analysis used to test this hypothesis, it can be concluded that the model for all the predictors has a significant effect on PU (p= .000<0.01), and that this therefore supports H1 (i.e. that there is a positive relationship between OC and the PU of KMS in the Libyan oil sector based on the type of dominant culture). See Table 5.9. The dominant profile of the Libyan oil sector is the hierarchy culture as shown in the descriptive analysis above.

Independent Variable Organisational culture	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	St. Error	Beta		
ADHOC	16.267	4.627	-.231	-1.840	.068**
MARKET	-.015	.008	-.368	-2.002	.048**
HIERARCHY	-.016	.008	-1.138	-2.879	.005***
CLAN	-.025	.009	-.520	-1.438	.153
Equation					
R	.538				
*R*2	28.9				
F	11.192				

***(P=<0.5), **(P=< .1) Dependent variable PU

Table 5.9: Results of Multiple Regression Analysis for PU (Dependent Variable) and Organisational Culture Diminutions (Independent Variables).

The sub-hypothesis referred to OC Diminutions vs. PU. As shown in Table 5.9, the standardised coefficient (beta) value for the adhocracy dimension is negative and significant (p= .068<0.1), and thus supports hypothesis *H1₁*. The standardised coefficient (beta) value for the market dimension is also negative and significant (p= .048<0.1), and thus supports hypothesis *H1₂*. In addition, the standardised coefficient (beta) value for the hierarchy dimension is negative and significant (p= .005<0.1), and thus supports hypothesis *H1₃*. Finally, the standardised coefficient (beta) value for the clan dimension is negative and not significant (p= .153>0.1), and thus does not support hypothesis *H1₄*.

Hypothesis 2 considered OC and PEOU.

H2. There is a positive relationship between Organisational Culture and the Perceived Ease of Use of KMS in the Libyan oil sector, based on the type of dominant culture. From the multiple regression analysis (coefficient beta) which was used to test this hypothesis, it can be concluded that the entire model has a significant effect on PEOU (sig= .000.between 001<0.01), and that it supports H2 (there is positive relationship between OC and the PEOU of KMS in the Libyan oil sector, based on the type of dominant culture). See Table 5.8. The dominant profile of the Libyan oil sector is the hierarchy culture, as shown in the descriptive analysis.

Independent Variable Organisational Culture	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	St.error	Beta		
ADHOC	-.028	.015	-.253	-1.867	.064**
MARKET	-.024	.015	-.316	-1.591	.115
HIERARCHY	-.047	.016	-1.214	-2.845	.005***
CLAN	-.032	.016	-.760	-1.949	.054**
Equation					
R	.415				
*R*2	.172				
F	5.708				

**P <0.1 Dependent variable: PEOU, ***P<0.5)

Table 5.10: Results of Multiple Regression Analysis for PEOU (Dependent Variable) and Organisational Culture Diminutions (Independent Variables).

Sub-hypothesis: Organisational Culture Diminutions vs. Perceived Ease of Use

As shown in Table 5.10, the standardised coefficient (beta) value for the adhocracy dimension is negative and significant (p=**.**064<0.1), and thus supports hypothesis *H2*$_1$. The standardised coefficient (beta) value for the market dimension is negative and significant (p=**.**115>0.1), and thus does not support hypothesis *H2*$_2$. The standardised coefficient (beta) value for the hierarchy dimension is negative and significant (p=**.**005<0.1), and thus supports hypothesis *H2*$_3$. Finally, the standardised coefficient (beta) value for the clan dimension is negative and significant (p=054<0.1), and thus supports hypothesis *H2*$_4$.

H3. There is a positive relationship between education and training and the perceived usefulness of KMS in the Libyan oil sector.

The multiple regression analysis (coefficient beta) was used to test this hypothesis. It can be concluded that the entire model has a significant effect on PU (sig= **.**039 between 001<0.01). As shown in Table 5.11, the standardised coefficient (beta) value for the education and training variable was negative and significant (p= .039<0.1), and it therefore supports hypothesis *H3.*

Independent Variable	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	St. error	Beta		
Education Training	-.205	.098	-.193	-2.090	.039**
Equation					
R	.193				
*R*2	.037				
F	4.370				

****P >0.05 Dependent variable: PU**

Table 5.11 Results of Multiple Regression Analysis for PU as (Dependent Variable) and Education and Training as (Independent Variable)

H4. There is a positive relationship between education and training and the perceived ease of use of KMS in the Libyan oil sector.

From the multiple regression analysis (coefficient beta) that was used to test this hypothesis, it can be concluded that there is no significant effect on PEOU (p= **.**760>0.1). As shown in Table 5.12, the standardised coefficient (beta) value for the education and training variable was negative and not significant (p= **.**760>0.1), and thus does not support hypothesis *H4.*

Independent Variable	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	St. error	Beta		
EducationTraining	-.054	.176	-.029	-.306	.760
Equation					
R	.029				
*R*2	.001				
F	.093				

Dependent variable: PEOU.

Table 5.12: Results of Multiple Regression Analysis for PEOU as (Dependent Variable) and Education and Training as (Independent Variable)

H5. There is a positive relationship between IT infrastructure and the perceived usefulness of KMS in the Libyan oil sector.

The multiple regression analysis (coefficient beta) was used to test this hypothesis. It can be concluded that there is a significant effect on PU (p= **.**039<0.05). As shown in Table 5.13, the standardised coefficient (beta) value for the education and training variable was negative and not significant (p= **.**039<0.05) and thus supports hypothesis *H5.*

Independent Variable	Unstandardised Coefficients		Standardise Coefficients	t	Sig.
	B	St. error	Beta		
IT infrastructure	-.205	.098	-.193	-2.090	.039***
Equation					
R	.193				
*R*2	.037				
F	4.370				

***** (p=>0.05*** (p=>0.05) Dependent Variable: PU**

Table 5.13: Results of Multiple Regression Analysis for PU as (Dependent Variable)and IT Infrastructure as (Independent Variable)

H6. There is a positive relationship between IT infrastructure and the perceived ease of use of KMS in the Libyan oil sector.

From the multiple regression analysis (coefficient beta) that was used to test this hypothesis, it can be concluded that there is no significant effect on PEOU (p= **.**760>0.1), as shown in Table 5.14. The standardised coefficient (beta) value for the education and training variable was negative and not significant (p= **.**760>0.1), and thus does not support hypothesis *H6.*

Independent Variable	Unstandardised Coefficients		Standardised Coefficient	t	Sig.
	B	St. error	Beta		
IT Infrastructure	-.054	.176	-.029	-.306	.760
Equation					
R	.001				
*R*2	.037				
F	.093				

Dependent Variable: PEOU

Table 5.14 Results of Multiple Regression Analysis for PEOU as (Dependent Variable) and IT Infrastructure as (Independent Variable)

H7. There is a positive relationship between perceived usefulness and perceived ease of use vs. attitude towards using KMS in the Libyan oil sector.

From the multiple regression analysis (coefficient beta) which was used to test this hypothesis among ATU as a dependent variable vs. PU and PEOU as independent variables, it can be concluded that there is a significant effect on PU and PEOU (p= .000<0.01) and also in the entire model for all the predictors; *R*2 shows 17.1 % of the variance related to ATU. As shown in Table 5.15, the standardised coefficient (beta) value for PU was positive and significant (p= 0.000<0.01). Consequently, it supports hypothesis H7. The standardised coefficient (beta) value for PEOU was positive and significant (p= 0.000<0.01) and thus supports hypothesis H8, as shown in the next stage.

Independent Variable	Unstandardised Coefficients		Standardised Coefficients	T	Sig.
	B	St. error	Beta		
PU	.059	.073	.115	.810	.000***
PEOU	.091	.041	.316	2.216	.000***
Equation					
R	.414				
*R*2	.17.1				
F	11.571				

(***P=000<0.01) Dependent Variable: ATU

Table 5.15: Results of Multiple Regression Analysis for ATU (Dependent Variable) vs. PU and PEOU (Independent Variables)

H8. There is a positive relationship between Perceived Ease of Use and Perceived Usefulness towards using KMS in the Libyan oil sector.

A simple linear regression analysis (coefficient beta) was used to test the hypothesis between PU as a dependent variable and PEOU as an independent variable. From the entire model, there is a significant effect on PU (p= 0.000<0.01). Over the entire model, *R*2 shows 53.1 % of the variance related to PU, as shown in Table 5.16. It thus supports hypothesis *H8.*

Independent Variable	Unstandardised Coefficients		Standardised Coefficients	T	Sig.
	B	St. Error	Beta		
PEOU	.482	.043	.728	11.301	.000***
Equation					
R	.728				
*R*2	.531				
F	127.711				

(***P<0.01) Dependent Variable PU

Table 5.16: Results of Simple Linear Regression Analysis for PU (Dependent) and PEOU (Independent Variables)

H9. There is a positive relationship between Perceived Usefulness and Behavioural Intentions to use KMS in the Libyan oil sector.

Simple linear regression analysis (coefficient beta) was used between BI, as the dependent variable, and PU as the independent variable. The entire model has a significant effect on BI (p= 0.000<0.01). In the entire model, R2 shows 0.038% of the variance related to BI, as shown in Table 5.17.

Independent Variable	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	St. error	Beta		
PU	.082	.039	.194	2.106	.000***
Equation					
R	.194				
*R*2	.038				
F	4.437				

(*p<0.01)Dependent Variable BI**

Table 5.17: Results of Simple Linear Regression Analysis for BI (Dependent Variables) and PU (Independent Variables)

H10.There is a positive relationship between Attitude and Behavioural Intentions towards use of KMS in the Libyan oil sector.

Simple linear regression analysis (coefficient beta) was used between BI (the dependent variable), and ATU (the independent variable). The entire model has a significant effect on BI (p= 0.000<0.01). In the entire model, R2 shows 48.2% of the variance related to BI, as shown in Table 5.18.

Independent Variable	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	St. error	Beta		
ATU	.577	.056	.694	10.257	.000***
Equation					
R	.694				
*R*2	.48.2				
F	105.205				

(***P<0.01) Dependent Variable BI

Table 5.18: Results of Simple Linear Regression Analysis for BI (Dependent Variable) and ATU (Independent Variables)

H11.There is a positive relationship between Behavioural Intentions and Actual Use of KMS in the Libyan oil sector.

A one-way between-groups analysis of variance was conducted to test hypothesis H11.

There was a statistically significant difference at p= .000<.05 for level of AU (independent variable) and BI, which was the independent variable. Subjects were divided into three groups according to their responses (Group 1: Strongly agree; Group 2: Agree; Group 3: Neutral). There was a statistically significant difference at the p< .05 level in AU. Despite reaching statistical significance, the actual difference in mean scores between the groups was quite small. The effect size, calculated using eta Equation squared was 02. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 1 (*M*=1.02) was significantly different from Group 3 (*M*=1.3158). Group 2 (*M*=1.0294) did not differ significantly from Group 1.

So, based on the results presented above and in Table 5.19, it can be concluded that hypothesis H11 is supported with statistically significant p= .000<.05 in the freedom degree 12.788.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.384	2	.692	12.788	.000***
Within Groups	6.060	112	.054		
Total	7.443	114			

Actual Use dependent variable

Table 5.19: A One-Way Analysis of Variance ANOVA of the Effect of Respondents' Behavioural Intention to Use KMS based on their Actual Use of IT in their Work in the Oil Sector

Stage	Analysis Approach	Hypotheses		Dependent Variable	Independent Variable	Result of the Analyses
		Main	Sub			
1	Multiple Linear Regression	H1	H11 H12 H13 H14	Perceived usefulness (PU)	• Organisational Culture • *ADHOCRACY* • *MARKET* • *HIERARCHY* • *CLAN*	.068** .048** .005*** .153
		H2	H11 H12 H13 H14	Perceived ease of use (PEOU)	Organisational Culture • *ADHOCRACY* • *MARKET* • *HIERARCHY* • *CLAN*	.064** .115 .005*** .054**
		H3		Perceived usefulness (PU)	Education and Training	.039**
		H4		Perceived ease of use (PEOU)	Education and Training	.760
		H5		Perceived usefulness (PU)	IT Infrastructure	.039***
		H6		Perceived ease of use (PEOU)	IT Infrastructure	.760
		H7		Attitude toward using (ATU)	Perceived usefulness (PU) Perceived ease of use (PEOU)	.000*** .000***
2	Simple Linear Regression	H8		Perceived usefulness (PU)	Perceived ease of use (PEOU)	.000***
		H9		Behavioural intention (BI)	Perceived usefulness (PU)	.000***
		H10		Behavioural Intention (BI)	Attitude toward using (ATU)	.000***
3	One Way ANOVA	H11		Actual use(AU)	Behavioural intention (BI)	.000***

Table 5.20: Summary of Data Analysis and Results for Each Stage

5.4 Semi-structured Interviews

5.4.1 Introduction

The main purpose of using the interview as the second stage in this research was to support the data and results from the survey in the first stage, a main component of mixed-methods research. The interviews were conducted in order to gather the opinions of managers of IT departments in the Libyan oil sector. It also aims to extend the theory of TAM and its influence on the adoption of KMS to highlight new themes or relevant issues emerging from the findings of the survey data. Semi-structured interviews were conducted with seven IT managers from several Libyan public oil companies. The data captured from these interviews was analysed, using a scenario containing themes that represent the research questions and the factors in the research model.

5.4.2 Reliability and Validity of Interview Analysis

One of the most important ways to evaluate and ensure the quality of social research it is to apply tests of both validity and reliability (Yin, 2009).

Reliability: Before commencing the process of interviewing, and in order to test the reliability and validity of the interview, the protocol was distributed to a small sample of Libyan students working in the oil sector, and to some students at the University of Manchester. During the second stage of research, the interviews were translated into Arabic and tested again with the same group of Libyan students to see whether there were any conflicting or different answers to the questions.

Validity: To achieve validity for the interviews the results were compared with the survey results, which provided a high validity rating (Sekaran, 2000).

5.4.3 Interview protocol

The questions that were included in the interview protocol were constructed based on

the factors that influence KMS adoption and which emerged from the literature review. The interview protocol was finalised after comprehensive discussions were conducted with the PhD supervisor and PhD students in the business systems division, and with Libyan students in the School of Electrical and Electronic Engineering, who were working in the oil sector in Libya. After making some amendments to the draft, based on previous consultations, the interview was translated into Arabic. The same students from Libya who had worked in the oil sector were then asked to make a comparison between their answers to the interview questions in both languages.

5.4.3.1 Structure and Content of Interview Protocol

The first section of the interview was designed to gather demographic and background information from participants. It addressed the demographic profile of the interviewee including their name, position, qualifications, area of speciality and work experience.

The second section was divided into several questions, covering the main themes of the study. In the main, these questions were concerned with IT infrastructure and staff skills, linking this point to training and education and, finally, to the obstacles encountered in the sector to adopting IT in general and KMS in particular.

5.4.3.2 Interview Procedures

The semi-structured interviews were conducted with seven IT managers in the Libyan oil sector. The sample was chosen purposely in order to best answer the research questions. The researcher travelled across Libya over a period of two months to conduct the interviews, visiting oil company sites and meeting IT managers, having gained prior approval from the appropriate IT headquarters (see Appendix 4). When the time and date of each interview had been agreed, managers were provided with a copy of the interview questions.

The interviews were conducted at the same time as the survey was undertaken. Formal requests from the general manager of IT and Computing in the oil sector were sent to all managers, asking them to participate in the interviews. Each interview commenced with a brief description of the study, along with the aims and objectives of the interview and an explanation that both the researcher and the interviewee would be subject to research ethics, and as such that their responses would not be published and their identity would be kept confidential. Each interview took about 40 minutes to complete, starting with the demographic questions, followed by the structured questions. The researcher made notes of any additional comments from interviewees, along with answers to open-ended questions. At the end of every interview, the researcher handed a copy of the interview transcript to the interviewee, if requested (see Appendix 3).

5.4.4 Interview Data Analysis

5.4.4.1 Demographic Information

Gender: All seven general managers interviewed were male (100%).

Age: All managers interviewed were aged 45 years or over.

Experience: All were IT managers working in the oil sector with more than 20 years' experience, meaning they were highly experienced within the oil sector and could therefore provide highly reliable information.

Education level: All seven interviewees were well educated, up to at least BSc level, with most of them specialists in computer science and IT.

5.4.4.2 CSFs Arising out of the Adoption of Knowledge Management Systems for the Libyan Oil Sector from the interview

The main reason to use interviews was to gain a wider picture of the factors that affect the adoption of KMS in the Libyan oil sector from the managers' point of view; and also

to support the survey results. Analysis of the interviews revealed several themes, as illustrated in Table 5.21. These themes emerged directly from the answers to the questions and comments made by interviewees.

Category	Themes
1	Information technology infrastructure: IT equipment; availability of KMS technologies in the oil sector
2	Organisational culture: top management role; organisational profile
3	Education and training: training programme efficiency, education level

Table 5.21: Categories of Critcal Sucsses Factors (CSFs) Descriptions as Revealed by IT Managers

5.4.4.2.1 The Information Technology Infrastructure (ITI)

According to the responses of IT managers in the Libyan oil sector, there are huge numbers of networked PCs and mainframes in all companies, with the average age of 71% of this equipment ranging from 3 to 5 years. 29% of equipment is more than five years old. With regard to the number of PCs in each company, most managers stated that there were more than 500, in addition to the private laptops owned by every technical and IT specialist. The managers stated that most of the time, the PCs were being used to achieve organisational or programme administration duties (e.g. bookkeeping, financial management, data entry, or transaction processing); 4.3 out of 5 were used for this purpose, and 3.9 out of 5 in report generation (e.g. sales, manufacturing, accounting), with 2.6 out of 5 making strategic decisions.

All respondents reported that their organisations used some KMS technologies, including web e-mail, communication systems, the Intranet and document and content management systems. Four managers reported that their companies were using data warehousing. In addition, KMS technologies are used in the oil sector to connect computers across multiple sites within organisations, and also to connect computers

within an immediate locality, to enable use of the Internet for data searching and file transfer. Managers also stated that all companies in the oil sector have used database packages for different purposes for more than ten years, and, in some cases, for more than 20 years. However, all managers felt that their companies needed to use KMS more comprehensively in order to develop work levels and enhance productivity, and that they were facing many obstacles in their quest to make better use of them. These obstacles were related to a number of problems. 71% of interviewees identified technology issues and a lack of expertise, highlighting that staff who were deemed experts in computers amounted to no more than 10% of total staff in the oil sector, with the rest distributed between those who have had some basic computer training and those who are classed as average in their ability to use a computer. Other management and financial problems were also noted in a small number of cases.

5.4.4.2.2 Organisational Culture

With reference to the level of problems being faced in using KMS technologies, most interviewees felt that the extent of these problems was moderate, and that all such problems were related to the dominant culture present in each company. Indeed, some interviewees provided examples of managers who had offered resistance to change and the use of new technology, as they preferred to use older systems of work.

Based on the OC profile in the oil sector (the hierarchy culture), the interviewees stated that this culture affected the way the oil sector accepted new technology. While some senior managers have a high level of acceptance of new technology, there are others who offer resistance to change in the work style that they have become familiar with over a long period of time.

5.4.4.2.3 Education and Training

The interviewees emphasised the importance of technical education and training, and developing the knowledge and skills of employees. They also highlighted the need for continuous training, in order to generate highly skilled technicians who can undertake tasks effectively; and to invest in modern technology in the oil sector.

Respondents also mentioned that training programmes tended to focus on using new technology below the required level; and the lack of technical support, due to the absence of a universal training plan in IT.

5.5 Summary

The findings from the quantitative and qualitative analysis will enable final conclusions to be made.

The quantitative analysis was based on sample regression, multiple regression and one-way analysis of variance (ANOVA) to test the eleven hypotheses. Prior to that, reliability analysis, descriptive statistics, and the variable categorical and organisational profile that serve as the basis of the OC diagnostic were defined by applying the OCAI. The qualitative analysis was guided by the Miles and Huberman (1994) analysis model. It was designed to support the quantitative section, and both sections will be discussed in the next chapter, in order to integrate results and draw conclusions from the research.

6 Chapter 6: Discussion

6.1 Introduction

This chapter identifies the factors that may assist the Libyan oil sector in adopting a KMS process in the future, based on the results obtained from the mixed-methods research. This study has revealed that there are many factors that could affect the success and efficacy of KMS in Libya's oil sector. According to the evidence found in the literature, some of these factors may not have been previously investigated. In this research, which has considered IT adoption in the Libyan context, it has been found that the technology acceptance model may play an important role in investigating how acceptance of a KMS system could be usefully applied. This model could also be extended to consider factors such as organisational culture, education and training, and IT infrastructure, which may also have an impact on the adoption of new technology. The TAM was adopted as the theoretical basis for this research, and it was extended with these factors added.

6.2 Discussion of the Findings

6.2.1 Findings of the Survey

The demographic information obtained from the survey showed that the majority of the respondents were male (93.9%). This reflects the nature of the work environment in the oil sector, with most sites located far from cities, usually in desert areas where the environment is harsh. It also reflects the reality of life for women in an Islamic society such as Libya, where cultural norms continue to have a strong influence on their work choices. The results of the survey showed that the greatest number of respondents were aged between 36 and 45 (45%), followed by those aged 26-35 (25.2%), and 46–55 (14.8%). The smallest groups were workers aged 55+ (10.4%) and 18-25 (4.3%).

The results also revealed that the majority of the respondents had Bachelor's degrees (68.7%), followed by those holding a Master's degree and above (5%). Rated third were holders of a community college degree (Diploma) (11.96%), while the smallest group were educated only to high school level (6.52%). The distribution of the sample population also considered the relationship between education and IT. It showed that the majority (67.8%) had specialised in IT or in a subject related to it. This confirms that the responses met the study objectives. The distribution of the sample population concerning the experience of using IT showed that the majority of respondents had many years' experience of using IT (11-15 years, or 31.3%). This was followed by two groups (6-10 and 16-20 years) with a percentage of 25.2 for both. The smallest group had only 1-5 years' experience of IT use (18.3%).

The distribution of the sample population showed that the majority had experience of using the Internet. Respondents who had used the Internet for between 6 and 10 years amounted to 50.4%, followed by respondents with 1 to 5 years' experience (40%), and finally those with 10-15 years' experience (9.6%).

The distribution of the sample population concerning their experience of IT training showed that the majority of respondents had attended IT training courses; with 100 having undertaken some kind of training (87%).

The distribution of the sample population concerning duration of work in the Libyan oil sector found that the majority of respondents had work experience of between 6 and 15 years (27%), while 23% of the population had less than 5 years' experience, with 18% of the population having more than 20 years' experience.

6.2.1.1 Results of the Research Hypothesis Test

The research hypotheses, which used the TAM model, were designed to be the tools used to answer the research questions and meet the research objectives. Twelve

hypotheses were tested, with results shown in Table 6.1.The first six hypotheses considered the three external TAM variables, which extended TAM, with the rest of the hypotheses the main variables of the TAM (two of them with sub-hypotheses). Ten research hypotheses were supported (**H1-H5** and **H7- H11)** by the empirical test, while one main hypothesis, **H6,** and the three sub-hypotheses were not supported.

Research Hypothesis	Results
***H1*. There is a positive relationship between organisational culture and the perceived usefulness of KMS in the Libyan oil sector, based on the type of dominant culture.**	**Supported**
H11: There is a direct and positive effect between the ADHOCRACY dimension and the perceived usefulness of KMS in the Libyan oil sector.	**Supported**
H12: There is a direct and positive effect between the MARKET dimension and the perceived usefulness of KMS in the Libyan oil sector.	**Supported**
H13: There is a direct and positive effect between the HIERARCHY dimension and the perceived usefulness of KMS in the Libyan oil sector.	**Supported**
H14: There is a direct and positive effect between the CLAN dimension and the perceived usefulness of KMS in the Libyan oil sector.	**Not Supported**
H2. There is a positive relationship between organisational culture and the perceived ease of use of KMS in the Libyan oil sector, based on the type of dominant culture.	**Supported**
H21: There is a direct and positive effect between the ADHOCRACY dimension and the perceived ease of use of KMS in the Libyan oil sector.	**Supported**
H22: There is a direct and positive effect between the MARKET dimension and the perceived ease of use of KMS in the Libyan oil sector.	**Not Supported**
H23: There is a direct and positive effect between the HIERARCHY dimension and the perceived ease of use of KMS in the Libyan oil sector.	**Supported**
H24: There is a direct and positive effect between the CLAN dimension and the perceived ease of use of KMS in the Libyan oil sector.	**Supported**
H3. There is a positive relationship between education and training level and the perceived usefulness of KMS in the Libyan oil sector.	**Supported**
H4. There is a positive relationship between education and training and the perceived ease of use of KMS in the Libyan oil sector	**Supported**
H5. There is a positive relationship between IT infrastructure and the perceived usefulness of KMS in the Libyan oil sector	**Supported**
H6. There is a positive relationship between IT infrastructure and the perceived ease of use of KMS in the Libyan oil sector	**Not Supported**
H7. There is a positive relationship between Perceived Usefulness and Perceived Ease of Use vs. Attitude towards Using KMS in the Libyan oil sector	**Supported**
H8. There is a positive relationship between Perceived Ease of Use and Perceived Usefulness towards Using KMS in the Libyan oil sector	**Supported**
***H9*.There is a positive relationship between Perceived Usefulness and Behavioural Intentions to use KMS in the Libyan oil sector**	**Supported**
***H10*.There is a positive relationship between Attitude toward Use and Behavioural Intentions**	**Supported**
***H11*.There is a positive relationship between Behavioural Intentions and Actual Use of KMS in the Libyan oil sector**	**Supported**

Table 6.1 Summary of Results of the Research Hypothesis Test

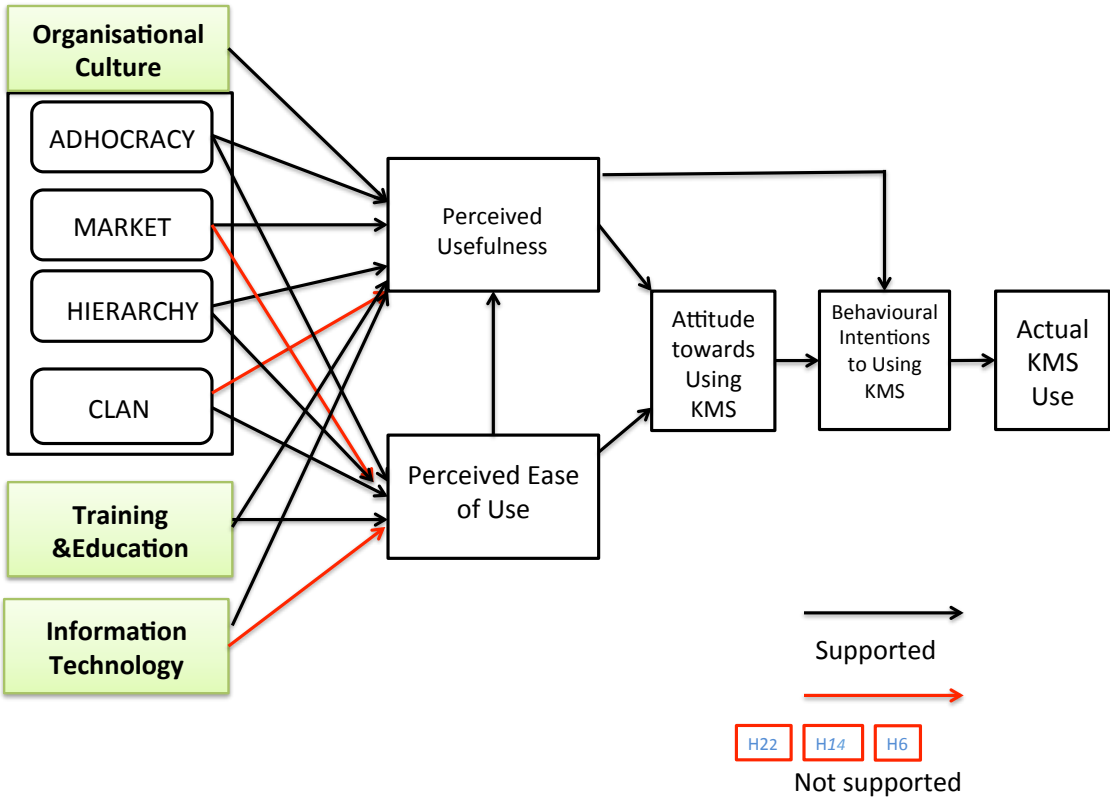

Figure 6.1 The Results Based on Research Model

6.2.1.2 Findings Related to the Research Hypotheses

The following section will discuss the outcomes arising from the hypothesis tests regarding the external variables for TAM, which evolved from the research objectives and the internal variables.

6.2.1.3 External Extended Variables of the Technology Acceptance Model

6.2.1.3.1 Organisational Culture

H1. There is a positive relationship between organisational culture and the perceived usefulness of KMS in the Libyan oil sector, based on the type of dominant culture.

Many studies in the IS literature have suggested that OC plays a key role in the adoption of IT (Cameron and Quinn, 2005; Cooper and Quinn, 1993; McDermott, 2001; Twati, 2006; Al-Busaidi, 2005; 2007; Whitfield, 2008). According to Straub et

al. (2001), culture plays a crucial role in adopting new technology in organisations based in Arab countries. The adoption and use of new technologies can also vary according to different social and cultural contexts. Thus, OC is considered to be an important vehicle for implementing organisational change (Yeung, Brockbank and Ulrich, 1991). This study has explored such influences on the adoption of IT in the Libyan context; with a conservative culture, technology levels are low compared with similar countries. Cultures and technology are interrelated and mutually dependent. Moreover, according to Straub el al. (2001), Al-Busaidi and Olfmans (2005) and Al-Gahtani (2004), the culture not only plays a role in IT diffusion, but also influences IT usage, findings which have been confirmed in this study; there is a direct relationship between the two.

Organisational Culture Dimensions

HIERARCHY

H11: There is a direct and positive effect between the HIERARCHY dimension *and the perceived usefulness of KMS in the Libyan oil sector.*

This research has revealed that the dominant OC in the Libyan oil sector is the hierarchy and, in part, the clan culture. In the IS literature, many studies have argued that senior management play a significant role in adopting and diffusing IT within organisations, with a range of studies confirming the existence of a relationship between types of organisational culture and innovation. The findings of this study concur with the findings of a study by Obenchain et al. (2004), which confirmed that OC is associated with organisational innovation. Similarly, Denison and Spreitzer (1991) concluded that the hierarchy culture type had a high correlation with organisational change and development. Researchers continually emphasise the importance of culture in the success of IT (Ives and Jarvenpaa, 1991; Shore and

Venkatachalam, 1995; Deans and Karwan, 1997; Palvia, 1998). Dasgupta et al. (1999) concluded that organisational factors had a significant impact on IT adoption decisions. Straub et al. (2001) studied the influence of cultural beliefs and values on the adoption of IT in Arab countries. They developed a cultural influence model of Information Technology Transfer (ITT) and concluded that the effect of culture on securing the support of senior management was one of the main factors affecting technology transfer. Surveys and interviews targeting Arab culture and beliefs proffer very strong evidence of resistance to IS and ITT. Based on the results of the hypothesis tests, there appears to be a high correlation between the presence of the hierarchy culture and KMS acceptance in the Libyan oil sector.

CLAN

H22*: There is a direct and positive effect between the CLAN dimension and the perceived ease of use of KMS in the Libyan oil sector.*

The research results showed that the second dominant culture profile in the Libyan oil sector is the clan culture, and the hypothesis related to this dimension supported its connection with 'ease of use' and rejected 'usefulness of KMS'. This finding was endorsed by the literature, which indicated that clan culture has a small effect on the adoption of new technology (Cooper and Quinn, 1993).

There also appears to be a lack of acceptance of KMS associated with the marketing and adhocracy culture types, as the research results did not support the hypotheses regarding those OC dimensions.

6.2.1.3.2 Education and Training

H3.There is a positive relationship between education and training levels and the perceived usefulness of KMS in the Libyan oil sector.

H4. There is a positive relationship between education and training and the perceived ease of use of KMS in the Libyan oil sector.

One of the most important factors that affects KM projects and the adoption of their systems is the level of education and training of employees (Wong, 2005; Hung et al., 2005; Yahiya and Goh, 2002; Horak, 2001). From the results of this study, it can be concluded that this factor plays a key role in the adoption of KMS in the Libyan oil sector. Furthermore, employees should be trained in using KMS and other technology for managing knowledge. This will ensure that they can maximise the full potential and capabilities offered by these techniques (Wong, 2005; Migdadi, 2009). Based on the results from the data analysis, it was found that there is a high positive relationship between KMS acceptance and training and education factors in the Libyan oil sector. Thus, both hypotheses related to training and education and the PU and PEOU of KMS were supported by both the research results and the literature review, indicating that there is a positive relationship between training and education and KMS adoption (Horak, 2001; Moffett, 2003; Wong, 2005; Al-Mabrouk, 2006; Migdadi, 2009).

6.2.1.3.3 Information Technology Infrastructure

H5. There is a positive relationship between IT infrastructure and the perceived usefulness of KMS in the Libyan oil sector.

H6. There is a positive relationship between IT infrastructure and the perceived ease of use of KMS in the Libyan oil sector.

One of the main factors influencing KMS adoption in Libya is the level of IT present in the sector, as it is considered to be a vehicle for ensuring KM projects reach a successful conclusion. According to Alavi and Leidner (2001), the notion of IT as a

KM enabler relates to the idea of IT being a fundamental building block that supports and coordinates KM. It is indisputable that IT is one of the key enablers for the implementation of KM. IT can enable rapid search, access and retrieval of information, and can support collaboration and communication between organisational members; it can certainly play a variety of roles in supporting an organisation's KM processes (Migdadi, 2009). However, the results of this study revealed some differences in the acceptance of new technology in relation to PU and PEOU, linked to the IT infrastructure. The conclusion reached was that, in general, the IT infrastructure did have an effect on the extended model of technology acceptance, especially with PU. However, the PEOU item was negative and not significant with regard to the IT infrastructure. As many researchers have argued (Davis, 1989; Adams, et al., 1992; Keil, et. al., 1995; Chau, 1996), PEOU may not be an important variable for explaining user acceptance of technology. On this point, the study was supported by research found in the literature review (Skyrme & Amidon, 1997; Davenport et al., 1998; Holsapple & Joshi, 2000; Alavi & Leidner, 2001; Chourides et al., 2003; Wong, 2005; Migdadi, 2009).

6.2.1.4 The Internal Variables (TAM Variables)

H7 Perceived Usefulness and Perceived Ease of Use vs. Attitude towards Using KMS in the Libyan oil sector

The study hypothesised that there would be a positive relationship between PU and PEOU versus attitude toward using KMS. The research found strong empirical support for hypothesis H7, which is consistent with findings of previous studies on KMS and IT diffusion. Furthermore, higher levels of PU also lead to a more positive attitude towards KMS (Davis, 1993). This finding is supported by previous empirical findings concerning the acceptance of new technologies, as a significant relationship was

identified. These results are in line with the majority of previous research that has focused on the acceptance or use of new technology (Davis, 1993; Al-Gahtani & King, 1999; McKechnie et al., 2006).

According to Chau (1996), the relationship between PEOU and attitude towards the technology is dependent upon the stage of technology diffusion or technology life cycle. In the early stages of diffusion, users need some skills to deal effectively with the new technology, justifying the inclusion of the education and training factor as an external factor in the research model. PEOU has a positive relationship with attitude towards the technology, and with behavioural intention to use KMS in the Libyan oil sector .

Based on the literature review, PEOU may not be an important variable in explaining user acceptance of technology. However, a number of factors influence the relationship between PEOU and ATU or BI. These factors include technology infrastructure (technology quality, technology life cycle, and technology category), and user characteristics (trust, culture, training and education). This study indicates that a more sophisticated theoretical framework including broad significant factors including technology infrastructure and user characteristics should guide the study of technology acceptance (Davis, 1989; Adams, et al., 1992; Keil, et. al., 1995; Chau, 1996).

H8. There is a positive relationship between Perceived Ease of Use and Perceived Usefulness Towards Using KMS in the Libyan oil sector.

Previous studies on the relationship between PEOU and PU have shown that the latter is a fundamental determinant of technology acceptance. However, the results of previous studies concerning the effect of PEOU on the acceptance of new technology have shown a variety of outcomes (Davis, 1989; Adams et al., 1992; Venkatesh &

Davis, 2000; Venkatesh & Morris, 2000; McKechnie et al., 2006; Sudarsan, 2009; Mallat, 2009). All these studies suggest that PEOU could influence technology acceptance through PU. This study confirms that there is a positive relationship between PU and PEOU, supporting previous research (Davis, 1989; Adams et al., 1992; Venkatesh & Davis, 2000; (Venkatesh, Morris et al. 2003); McKechnie et al., 2006; (Jayasingh & Eze 2009; Mallat, et al. 2009).

In addition, the results presented in Table 5.1 reveal that the PU of KMS in the Libyan oil sector is high. Likert-scale ratings for responses to statements addressing PU of KMS were high; PEOU of KMS in the Libyan oil sector was also ranked at a high level.

H9.There is a positive relationship between Perceived Usefulness and Behavioural Intentions to use KMS in the Libyan oil sector.

In ascertaining the influence of cognitive beliefs (PU) on respondents' intention to use KMS in the Libyan oil sector, results show that the respondents had strong intentions to continue to use KMS, based on previous PU of similar technologies involving KMS. This means that PU is a major factor and predictor of BI to use KMS. This finding is supported in the literature, particularly by Davies (1989; 1993), who devised TAM and who first suggested that PU is an important predictor that leads to intention to use. There is also an indirect relationship between intention to use and ease of use.

H10. There is a positive relationship between Attitude Towards Using KMS and Behavioural Intentions.

This hypothesis posited that there would be a positive relationship between ATU and BI regarding KMS. From the research results, it can be seen that ATU is high. This statement was confirmed by the respondents' answers to four statements in the survey. Furthermore, it was found that the BI to use KMS in the Libyan oil sector was high.

This issue was tested by examining responses from three statements in the survey, which formed the composite index used to measure respondents' intentions to use KMS technologies. These results were supported by previous studies in the IS literature regarding IT implementation (Davis, 1989; Adams et al., 1992; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000; McKechnie et al., 2006; Sudarsan, 2009; Mallet, 2009).

H11. There is a positive relationship between Behavioural Intentions and Actual Use of KMS in the Libyan oil sector.

The study revealed a significant and positive relationship between BI and AU of KMS in the Libyan oil sector. AU was found to be high (i.e. the study predicted that there would be high acceptance of KMS technologies based on usage of available IT). This issue was tested by examining respondents' answers to two statements in the survey on the use of KMS technology. It would appear that the main reason for this higher acceptance of KMS technologies is that they have experience of similar technologies.

6.2.2 Findings of the Semi-structured Interviews

The underlying purpose in conducting semi-structured interviews was to obtain more information about IT in the oil sector in general, and specifically KMS technologies, in order to support the survey results drawn from employees' responses. The majority of the interviewees were IT managers in the oil sector, with some from senior management. Results of the interviews were categorised into three main themes, based on the factors influencing KMS adoption identified in the survey and literature review.

6.2.2.1 Demographic Information

Gender

All the IT managers interviewed in the Libyan oil sector were male. This reflects the nature of Libyan society, where male culture is predominant. However, this does not

necessarily reflect the general attitude of Libyan society towards women, who are encouraged to take up high positions in many organisations on the same footing as men. Indeed, Libya has ratified the United Nations Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW).

Age

All managers interviewed were aged 45 or over.

6.2.2.2 Employment Experience

All interviewees had worked for more than 20 years in the oil sector, giving them a wealth of experience. This meant that they were able to provide highly reliable information about the issues under investigation.

6.2.2.3 Educational Levels

All interviewees were well educated, up to at least BSc level, with most of them being majors in computer science and IT. This confirms that a wide range of educational opportunities have been offered to the Libyan population over the past 40 years.

6.2.2.4 IT Infrastructure

IT infrastructure plays a critical role in the adoption of KM technology (Alavi & Leidner, 2001; Migdadi, 2009). Evidence from the interviews leads to the conclusion that the equipment and technology being used within the infrastructure of the Libyan oil sector is reasonably current, with an average age of no more than three years. This level of modernity will assist the oil sector in adopting KM projects to enhance productivity and the quality of work. However, despite the ready availability and high quality of the IT infrastructure, which has been the case since the 1970s, there is still a need to enhance the current systems and technology to meet new KM processes and projects.

The study revealed the presence of some basic KM technologies in the Libyan oil sector, albeit minimal. In order to build a successful KM project and reap the substantial benefits, there remains a need to install the latest technologies, such as Intranet and business intelligence, knowledge base, collaboration, content and document management, portals, customer relationship management, data mining, workflow, search, and e-learning (Wong, 2005).

6.2.2.5 Organisational Culture

The results of the study clearly show that OC is another important factor affecting the successful implementation of KM (Davenport et al., 1998; Cameron and Quinn, 2005; Cooper and Quinn, 1993; McDermott, 2001; Twati, 2006; Al-Busaidi, 2005, 2007; Whitfield, 2008). The culture not only plays a crucial role in the adoption of new technology within organisations, it also affects the usage of IT. Indeed, many respondents in the study have stated that OC is affecting the adoption of new technology such as KMS in the Libyan oil sector. They stated that many senior managers, who were older and who had worked in the oil sector for a long time, were resistant to the adoption of new technologies, due to a reluctance to accept new ways of working.

6.2.2.6 Training and Education

> Training and education is another important consideration for successful KM. In a basic sense, organisational members need to be aware of the needs to manage knowledge and to recognise it as a key resource for the viability of a company. This issue can be addressed if proper basic training is provided to the employees. Through such training, they will have a better understanding of the concept of KM (Wong, 2005, p.272).

This study shows that there is a lack of experts in the Libyan oil sector to establish effective training programmes to provide employees with the knowledge and skills that they require to deal with new KMS technology. It also demonstrates that existing training programmes are not delivered at a high enough level to meet the requirements of KMS projects.

6.3 Summary

This chapter has proposed a number of conclusions, arising from the quantitative and qualitative results of this study. It has shown that there are three key factors playing a crucial role in KMS acceptance and adoption in the Libyan oil sector: organisational culture, training and education, and IT infrastructure all play a vital role.

Many of the findings in this research support the existing literature. The next chapter will present the conclusions drawn from these findings, their future implications, and their potential contribution to theory and practice.

7 Chapter 7: Conclusion

7.1 Introduction

The purpose of this study was to determine the critical success factors that have an influence on the adoption of KMS in the Libyan oil sector. Specifically, it described the influence of organisational culture, training and education, and the information technology infrastructure on the adoption of KMS in the Libyan oil sector. Furthermore, the study investigated how the factors mentioned above influence acceptance of KMS as new technology in relation to the technology acceptance model (Davis 1989; Davis 1996; Venkatesh & Davis 2000; Hsiao & Yang 2011).

7.2 Overview of Thesis

The first chapter presented an introduction to the study and the background to the research within the IS domain. It also provided an explanation of areas of concern, and the motivation underlying the research.

The second chapter provided a broad review of the literature on KM, KMS, and the critical success factors related to their acceptance, including organisational culture, training and education, and IT infrastructure. In order to define OC, the study relied on the Cameron's Organisational Culture Assessment Instrument (Cameron 1999; Cameron & Quinn 2005; Cameron & Quinn 2011).

The third chapter presented the theoretical framework, and provided a detailed description of the technology acceptance model (TAM), including its historical background. The chapter also introduced an extension of TAM, to be applied as a conceptual model for this study. Finally, the development of the research hypotheses, based upon the research model variables, was presented.

The fourth chapter provided an outline of research methodologies, including research paradigms in IS. It outlined the selection of a pragmatic mixed-methods research

paradigm for the study, chosen in order to gain a wider profile of the research context. It also presented a description of the fieldwork conducted in the Libyan oil sector.

The fifth chapter presented the associated data analysis and results of the study, both quantitative and qualitative. This chapter included reliability analysis, sample analysis, an OC profile based on OCAI, and testing of the research hypotheses. It presented results of the analysis from qualitative data, including interviews and documents, which were subjected to reliability and validity analysis, and finally extracted the critical success factors for the adoption of KMS in the Libyan oil sector.

Chapter 6 provided a detailed discussion of the research findings, linking them to the literature review. The aim of this chapter was to present the current situation regarding the acceptance of KMS in the Libyan oil sector, with the aim of persuading the sector to adopt KMS successfully. Finally, this chapter was designed to outline the research context, to provide further theoretical and practical implications for the advancement of knowledge within the IS domain.

7.3 Summary of Research Methods

This research adopted a mixed-methods research approach to the study of phenomena, by using multiple data collection techniques to generate multiple datasets (Creswell & Clark 2010). Research was undertaken with the aim of collecting empirical data based primarily on three sources: a survey, semi-structured interviews, and documents provided by the organisations concerned. The researcher used both qualitative and quantitative research methods, through the utilisation of the survey and semi-structured interviews for data collection, and also used thematic and statistical analysis. This mixed-method approach was followed in order to investigate the current use of IT in general, and KMS in particular, in the Libyan oil sector, seeking to predict and understand the acceptance of KMS. The results of the multiple data sources, along

with knowledge gained during fieldwork, offer an opportunity for the researcher to contribute both theoretically and practically to this research area.

7.4 Conclusions and Implications of the Research

Research Question 1

What factors influence the adoption and acceptance of Knowledge Management Systems in the Libyan oil sector?

From the literature review it can be inferred that there are many factors that influence the successful adoption of KMS. The findings of the survey and interviews suggest that an extension of the Technology Acceptance Model should include three new dimensions. The first, concerning organisational culture, includes three components. The second dimension is concerned with training and education; whilst the third relates to the information technology infrastructure. The relationship between these factors and the attitude and behaviour of employees was examined in terms of putting KMS to good use. The extension includes specific issues, such as organisational and educational and technology factors. More precisely, the issues of OC and training and education are related to the IT infrastructure of the oil sector itself. The results from the survey and qualitative analysis illustrated that there is a high correlation between OC and adoption of KMS, based upon the results of the hypothesis testing, which showed a high correlation between the hierarchy as the dominant culture type in the Libyan oil sector, and KMS acceptance. Such findings could encourage the National Oil Corporation to accelerate its efforts to adopt such technology, in order to increase productivity and global competitiveness. The hypothesis related to the hierarchy culture was supported by research results and by the literature review, which concluded that there is a positive relationship between it and IT adoption (Cooper and Quinn, 1993). The research hypothesis concerning the relationship between training

and education and KMS acceptance was confirmed, based on the study findings and on quantitative results, showing a direct correlation between training and education as an external factor to TAM and the acceptance of new technology. The qualitative analysis adds support to this finding, based on the outcome of the interviews conducted with managers of IT departments in the Libyan oil sector, who stated that there is strong interest amongst senior management for presenting advanced training programmes for their employees, both at home and abroad (Annual Report of the National Oil Corporation, 2009/2010). Such training could be effective in enabling employees to become more familiar with advanced technologies. Finally, the research hypothesis regarding IT infrastructure was confirmed by the quantitative results, revealing a direct relationship between IT and PU and PEOU. This showed that there was high acceptance of KMS, with other relationships between internal variables of TAM also being supported and confirmed. The results of the qualitative analysis supported this conclusion, based on the availability of advanced IT in the Libyan oil sector, resulting from the financial resources allocated to it.

Research Question 2

How can the traditional Technology Acceptance Model (TAM) be used to study these factors within the Libyan context?

The results of the quantitative analysis of the survey responses, along with the outcome of the interview analysis, confirmed all the relationships in the traditional TAM, as well as revealing the importance of OC and its associated dimensions, in addition to training and education and IT infrastructure. PU as an internal variable was confirmed as providing a diagnostic insight into user attitudes towards using KMS, and intentions to use it. PU also has a direct relationship with and exerts influence on intention to use, over and above its influence on attitude. PEOU was also shown to be

a major determinant of attitude towards using KMS. However, there remain many factors that could affect the success and effectiveness of KMS in the Libyan oil sector (Al-Mabrouk, 2006). The areas of analysis in this study were chosen based on an exploratory survey and literature review, which identified the factors that have the most influence on IT adoption in developing countries and Libyan context. The results of this research confirm the main TAM relationships, but this may not be of much use without the moderating external variables, which allow for its adoption in diverse environments. This study has investigated these factors; however, more research is needed. It may be that OC cannot be so explicitly determined and, therefore, that an empirical model such as TAM may have limited practical application in guiding technology adoption in developing countries. It may also be that a complex mix of culture types, economic conditions and technical ability needs to be considered in different sectors.

Research Question 3

How do the organisational culture, training and education, and IT infrastructure affect the adoption of KMS in the Libyan oil sector?

The results of the study reveal that the Libyan oil sector has the ability and the desire to adopt advanced IT in its work, to enhance productivity and quality, in order to improve efficiency and enable it to remain competitive in the growing oil market. The study results also show that OC not only plays a key role in IT diffusion, but also influences IT usage. This finding is supported by the results from the survey and interviews. Moreover, the research results show a direct relationship between the training and education dimension and the level of acceptance of KMS as a new technology. The employees with qualifications in IT or related to IT, or who have attended IT training courses, revealed a greater tendency to use and accept KMS. With

regard to IT infrastructure, the key element in the acceptance process was the availability of advanced IT, which allowed employees to be more open to it; this is reflected in their acceptance of new technologies, including KMS. This will provide employees with an effective tool for adopting KMS, to better guarantee successful implementation of advanced IT.

7.5 Implications and Benefits of Research

A number of implications can be drawn from these conclusions. KMS are a critical tool for the Libyan oil sector, and should play a leading role in enhancing productivity and competitiveness. This study imparts three important implications for the Libyan oil sector.

First, the study provides a general guide to user behaviour for IT department managers, before they make huge investments in new technology. Because employees' previous tendencies to resist the adoption of new technology may have been related to their attitudes towards past experiences with such technology, the failure to adopt good quality KMS can lead to poor acceptance of the technology and thus result in the waste of costly investment. This study also revealed the importance of considering issues such as organisational culture, training and education, and IT infrastructure within the Libyan oil sector.

The second implication is to provide better understanding of employees' acceptance of knowledge-sharing applications, such as KMS. More specifically, the research has produced a validated instrument to measure the acceptance of KMS. The findings have implications for predicting future user problems, and determining ways to improve employees' acceptance and usage of KMS, as well as determining why these technologies might be used.

The third implication of this research is that it offers a validated tool to IT department managers to determine which type of KMS they will adopt in the first instance, and

which type to adopt in later stages, depending on the level of acceptance of KMS technology by employees.

7.6 Research Contribution

The research contribution has three perspectives: theory and knowledge, methodology and practice, and management. The research contribution diagram has been designed based on modification of Checkland's (1995) FMA model of 'any piece of research' (Figure 7.1) from a mixed-methods perspective (Figure 7.2).

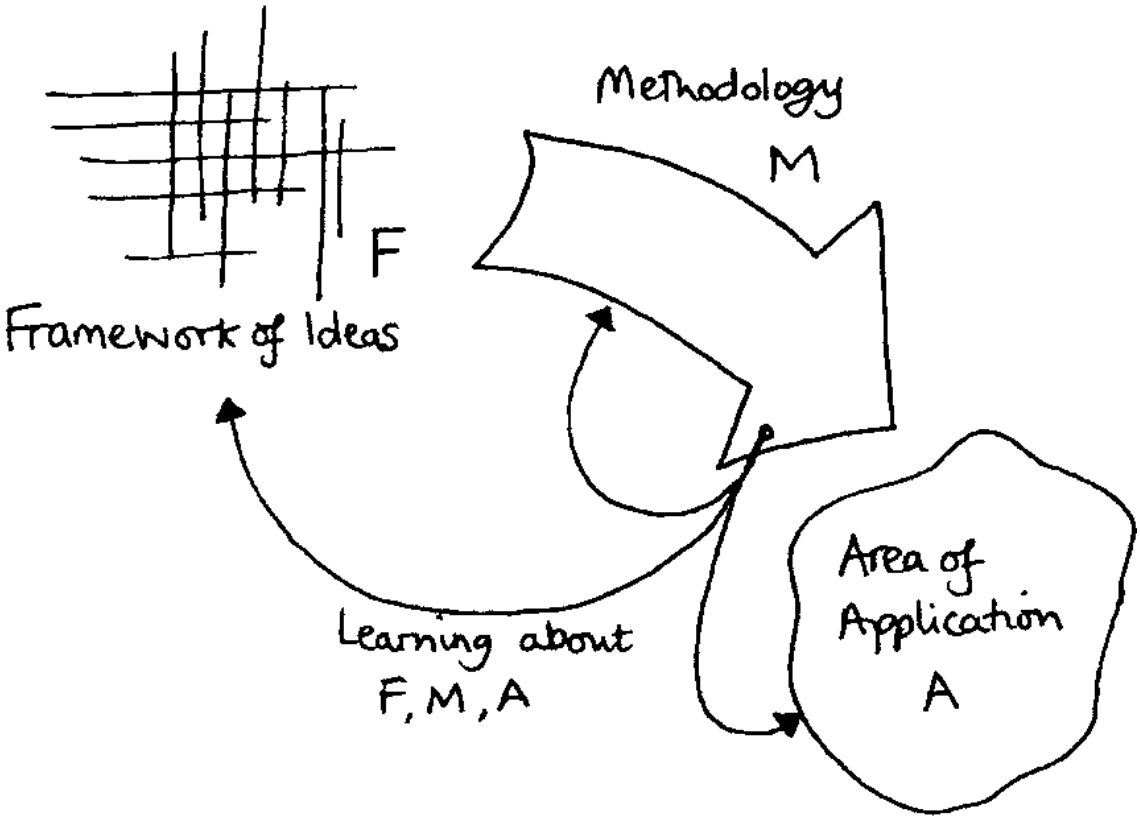

Figure 7.1 The FMA model of 'any piece of research' (Checkland, 1985)

The model recasts the contributions of this research, the numbers 1, 2 and 3 representing the three stages in the FMA model.

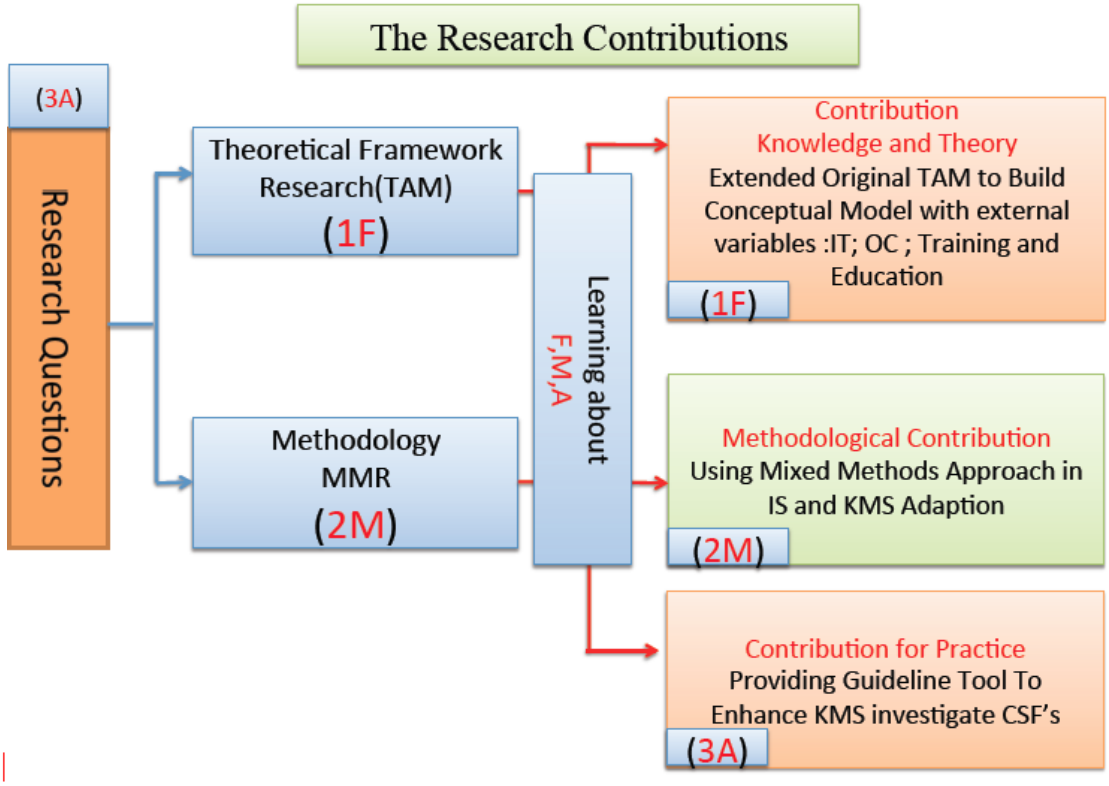

Figure 7.2 The Research Contributions

7.6.1 Contributions to Knowledge and Theory

The most important contribution of this research is the development of the Technology Acceptance Model with external variables to include the theory of OC, which adds reliance on the assessment instrument (OCAI), training and education, and IT infrastructure.

- This study has been applied to the oil sector in Libya as a developing country within a different context and culture to that for which TAM was created.
- While technology adoption and acceptance have long been attractive research topics, few empirical studies have investigated why organisations accept or reject KMS adoption in the Libyan context. Moreover, most previous studies have been conducted in developed and western countries. This study is intended to fill a gap from both perspectives: technology acceptance and the case of

Libya.

- This study has produced results based on integration and a defined conceptual model of KMS adoption in the Libyan oil sector, providing a theoretical contribution to this research by expanding the TAM, adding external variables to answer the research questions.
- The study has sought to explain and predict the factors that influence the adoption and acceptance of KMS in the Libyan oil sector. Conducting and testing hypotheses that were endorsed by the literature obtained empirical support for the study.
- The study has developed a unique survey instrument, by merging survey questions with questions from OCAI. Both investigative tools helped to answer the research questions.

7.6.2 Contributions to Methodology

From a methodological perspective, this research has made a contribution to the IS domain, by conducting mixed-methods research, which few previous studies have adopted. Mingers (2003, p. 233) stated that it has commonly been argued that the use of different research methods within the IS discipline and within individual pieces of research will produce richer and more reliable results. In survey work regarding the extent of mixed-methods research in the IS literature, it was revealed that such work is relatively scarce and, where it does occur, it involves only a small set of traditional methods. Williams, Dwivedi et al. (2009), in an extensive study of research techniques in IS, stated that only six papers out of 301 (i.e. 2%) included in the study used mixed-methods research. Dwivedi et al. (2011) revealed in their study on research trends in KM that just 19% of their research samples in the period 1974-2008, including 1,043 articles on KM, were conducted using mixed-methods research.

The main objective of this study was the investigation of KMS in the Libyan oil sector. The study was carried out using mixed-methods research to validate the research findings.

The contribution of this research approach is that there are few studies using mixed-methods research in the IS field, as discussed above. The majority of IS research uses case studies and a qualitative approach to investigate phenomena. Thus, this study merges both qualitative and quantitative methods to investigate the acceptance of KMS in the Libyan oil sector, with the TAM providing the theoretical background to the empirical analysis.

7.6.3 The Contributions to Management and Practice

This study has investigated the Libyan oil sector, revealing that companies plan to adopt KMS. Although some senior managers may have offered some resistance to adopting IT, based on the research findings, they may rethink this issue when presented with evidence of the highly successful KMS initiatives of other leading companies in the global oil sector, such as BP.

In terms of management and practice, the findings of this research have significant implications for IT departmental managers, who are responsible for plans to adopt KMS in the Libyan oil sector. They should consider the importance of factors such as OC, training and education, and IT infrastructure and their availability in the oil sector, as well as the factors that influence the acceptance of KMS, including PEOU, PU and their relationship with behaviour towards using such systems. Employees should therefore be involved and participate in the adoption of KMS, with assurances that they obtain the training necessary to build their capability to use these systems.

Moreover, the managers of IT departments should ensure that KMS technologies are

easy to use and can support employees in fulfilling their duties and improving their productivity. Theoretically, the findings of this research study have revealed that perceived usefulness, attitude towards using and perceived ease of use significantly influences the adoption of KMS.

The managers of IT departments can improve the adoption of KMS by aiming to increase PU, ATU, and PEOU. These aims can be achieved by educating employees and enhancing their capabilities in KMS, through the provision of user education and training programmes. Similarly, acceptance of KMS will be more likely if employees are provided with an IT infrastructure that allows them to gain the required individual preparation in the new technology.

7.7 Recommendations

From the results of this research, a set of recommendations are presented that may provide guidelines for the oil sector in planning successfully for the introduction of KMS in their organisations. There is a need to raise awareness of the benefits of KMS within the oil sector, and to train employees to make effective use of IT. Senior management in the oil sector can play an important role in ensuring that employees are fully involved in the KMS adoption process.

The oil sector needs to make huge investments in KM technologies, and to improve their IT infrastructure, in order to replicate the developments in KMS around the world. Emphasis should be given to increasing PC and Internet access wirelessly and providing appropriate devices to employees. The oil sector must work closely with the Libyan government and its agencies in order to develop the telecommunications services nationally that will play an important role in improving links between the oil companies and their sites around the country. To achieve a high level of acceptance of new technology like KMS from employees, the oil sector has to include the provision

for the development of advanced skills in IT training programmes, within a continuous policy of training and development.

The oil sector has to adopt organisational change in order to strengthen the use of IT in general and KMS in particular, to secure a competitive advantage in the rapidly developing oil marketplace.

7.8 Limitations of the Study

There are a number of limitations of this research, all related to the sample size used.

Firstly, the size of the sample that was analysed using the quantitative method was relatively small (n = 150), in terms of looking at a population's attitude and behaviour towards using and accepting KMS technologies. Similarly, the qualitative method involved a limited number of interviews (seven semi-structured interviews); and the data analysis was also limited due to time restrictions.

The current study adopted a cross-sectional design, which was conducted at one point in time. This cross-departmental study therefore represents only one timeframe, and does not show how an individual's behaviour may change after the long-term use of technology. Future research could be designed to determine whether or not an individual's attitude towards the adoption of KMS technology changes over time. While this research presented a useful set of usage data, thus helping to explain the acceptance of KMS, it does not explain possible change in employee attitudes over time. It is generally recognised that longitudinal research studies, or a series of cross-sectional studies, may help to identify such changes of attitude over time.

Finally, this study was conducted within the Libyan oil sector, and to strengthen the findings of the research, future investigations should be conducted in a cross-organisational environment and include the wider public sector in Libya.

7.9 Implications for Future Study

The implications of this research study are important and substantial for KMS adopters, practitioners, developers, vendors, and academics who have an interest in the adoption of KMS in the Arab world and other developing countries. There is a shortage of research in the IS literature regarding the influence of organisational culture and IT infrastructure on the adoption of KMS in developing countries. Thus, this research could be used as a potential base for further research.

Future research efforts surrounding KMS should be directed towards other public sector industries in Libya and other similar countries. This would provide a better understanding of organisational culture, IT infrastructure, and training and education in the wider Libyan economy. It would also be interesting to investigate the interrelationships between the sets of independent variables and KMS adoption, exploring how they interact in determining how extensively they are implemented in different industry sectors and across different sized organisations. This research could be replicated in different industry sectors including SMEs, and in other developing countries with similar economic conditions but with different organisational cultures, quality of IT infrastructure, and training and education programmes.

Based on the research findings, the research model devised for use in this study could be adopted for further research on KMS adoption in other developing countries, based on environmental, situational and cultural factors.

Another extension of this work would be to adopt different instruments and models for assessing IT adoption, for example, using the Task-technology Fit (TTF) theory as a research model to assess the influence of organisational culture, training and education, and the quality of IT infrastructure.

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9 Appendices

9.1 Appendix 1: The survey

Study of Critical Success Factors in Adopting Knowledge Management Systems for the Libyan public Oil Sector

Dear/ participant

Thank you for showing an interest in this research project. Please read this information sheet carefully before deciding whether or not you wish to participate. Participation in the study is entirely up to you.

I am conducting a survey as partial fulfilment of the requirements for the degree of Doctor of Philosophy in Information Systems in Manchester Business School at the University of Manchester United Kingdom. My doctoral research concern is to determine the factors that influence Knowledge Management Systems adoption in the oil sector in Libya. More specifically, this study will investigate the adoption of this kind of information technology and identify the problems that individuals and organisations encounter while adopting Knowledge Management Systems.

Description: The purpose of this survey is to provide and identify the cultural issues, education and training level, and information technology used in the oil sector. This questionnaire starts by capturing background information about yourself. It is estimated that it will take approximately 20 minutes to complete the survey. All survey items are confidential and will be solely used to serve the purpose of this PhD work.

Your help and participation is highly respected.

Confidentiality: your responses will be treated in strict confidence by the researcher and Manchester Business School,. Any result reported will be done in aggregate to protect your anonymity and will not show any participant or organisation your identity.

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Section 1: – Personal Information
-Please tick the most appropriate answer:.
A1. What is your gender?

Male ( )
Female ( )
A2.What age group are you in?
18 – 25 years ( )
26 - 35 years ( )
26 - 45 years ( )
46 – 55 years ( )
55 and above ( )
Section 2: Training and Education
B1. Define your education level:
High school ( )
Community degree ( )
Bachelor degree ( )
Master degree ( )
Doctoral degree ( )
B2. Was your education in Information Technology (IT) or related area of IT?

Yes, in. …… No, in……

B4. Have you attended any training courses in IT during your work?
Yes …… No ……
B5. How long have you been working in the oil sector?
1-5 years ( )
6-10 ( )
11-20 ( )
More than 20years ( )
B6. How long you have been using computers in general? *Please specify (…….) in years.*

B7. How many years have you been using the Internet? *Please specify (……..) in years*.

Section 2: Organisational culture:

In this section we are going to characterise your organisation's culture. This part consists of 6 questions where you are asked to rate your organisation. Each question has four alternatives. Divide 100 points among the four alternatives depending on the extent to which each alternative fits your own organisation. Give a higher number of points to the alternative that is most appropriate to your organisation (for example, in question1 ,if you think

C1. Dominant Characteristics		**Points**
A	The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves	
B	The organization is a very dynamic entrepreneurial place. People are willing to stick their necks out and take risks.	
C	The organization is very results oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.	
D	The organization is a very controlled and structured place.	

	Formal procedures generally govern what people do.	
Total		**100**

C2. Organisational Leadership		**Points**
A	The leadership in the organisation is generally considered to exemplify mentoring, facilitating, or nurturing.	
B	The leadership in the organization is generally considered to exemplify entrepreneurship, innovating, or risk taking.	
C	The leadership in the organization is generally considered to exemplify a no-nonsense, aggressive, results-oriented focus	
D	The leadership in the organization is generally considered to exemplify coordinating, organizing, or smooth-running efficiency	
Total		**100**

C 3. Management of Employees		**Points**
A	The management style in the organization is characterized by teamwork, consensus, and participation	
B	The management style in the organization is characterized by individual risk-taking, innovation, freedom, and uniqueness.	
C	The management style in the organization is characterized by hard-driving competitiveness, high demands, and achievement.	
D	The management style in the organization is characterized by security of employment, conformity, predictability, and stability in relationships	
Total		**100**

C4. Organization Glue		**Points**
A	The glue that holds the organization together is loyalty and mutual trust. Commitment to this organization runs high	
B	The glue that holds the organization together is commitment to innovation and development. There is an emphasis on being on the cutting edge	
C	The glue that holds the organization together is the emphasis on achievement and goal accomplishment. Aggressiveness and winning are common themes.	
D	The glue that holds the organization together is formal rules and policies. Maintaining a smooth-running organization is important.	
Total		**100**

C5. Strategic Emphases		**Points**
A	The organization emphasizes human development. High trust, openness, and participation persist	

B	The organization emphasizes acquiring new resources and creating new challenges. Trying new things and prospecting for opportunities are valued	
C	The organization emphasizes competitive actions and achievement. Hitting stretch targets and winning in the marketplace are dominant..	
D	The organization emphasizes permanence and stability. Efficiency, control and smooth operations are important.	
Total		**100**

C6. Criteria of Success		**Points**
A	The organization defines success on the basis of the development of human resources, teamwork, employee commitment, and concern for people.	
B	The organization defines success on the basis of having the most unique or newest products. It is a product leader and innovator.	
C	The organization defines success on the basis of winning in the marketplace and outpacing the competition. Competitive market leadership is key.	
D	The organization defines success on the basis of efficiency dependable delivery; smooth scheduling and low-cost production are critical.	
Total		**100**

Section3. Technology Acceptance

Please answer the items below writing beside each item a number from the scale below. Please write your answer numbers clearly and if you want to correct your answer, erase the wrong answer carefully first.

1	**2**	**3**	**4**	**5**
Strongly agree	Agree	Neutral	Disagree	Strongly disagree

D1. Using KMS in my job would enable me to accomplish tasks more quickly. ( )

D2. Learning to operate KMS would be easy. ( )

D3. Using KMS technology would improve my job performance. ( )

D4. I would find KMS technology easy to use. ( )

D5. Using KMS would enhance my effectiveness on the job. ( )

D6. I would find it easy to get KMS to do what I want it to do. ( )

D7. I would find KMS useful in my job. ( )

D8. My interaction with KMS would be clear and understandable. ( )

D9. Using KMS would make it easier to do my job. ( )

D10. It would be easy for me to become skilful at using KMS. ( )

D11. Using KMS in my job would increase my productivity. ( )

D12. I would find KMS to be flexible to interact with. ( )

Please, circle around the number which expresses the degree of your Favourableness or unfavourableness towards using KMS.

D13. Using KMS is a good idea ( )

D14. I like the idea of using KMS ( )

D15. Using KMS would be pleasant ( )

D16. I dislike the idea of using KMS ( )

9.2 Appendix 2: The survey Arabic copy

بداية شكرا لأهتمامكم الشخصى بالمساهمة فى هذا البحث،هذا الاستبيان هو جزء اساسى من اتمام هذه الدراسة والتى تدور حول العوامل المؤثرة فى تبنى واستخدام نظم إدارة المعرفة كوسيلة جديدة لتعزيز وتطوير العمل بالمؤسسات النفطية الليبية، ونظرا لما للتقنيات الحديثة من دور هام فى الرقى بكفاءة العمل الادارى والفنى بالمنظمات والمؤسسات المختلفة فاننى مقدم على اجراء هذه الدراسة كجزء من متطلبات الحصول على الدرجة الدقيقة (الدكتوراه) في نظم المعلومات بكلية ادارة الاعمال بجامعة مانشيستر بالمملكة المتحدة وعنوا ن الدراسة هو:

"دراسة العوامل المؤثرة فى نجاح تبنى نظم ادارة المعرفة فى قطاع النفط العام الليبي"

تتناول هذه الدراسة بالبحث والتحليل العوامل المؤثرة مثل الثقافة التنظيمية ، التدريب والتاهيل والبنية التحتية لتقنية المعلومات بحيث نتوصل الى توقع مدى امكانية تبنى هذه النظم التكنولجبة الحديثة وايضا مدى استعداد المنظمات والافراد لاستخدامها فى تنمية وتطوير العمل بمؤسساتهم ، وفى هذا الاطار فأن الباحث وجامعة مانشيستر بناء على القيم الاخلاقية للبحث العلمى يتعهدان بالحفاظ على سرية البيانات وان شخصية المشاركين والمؤسسات التابعين لها ستكون طى الكتمان ولن يصرح بها لاى كان ولن تستخدم الا لاغراض البحث العلمي.

والسلام عليكم ورحمة الله وبركاته

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معلومات عامة حول الاسبيان

يتكون هذا الأستبيان من ثلاثة اقسام رئيسية :

قسم المعلومات العامة عنك وعن المنظمة التى تعمل بها.
قسم الثقافة التنظيمية.
قسم قبول تكنولوجيا ونظم ادارة المعرفة.

الرجاء الاجابة عن جميع الاسئلة وان تتفضل باتباع الارشادات التالية:

ان تكون من العاملين فى احدى الشركات النفطية المملوكة بالكامل للمؤسسة الوطنية للنفط.
لايشترط ان تكون انت ومؤسستك (شركة،ادارة....الخ) من مستخدمى تكنولوجيا الحاسب او ادارة المعرفة او نظم المعلومات بصفة عامة.
الرجاء عدم التفكير كثيرا فى الاجابة لانه ليس هناك اجابة خاطئة بل فقط تختار ماينا سبك او تعطى قيمة رقمية لكل خيار كلما طلب منك ذلك .
حاول الاجابة على الاستبيان بالكامل دفعة واحدة.
الرجاء قراءة التعليمات الخاصة بكل سؤال بعناية.
نظرا لأهمية الوقت للباحث فأننى أمل منكم ارسال هذاالاستبيان فورتعبئته الى الشخص المسئول عن تجميعه او الى عنوان الجامعة او ادارة الحاسب الالى بالمؤسسة الوطنية للنفط او الى البريد الاليكترونى التالى:
soleman.saleh@postgrad.manchester.ac.uk
يمكنك ايضا اذا رغبت تعبئة الاستبيان عبر الانترنت على بنسخ الربط التالى على متصفحك والاجابة على الاستبيان مع ملاحضة انه يمكنك فقط الاجابة بطريقة واحدة اما على الانترنت او على النسخة الورقية . الرابط هو :
http://theuniversityof.oilsectorkms.sgizmo.com/. http://s-atz1n-41396.sgizmo.com

يمكنك الاتصال بى لو رغبت فى اى تعليق على الهاتف: 0928716911 او 00447733317902 فى بريطانيا
وسنقوم بالرد عليك بمجرد ظهور رقمك على الهاتف فى بريطانيا.
المقصود بنظم ادارة المعرفة التكنولوجيات التالية:

ا. تقنيةادارة الوثائق والمحتويات Document and content management
ب. ادارة خرائط التدفق Workflow management.
ج. شبكة الانترنت المحلية (انترانت) Intranet
د. تقنيات للتبادل الافكار وانجاز الاعمال مشاركة مع الاخرين عن بعد اليكترونيا Groupware
هـ. مستودعات البيانات الاليكترونية Data warehousing
و. نظم الاعمال الذكية Business intelligence.
ز. نظم دعم مجموعات العمل اليكترونيا Group support systems (GSS)
ح. نظم التدريب عبر الانترنت او من خلال شبكة داخلية Computer based training (CBT) tools and learning environments(وتعرف ايضا بـ Web CT)
ط. نظم الاتصال المختلفة Communication systems.
ك. نظم الذكاء الصناعى Artificial Intelligence (AI) technologies.
ل. البريد الاليكترونى Email.

القسم الاول: معلومات عامة

1. فضلا حدد الجنس

ذكر	
انثى	

2 . حدد الفئة العمرية التى تنتمى اليها حسب السنوات

25 -18	35 26	44 36	55 -46	55 واكثر

3. فضلا حدد مستواك التعليمى

اعـدادى	ثانـــوى	جامعى (جامعى يشمل المعاهد العليا)	دراسات عليا ماجستير، دكتوراه

4. هل دراستك فى مجال تقنية المعلومات او له علاقة وثيقة بها

نعم	
لا	

5. فضلا حدد عدد سنوات استخدامك للحاسب بصفة عامة.

اقل من 5 سنوات	10 6	15 11	20 16

6. فضلا حدد عدد سنوات استخدمك للانترنت.

من1 5 سنوات	10 6	15 10

7. هل تحصلت على اى برامج تدريبية فى مجال تقنية المعلومات:حاسوب،شبكات ، برمجة...الخ خلال عملك فى الشركة.

نعم	
لا	

8. فضلا حدد عددسنوات عملك فى الشركة او المؤسسة.

1 – 5	10 -6	15 -11	20 -16	اكثر من عشرن سنة

القسم الثانى : ثقافة المنظمة :

هذا القسم يحتوى على ستة اسئلة لتقييم المؤسسة ،كل سؤال يحتوى على اربعة أجابات اختيارية والمطلوب منك توزيع 100 نقطة على هذه الاجابات، بحيث يصبح الاجمالى لهذه الاجابات مساوي100نقطة.

(مثال: السؤال الاول، لو انك ترى ان الخيار قريب جدا من منظمتكم والخيارين الثانى والثالث قريبين قليلا والرابع بعيد من مؤسستكم، عليه يمكن ان تقسم الدرجات على النحو التالى: 50

نقطة للخيار الاول و20 نقطة للخيار الثانى و25نقطة للخيار الثالث، ثم باقى النقاط للخيار الرابع....اى 5نقاط فقط ، وبالتالى يصبح المجموع 100 نقطة ؛ هذا على سبيل المثال فقط، وفى اجابتك يمكنك توزيع النقاط بطرق مختلفة وحسب ماتراه مناسبا).

ارجو التأكد من ان اجمالى النقاط للاجابات يكون مساويا لـ 100 نقطة لكل سؤال.

		النقاط
9. الصفات السائدة فى المؤسسة :		
1	**المؤسسة يسودها الطابع الشخصى، وهى مثل الاسرة الواحدة والافراد فيها متعاونون ومشتركون فى كثير من الصفات العامة بينهم.**	
2	**المؤسسة نشطة وحركية ، والموظفون بها مستعدون للمغامرة والخوض فى المخاطر والمنافسات فى مجال العمل.**	
3	**المؤسسة تركز على النتائج، والقلق الرئيسى داخل المنظمة هو انجاز الاعمال والموظفون متنافسون جدا.**	
4	**المؤسسة عبارة عن مكان عمل متحكم به ومنظم جدا ،والموظفون يتبعون الاجراءات الرسمية دائما ، والموظفون يقمون بأعمالهم وفقا للااجرأت الرسمية بصفة عامة.**	
الأجمـــــــــــــالـــــى		**100**

ارجو التأكد من ان اجمالى النقاط للاجابات يكون مساويا لـ 100 نقطة لكل سؤال.

		نقاط
10 نوعية القيادة داخل المنظمة		
	سياسة الارشاد والتسهيل القيادات فى المنظمة تعتبر بوجه عام تميل الى	
	القيادات فى المنظمة تميل الى العمل الحر والحث على التطوير والتحديث وتحمل المخاطرة	
	القيادات فى المؤسسة تميل بوجه عام الى الجدية فى العمل وذات طابع جدى، وتهتم بالنتائج فى العمل.	
	القيادات فى المؤسسة تميل بوجه عام الى التعاون وتنظيم العمل والاهتمام بأداءالعمل بكفاءة.	
الأجمـــــــــــــالـــــى		**100**

ارجو التاكد من ان اجمالى النقاط للاجابات يكون مساويا لـ 100 نقطة لكل سؤال.

		النقاط
11. ادارة الموظفين داخل المنظمة:		
1	**. اسلوب الادارة فى المؤسسة يتميز بروح الفريق والاجماع والمشاركة**	
2	**اسلوب الادارة فى المؤسسة يتميز بالمخاطرة الفردية والابتكار والحرية والتميز.**	
3	**اسلوب الادارة فى المؤسسة يتميز بمنافسة صارمة، الطلبات المتكررة والنجاح.**	
4	**اسلوب الادارة فى المؤسسةيتميز بتأمين الوظيفة، الالتزام،التنبؤ، الاستقرار فى العلاقة بين المؤسسة والموظف.**	
الأجمـــــــــــــالـــــى		**100**

ارجو التاكد من ان اجمالى النقاط للاجابات يكون مساويا لـ 100 نقطة لكل سؤال.

		النقاط
	12. الرابطة داخل المنظمة:	
1	**الربطة التى تميز وتسيطر بهذه المؤسسة والتى تساهم فى ترابطها معا هى الاخلاص والصدق المتبادل يرتقى بهذهالمنظمة الى الاعلى.**	
2	**الربطة التى تميز وتسيطر بهذه المؤسسة والتى تساهم فى ترابطها معا هى الالتزام بالابتكاروالتطوير، وهناك التشديدعلى المنافسة والتحديات الجدية.**	
3	**الربطة التى تميز وتسيطر بهذه المؤسسة والتى تساهم فى ترابطها معا هى التشديد على انجاز الاعمال، والوصول للهدف بجدية وصرامة تامة والفوز.**	
4	**الربطة التى تميز وتسيطر بهذه المؤسسة والتى تساهم فى ترابطها معا هى القواعد والسياسات والعلاقات الرسمية .**	
الأجمـــــــــــــــالـــــى		**100**

ارجو التاكد من ان اجمالى النقاط للاجابات يكون مساويا لـ 100 نقطة لكل سؤال.

		النقاط
	13.الاهتمام الاسترتيجى داخل المؤسسة :	
1	**المؤسسة تهتم وتشدد المنظمة على العنصر البشرى مع مستوى عالى من الثقة المتبادلة والانفتاح والمشاركة .**	
2	**المؤسسة تهتم وتشدد على الموارد الجديدة والحديثة وخلق تحديات والبحث عن الفرص .**	
3	**المؤسسة تهتم وتشدد على الاعمال التنافسية والانجاز وتلميع اهداف الامتداد والفوز بمكان مهيمن فى السوق.**	
4	**المؤسسة تهتم وتشدد على الدوام والاستقرار والفعالية، والسيطرة والعملبات البسيطة المهمة .**	
الأجمـــــــــــــــالـــــى		**100**

ارجو التاكد من ان اجمالى النقاط للاجابات يكون مساويا لـ 100 نقطة لكل سؤال

		النقاط
	14. معايير النجاح فى المنظمة:	
1	**تعرف المؤسسة النجاح على اساس تطوير الموارد البشرية وعمل الفريق والتزام الموظف، وتهتم بموظفى المؤسسة.**	
2	**تعرف المؤسسة النجاح على اساس الحصول على منتجات جديدة وفريدة ، وأنها سباقة للابداع والانتاج.**	
3	**تعرف المؤسسة النجاح على اساس الفوز فى السوق وسبق المنافسة وسياسة وقيادة التسويق والتحديات التنافسية اساسية.**	
4	**تعرف المنظمة النجاح على اساس الفعالية والتسليم الجدير بالثقة والتخطيط الانسيابى وانتقاد انتاج التكلفة المنخفضة .**	
الأجمـــــــــــــــالـــــى		**100**

القسم الثالث: قبول تكنولوجيا نظم ادارة المعرفة

(فضلا الرجاء اختيار الاجابة التى تراها مناسبة لرأيك امام الاسئلة التالية واذا رغبت فى تغير اجابتك يمكنك القيام بذالك مع الشطب على الاجابة غير المرغوبة بعنايه .)

15 استخدام تكنولوجيا المعلومات ونظم ادارة المعرفة فى عملى سيمكننى من انجاز المهام بسرعة وكفاءة اكثر.

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

16 تعلم وتشغيل نظم وتكنولوجيا ادارة المعرفة سيكون سهلا بالنسبة لى.

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

17 سيكون من السهل علىّ استخدام نظم أدارة المعرفة

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

18 استخدام تكنولجيا نظم ادارة المعرفة سيحسن فعاليتى اثناء العمل.

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

19 ستكون تكنولوجيا نظم ادارة المعرفة سهلة لتنفيد ماريدها ان تعمله.

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

20 ستكون تكنولوجيا نظم ادارة المعرفة مفيدة فى عملى.

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

21. تفاعلى مع نظم ادارة المعرفة وتقنياتها سيكون واضح ومفهوم.

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

. استخدام تكنولوجيا نظم المعلومات سيجعل عملى سهلا.22

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

23. سيكون من السهل علىّ ان اكون ماهرا فى استخدام تقنيات ادارة المعرفة.

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

. استخدام تكنولوجيا المعلومات فى عملى سوف يزيد من اءنتاجيتى.24

اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

.25. بالنسبة لى ستكون تقنية نظم ادارة المعرفة مرنة فى التفاعل معها

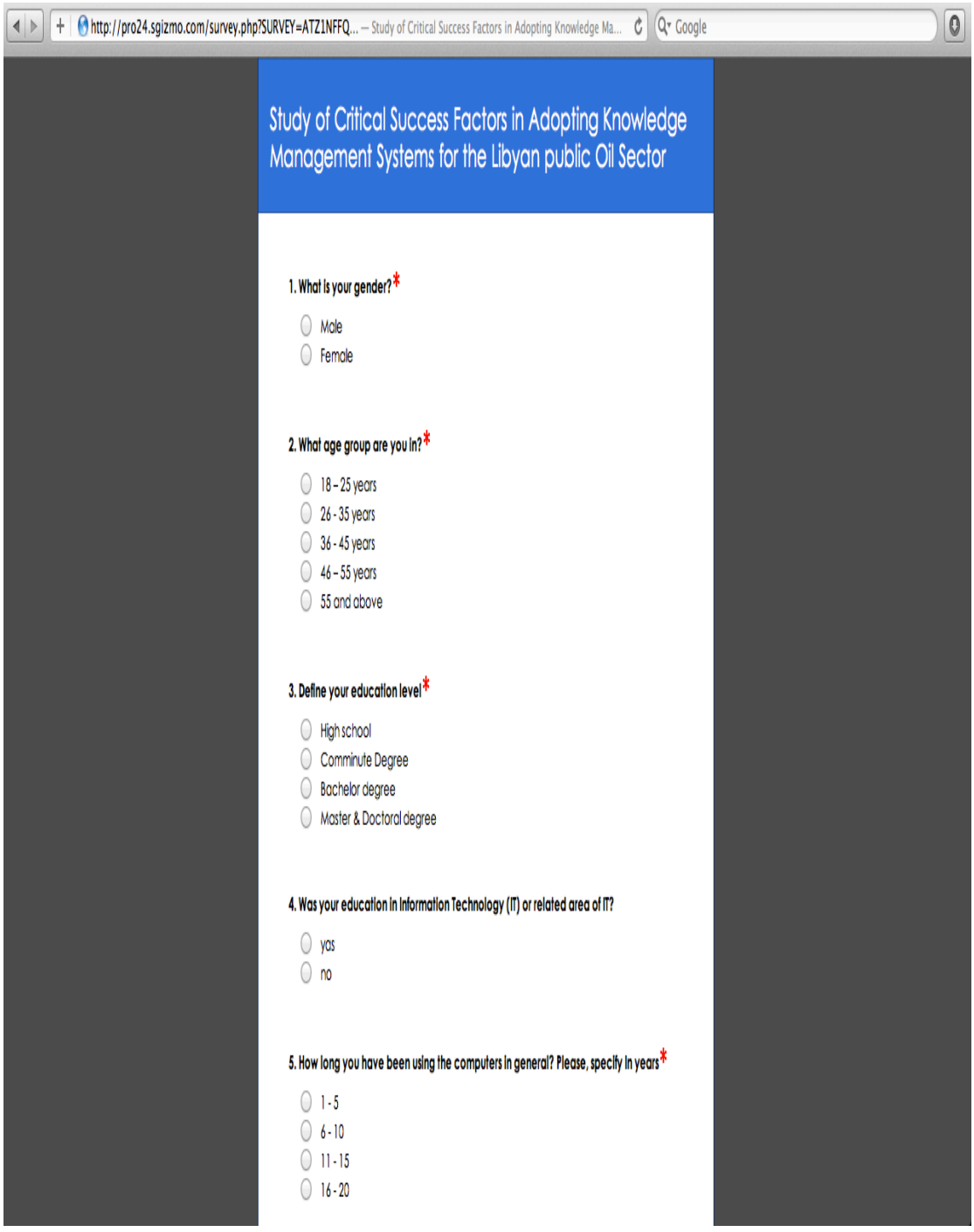
اوافـــق بشدة	اوافـــــــق	متـــــوسط	لاأوافـــــــق	لاأوافق بشدة
1	2	3	4	5

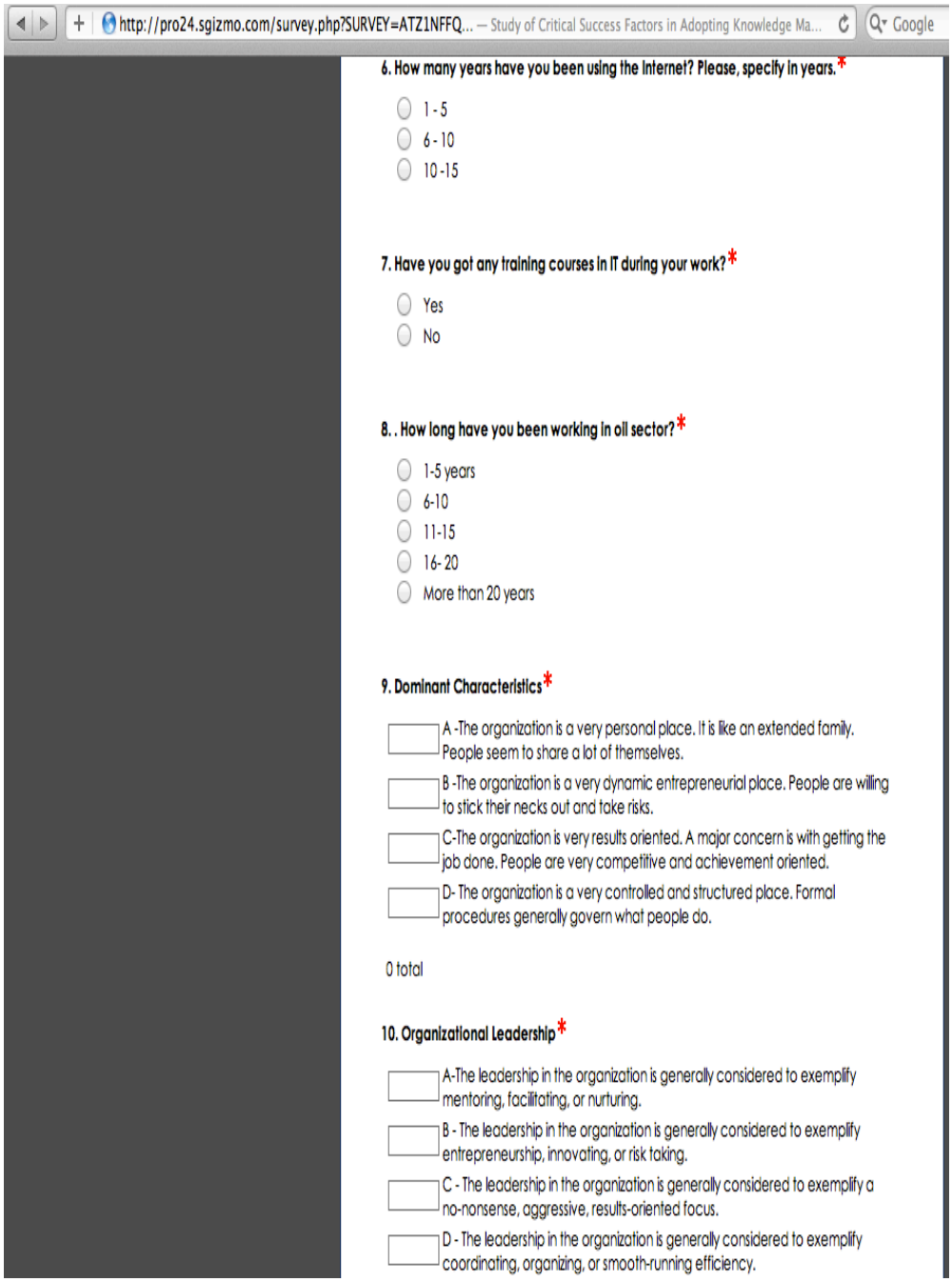
26. فضلا حدد من بين الخيارات التالية ما يعبردرجة عن رغبتك فى استخدام تقنية ادارة المعرفة

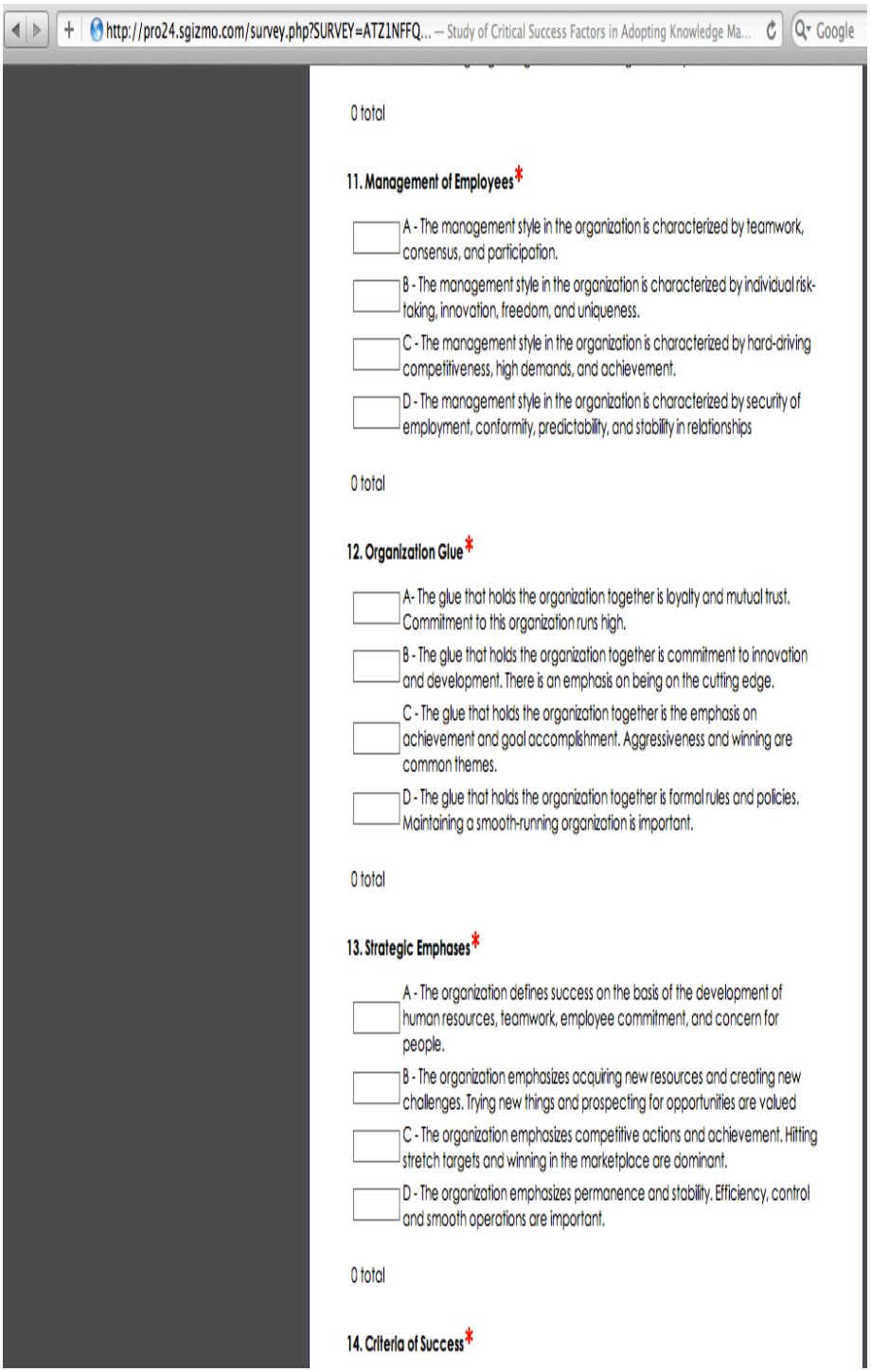
1 استخدام تكنولوجيا ادارة المعرفة سيكون فكرة جيدة . ( )
2 انا ارحب بفكرة استخدام تكنولوجيا ادارة المعرفة. ( )
3 استخدام تكنولوجيا ادارة المعرفة سيكون امرا ممتعا بالنسبة لى. ( )
4 انا لا اؤيد فكرة استخدام تكنولوجيا المعرفة . ( )

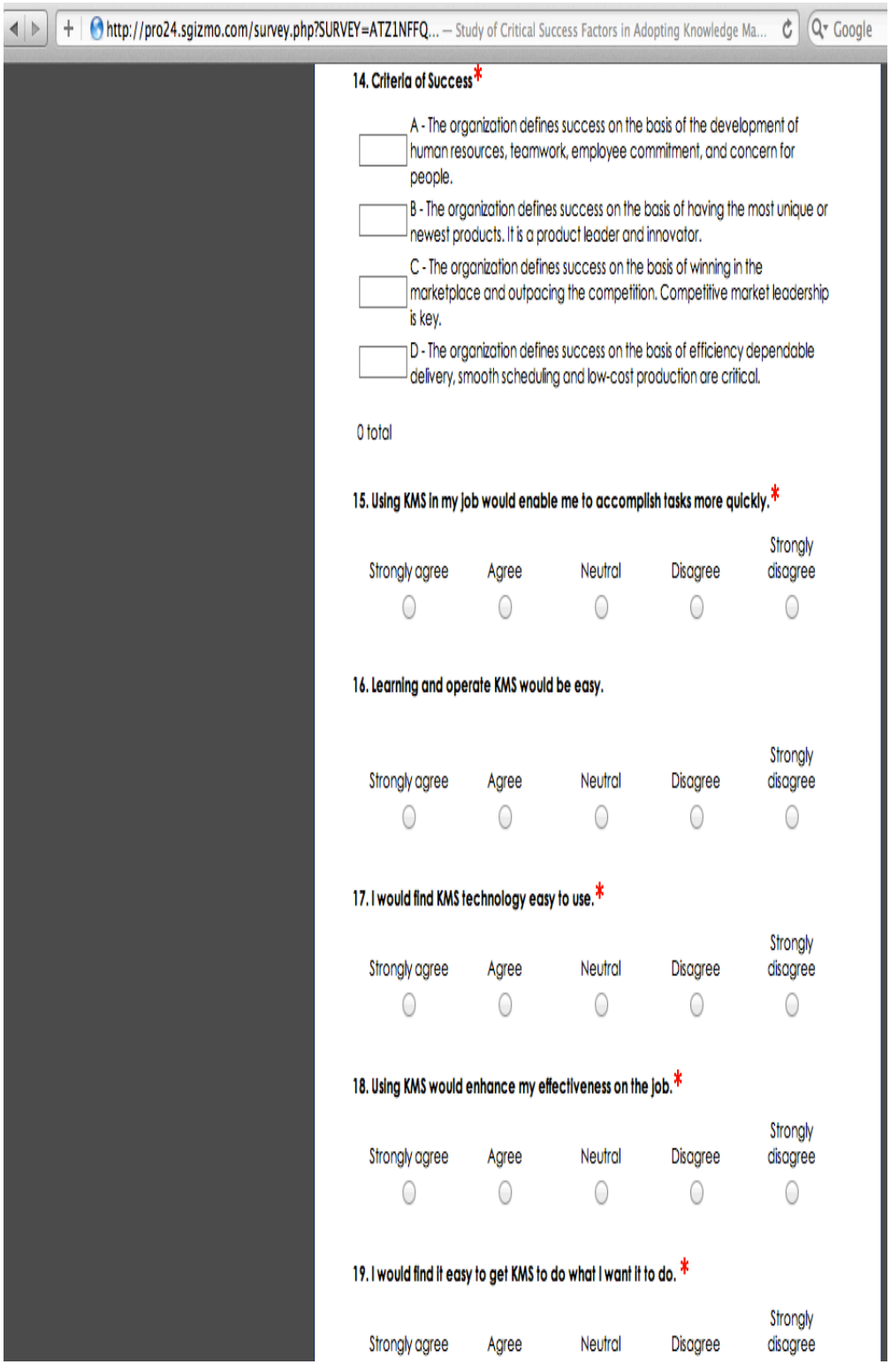
شكرا جزيلا لتعاونك معنا فى الاجابة على اسئلة الدراسة متمنين لكم دوام التوفيق فى اعمالكم خدمة للوطن

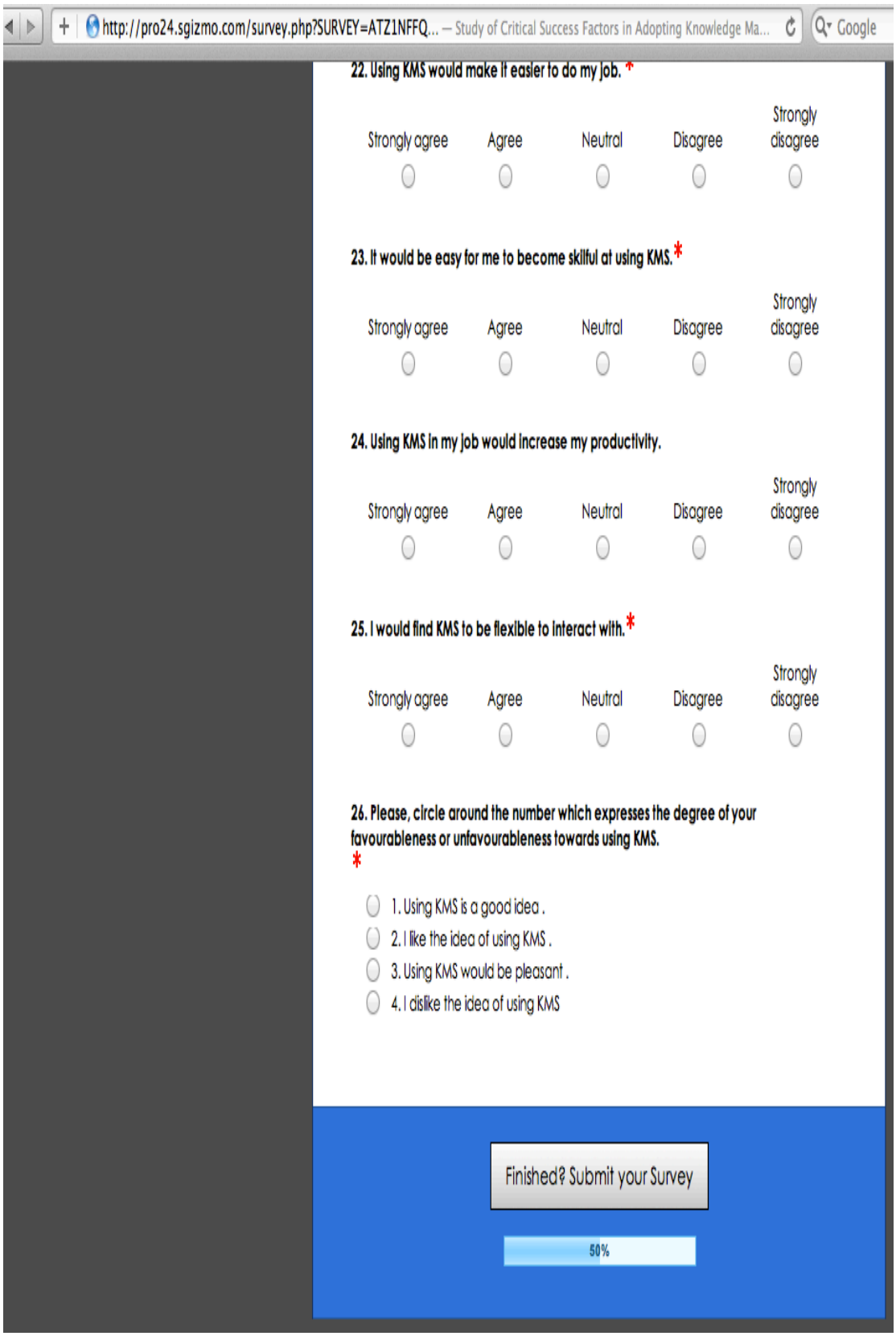
9.3 Appendix 3. Online Survey




http://pro24.sgizmo.com/survey.php?SURVEY=ATZ1NFFQ... — Study of Critical Success Factors in Adopting Knowledge Ma...
Google
6. How many years have you been using the Internet? Please, specify in years.*
1 - 5
6 - 10
10 -15
7. Have you got any training courses in IT during your work?*
Yes
No
8. . How long have you been working in oil sector?*
1-5 years
6-10
11-15
16- 20
More than 20 years
9. Dominant Characteristics*
A -The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves.
B -The organization is a very dynamic entrepreneurial place. People are willing to stick their necks out and take risks.
C-The organization is very results oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.
D- The organization is a very controlled and structured place. Formal procedures generally govern what people do.
0 total
10. Organizational Leadership*
A-The leadership in the organization is generally considered to exemplify mentoring, facilitating, or nurturing.
B - The leadership in the organization is generally considered to exemplify entrepreneurship, innovating, or risk taking.
C - The leadership in the organization is generally considered to exemplify a no-nonsense, aggressive, results-oriented focus.
D - The leadership in the organization is generally considered to exemplify coordinating, organizing, or smooth-running efficiency.


http://pro24.sgizmo.com/survey.php?SURVEY=ATZ1NFFQ... — Study of Critical Success Factors in Adopting Knowledge Ma...
Google
0 total
11. Management of Employees*
A - The management style in the organization is characterized by teamwork, consensus, and participation.
B - The management style in the organization is characterized by individual risk-taking, innovation, freedom, and uniqueness.
C - The management style in the organization is characterized by hard-driving competitiveness, high demands, and achievement.
D - The management style in the organization is characterized by security of employment, conformity, predictability, and stability in relationships
0 total
12. Organization Glue*
A- The glue that holds the organization together is loyalty and mutual trust. Commitment to this organization runs high.
B - The glue that holds the organization together is commitment to innovation and development. There is an emphasis on being on the cutting edge.
C - The glue that holds the organization together is the emphasis on achievement and goal accomplishment. Aggressiveness and winning are common themes.
D - The glue that holds the organization together is formal rules and policies. Maintaining a smooth-running organization is important.
0 total
13. Strategic Emphases*
A - The organization defines success on the basis of the development of human resources, teamwork, employee commitment, and concern for people.
B - The organization emphasizes acquiring new resources and creating new challenges. Trying new things and prospecting for opportunities are valued
C - The organization emphasizes competitive actions and achievement. Hitting stretch targets and winning in the marketplace are dominant.
D - The organization emphasizes permanence and stability. Efficiency, control and smooth operations are important.
0 total
14. Criteria of Success*


http://pro24.sgizmo.com/survey.php?SURVEY=ATZ1NFFQ... – Study of Critical Success Factors in Adopting Knowledge Ma...
Google
14. Criteria of Success*
A - The organization defines success on the basis of the development of human resources, teamwork, employee commitment, and concern for people.
B - The organization defines success on the basis of having the most unique or newest products. It is a product leader and innovator.
C - The organization defines success on the basis of winning in the marketplace and outpacing the competition. Competitive market leadership is key.
D - The organization defines success on the basis of efficiency dependable delivery, smooth scheduling and low-cost production are critical.
0 total
15. Using KMS in my job would enable me to accomplish tasks more quickly.*
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
16. Learning and operate KMS would be easy.
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
17. I would find KMS technology easy to use.*
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
18. Using KMS would enhance my effectiveness on the job.*
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
19. I would find it easy to get KMS to do what I want it to do. *
Strongly agree
Agree
Neutral
Disagree
Strongly disagree


http://pro24.sgizmo.com/survey.php?SURVEY=ATZ1NFFQ... – Study of Critical Success Factors in Adopting Knowledge Ma...
Google
22. Using KMS would make it easier to do my job. *
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
23. It would be easy for me to become skilful at using KMS. *
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
24. Using KMS in my job would increase my productivity.
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
25. I would find KMS to be flexible to interact with. *
Strongly agree
Agree
Neutral
Disagree
Strongly disagree
26. Please, circle around the number which expresses the degree of your favourableness or unfavourableness towards using KMS. *
1. Using KMS is a good idea .
2. I like the idea of using KMS .
3. Using KMS would be pleasant .
4. I dislike the idea of using KMS
Finished? Submit your Survey
50%

9.4 Appendix 4. The Interview

What is your gender?
Male ( )
Female ( )
What age group are you in?
18 – 25 years ( )
26 - 35 years ( )
26 - 45 years ( )
46 – 55 years ( )
55 and above ( )
How long have you been working the in oil sector?
1-5 years ( )
6-10 ( )
11-20 ( )
More than 20years ( )
Define your education level:
High school ( )
Community degree ( )
Bachelor degree ( )
Master degree ( )
Doctoral degree ( )
Overall, what is the average age of computing equipment at your organisation?
Lees than a Year. [ ]
1 – 3 years [ ].
3 – 5 years [ ].
More than 5 years [ ].
Don't know [ ].

What is the total number of staff at your organisation?
< 100 ( )
101 – 200 ( )
201 – 300 ( )
301 – 400 ( )
> 400 ( )
Do you use any of the following knowledge management systems in your organisation? (Check all that apply)
Document and content management
[ ]
Workflow management [ ]
Intranet
[ ]
Groupware
[ ]
Data warehousing
[ ]
Business intelligence
[ ]
Group support systems (GSS)
[ ]
Computer based training (CBT) tools and learning environments [ ]
Communication systems [ ]

Artificial Intelligence (AI) technologies [ ]
Email
[ ]

*Do you think that your organization is in need of knowledge management systems technology?

*What keeps your organization from acquiring, or making better use of computer information systems or management information systems?

*What is the total number of personal computers in your organization?

1	2	3	4	5
None	1-30	31-60	61-100	More than 100

*Overall, what is the average age of computing equipment at your organization?

1	2	3	4	5
Less than a Year	1-3 Years	3-5 Years	More than 5 yrs	Don't know

Approximately how long has your organization used computer systems other than personal productivity tools (e.g. word processing)?

1	2	3	4	5
None	1-2 Years	3-5 Years	6-10 Years	More than 10 Years

*Does your organisation have access to:
The Internet for electronic mail
The Internet for data searching and/ or file transfer?
A network to connect computers within your immediate locality.
A network to connect computers across multiple sites within your organization?

*Does your organization make use of any database packages?

Please answer the items below by writing beside each item a number from the scale below

1	2	3	4	5
0-10%	11-20%	21-40%	41-60%	More than 60%

*Please estimate the percentage of time computers are used on:
Organisation/Program administration (e.g., bookkeeping, financial management, data entry, or transaction processing).
Report generation (on sales, manufacturing, accounting)
Strategic decisions

*What percentage of that the staff with IT skills:
Have some basic or computer training?
Are average with computers?
Are expert with computers?

*Did you encounter any problems in adopting the knowledge management system in general?

1	2	3	4	5
Yes major		Moderate		Very minor

*Do you think those problems are related to?

1	2	3	4	5
Technical	Education & training	Management	Culture	Other

Any other issues please state:

……
……
……
……
……
……
……
……
……
……
……
……

9.5 Appendix 5. Interview: Arabic Copy

السلام عليكم ورحمة الله وبركاته

بداية شكرا لأهتمامكم الشخصى بالمساهمة فى هذا البحث،**استمارة المقابلة** هذه عبارة جزء اساسى من اتمام هذه الدراسة والتى تدور حول العوامل المؤثرة فى تبنى واستخدام نظم إدارة المعرفة كوسيلة جديدة لتعزيز وتطوير العمل بالمؤسسات النفطية الليبية، ونظرا لما للتقنيات الحديثة من دور هام فى الرقى بكفاءة العمل الادارى والفنى بالمنظمات والمؤسسات المختلفة فاننى مقدم على اجراء هذه الدراسة كجزء من متطلبات الحصول على الدرجة الدقيقة (الدكتوراه) في نظم المعلومات بكلية ادارة الاعمال بجامعة مانشيستر بالمملكة المتحدة وعنوا ن الدراسة هو:

"دراسة العوامل المؤثرة فى نجاح تبنى نظم ادارة المعرفة فى قطاع النفط العام الليبي"

تتناول هذه الدراسة بالبحث والتحليل العوامل المؤثرة مثل الثقافة التنظيمية ، التدريب والتاهيل والبنية التحتية لتقنية المعلومات بحيث نتوصل الى توقع مدى امكانية تبنى هذه النظم التكنولجية الحديثة وايضا مدى استعداد المنظمات والافراد لاستخدامها فى تنمية وتطوير العمل بمؤسساتهم ، وفى هذا الاطار فأن الباحث وجامعة مانشيستر بناء على القيم الاخلاقية للبحث العلمى يتعهدان بالحفاظ على سرية البيانات وان شخصية المشاركين والمؤسسات التابعين لها ستكون طى الكتمان ولن يصرح بها لاى كان ولن تستخدم الا لاغراض البحث العلمي.

والسلام عليكم ورحمة الله وبركاته

الطالب / سليمان محمد صالح كتى

Soleman Saleh
Manchester Business School (MBS)
Business System Division
The University of Manchester
Oxford road
M13 9PL
Tel + 441613062088
Mobil + 447733317902
E-mail: soleman.saleh@postgrad.manchester.ac.uk

استـــــمـــارة مـقابـلـة

المستوى الادارى: (الرجاء التحديد):

.....

1. فضلا حدد الجنس

ذكر	
انثى	

2. ماهى الفئة العمرية التى تنتمى اليها ؟

25 -18	**35 26**	**44 36**	**55 -46**	**55 واكثر**

3. فضلا حدد مستواك التعليمى

اعـدادى	**ثانـــوى**	**جامعى** (جامعى يشمل المعاهد العليا)	**دراسات عليا** ماجستير، دكتوراه

4. ما العمر الزمنى لاجهزة الحاسب فى مؤسستكم؟

100 **اقل من**	101 **200**	–201**300**	**400 301**	400**اكثر من**

5. ماعدد العاملين فى مؤسستكم؟

اقل من 500	600- 100	5000 100

6. هل تستخدمون فى مؤسستكم اى من تقنيات ونظم ادارة المعرفة التالية: ضع اشارة (X) امام النظم المستخدم

( ) تقنيةادارة الوثائق والمحتويات Document and content management
( ) ادارة خرائط التدفق .Workflow management
( ) شبكة الانترنت المحلية (انترانت) .Intranet
( ) تقنيات للتبادل الافكار وانجاز الاعمال مشاركة مع الاخرين عن بعد اليكترونيا Groupware
( ) مستودعات البيانات الاليكترونية .Data warehousing
( ) نظم الاعمال الذكية Business intelligence.
( ) نظم دعم مجموعات العمل اليكترونيا Group support systems (GSS)
( ) نظم التدريب عبر الانترنت او من خلال شبكة داخلية
Computer based training (CBT)
(Web CT وتعرف ايضا بـ)(CBT) tools and learning environments
( ) نظم الاتصال المختلفة .Communication systems
( ) نظم الذكاء الصناعى Artificial Intelligence (AI) technologies.
( ) البريد الاليكترونى .Email

7. هل تعتقد ان مؤسستكم فى حاجة الى استخدام نظم وتقنيات ادارة المعرفة؟

8. ما العوائق التى تعتقدون انها تقف حائلا دون استخدام افضل لنظم وتقنيات نظم ادارة المعرفة؟
النقص فى المهارات التقنية لدى العاملين.
النقص فى البنية التحتية لتقنية المعلومات .
عدم الرغبة فى التغيير .
المؤسسة ليست فى حاجة لها الان.
اسباب اخرى اذكرها:
.....
.....
.....
.....

9. ماعدد أجهزة الحاسب الشخصى فى مؤسستكم .

1	2	3	4	5
لايوجد	اقل من 50	من51 100	من101 500	اكثرمن500

10. ما متوسط العمر الزمنى لاجهزة الحاسب فى مؤسستكم؟

1	2	3	4	5
لااعرف	اقل من سنة	من1 3 سنوات	من 3 5 سنوات	اكثرمن5 سنوات

11. هل لدى مؤسستكم اى من الخدمات التقنية التالية:

خدمات انترنت لاستخدام البريد الاليكترونى E-mail.
استخدم الانترنت لنقل وتبادل البيانات والملفات.
شبكة محلية تسمح بالاتصال المباشر فى نفس الوقت.
شبكة محلية لربط الحاسبات فى اقسام ووحدات فى مواقع متعددة تتبع المؤسسة

12. هل تستخدم مؤسستكم اى حزمة من قواعد البيانات.

نعم ( ) **لا ( )**

13. ماهى النسبة المئوية لاستخدام الحاسب الالى فى كل من الاعمال التالية: (معتمدا على المقياس التالى)

1	2	3	4	5
0-10%	11-20%	21-40%	41-60%	اكثر من60%

البرامج الادارية (مثل ادارة الملفات، الشئون المالية،ادخال البيانات ...الخ). ( )
ادرة الانتاج والتسويق والمحاسبة والمبيعات. ( )
القرارات الاستراتيجية. ( )

14. ماهى نسبة العاملين فى مؤسستكم الذين :

1	2	3	4	5
0-10%	11-20%	21-40%	41-60%	اكثر من60%

حصلو على تدريب فى مبادىء استخدام الحاسوب. ( )
مهارات متوسطة فى استخدام الحاسوب وتقنيات المعلومات. ( )
تعتبرهم خبراء فى استخدام الحاسوب وتقنيات المعلومات. ( )

15. هل تواجهون مشاكل فى تبنى نظم وتقنيات المعرفة .

3	2	1
صعبة جدا	متوسطة الصعوبة	قليلة

16. هل هذه المشاكل تتعلق بـأى من التالى:

5	4	3	2	1
اخرى	مستوى التاهيل والتدريب	ادارية	مشاكل تتعلق بثقافة المؤسسة	مشاكل تقنية

17. ملاحضات اخرى تود أضافاته

9.6 Appendix 6. Correspondence with Libyan Oil Sector

From: akamaily@libyanoc.com
To: Soleman.Saleh@postgrad.manchester.ac.uk; Christopher.Atkinson@manchester.ac.uk; sulkatty@hotmail.com
CC: oelmahguibi@libyanoc.com; Mbasha@libyanoc.com; melbouzedi@libyanoc.com; fkhabuli@libyanoc.com; noclib@libyanoc.com
Subject: RE: from soleman saleh Katty
Date: Sat, 13 Oct 2007 21:37:14 +0200

Dear Sir
I am Abdulhakim O. Kamaily the NOC ICT Department manager writing this email confirming with in legal capacity and limited power of attorney that NOC as Organizations had no technical objections (legally limited to s research topic Information's flow & Technology value for the Libyan Oil Sector and the later written agreed documents) for Mr. Soleman to conduct his search with NOC HQ organizations and Companies but we need clear information's for what the questioner requirements, kick-off date, confirmations of at least one copy of research finding and conclusion to be hand over to NOC library with no cost.

Also information's disclosure agreement may be required.
Therefore you are kindly request to send us your kind abstract, time-plan, kick off date, questions content, while we prefer to communicate electronic thru a web site link or email massages.

Best Regards

A. Kamaily
-----Original Message----- From: Soleman Saleh [mailto:Soleman.Saleh@postgrad.manchester.ac.uk] Sent: Wednesday, October 10, 2007 1:40 PM To: akamaily@libyanoc.com Subject: from soleman saleh Katty

Dear Dr. Alkamaily
Thanks for your help; hopefully you are OK and your family.
I'm pleasing to send my supervisor Email
Christopher.Atkinson@manchester.ac.uk
Regarding to approving for conduct my field work whiten your organization
Thank you again
Best regards

Soleman Saleh
Manchester Business School
The University of Manchester
Booth street west
Manchester M15 6PB
United Kingdom
Tel: +44 161 306 3106
Mob: +4477733317902
Email: Soleman.Saleh@postgrad.manchester.ac.uk
sulkatty@hotmail.com

9.7 Appendix 7. The survey SPSS output

Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.797[a]	.636	.633	1.08253

Model Summary

Model	Change Statistics				
	R Square Change	F Change	df1	df2	Sig. F Change
1	.636	197.214	1	113	.000

a. Predictors: (Constant), PEOU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	231.109	1	231.109	197.214	.000[a]
	Residual	132.421	113	1.172		
	Total	363.530	114			

a. Predictors: (Constant), PEOU

b. Dependent Variable: PU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.665	.401		1.660	.100
	PEOU	.453	.032	.797	14.043	.000

a. Dependent Variable: PU

Regression

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.538[a]	.289	.263	1.53260

a. Predictors: (Constant), CLAN, MARKET, ADHOCH , HIERARCHY

b. Dependent Variable: PU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	105.155	4	26.289	11.192	.000[a]
	Residual	258.376	110	2.349		
	Total	363.530	114			

a. Predictors: (Constant), CLAN, MARKET, ADHOCH , HIERARCHY

b. Dependent Variable: PU

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.267	4.627		3.516	.001
	ADHOCH	-.015	.008	-.231	-1.840	.068
	MARKET	-.016	.008	-.368	-2.002	.048
	HIERARCHY	-.025	.009	-1.138	-2.879	.005
	CLAN	-.012	.009	-.520	-1.438	.153

Model		95% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	7.097	25.437
	ADHOCH	-.030	.001
	MARKET	-.032	.000
	HIERARCHY	-.042	-.008
	CLAN	-.029	.005

Model		Correlations			Collinearity Statistics	
		Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)					
	ADHOCH	.200	-.173	-.148	.410	2.436
	MARKET	-.023	-.187	-.161	.191	5.233
	HIERARCHY	-.504	-.265	-.231	.041	24.188
	CLAN	.474	-.136	-.116	.049	20.218

a. Dependent Variable: PU

Regression

Model Summary[b]

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	193.854	4	48.463	5.708	.000[a]
	Residual	934.007	110	8.491		
	Total	1127.861	114			

a. Predictors: (Constant), CLAN, MARKET, ADHOCH , HIERARCHY

b. Dependent Variable: PEOU

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.951	8.798		3.632	.000
	ADHOCH	-.028	.015	-.253	-1.867	.064
	MARKET	-.024	.015	-.316	-1.591	.115
	HIERARCHY	-.047	.016	-1.214	-2.845	.005
	CLAN	-.032	.016	-.760	-1.949	.054

Model		95% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	14.516	49.385
	ADHOCH	-.058	.002
	MARKET	-.054	.006
	HIERARCHY	-.080	-.014
	CLAN	-.064	.001

Model		Correlations			Collinearity Statistics	
		Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)					
	ADHOCH	.132	-.175	-.162	.410	2.436
	MARKET	.106	-.150	-.138	.191	5.233
	HIERARCHY	-.370	-.262	-.247	.041	24.188
	CLAN	.277	-.183	-.169	.049	20.218

a. Dependent Variable: PEOU

Regression

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.029[a]	.001	-.008	3.15798

a. Predictors: (Constant), EDUCATION&TRAINING

b. Dependent Variable: PEOU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.931	1	.931	.093	.760[a]
	Residual	1126.930	113	9.973		
	Total	1127.861	114			

a. Predictors: (Constant), EDUCATION&TRAINING

b. Dependent Variable: PEOU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.469	1.451		8.594	.000
	EDUCATION& TRAINING	-.054	.176	-.029	-.306	.760

Model		95% Confidence Interval for B		Correlations		
		Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	9.594	15.343			
	EDUCATION& TRAINING	-.402	.294	-.029	-.029	-.029

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	EDUCATION& TRAINING	1.000	1.000

a. Dependent Variable: PEOU

Regression

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.029[a]	.001	-.008	3.15798

a. Predictors: (Constant), IT Infrastructure

b. Dependent Variable: PEOU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.931	1	.931	.093	.760[a]
	Residual	1126.930	113	9.973		
	Total	1127.861	114			

a. Predictors: (Constant), IT Infrastructure

b. Dependent Variable: PEOU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.469	1.451		8.594	.000
	IT Infrastructure	-.054	.176	-.029	-.306	.760

Model		95% Confidence Interval for B		Correlations		
		Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	9.594	15.343			
	IT Infrastructure	-.402	.294	-.029	-.029	-.029

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	IT Infrastructure	1.000	1.000

a. Dependent Variable: PEOU

Regression

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.193[a]	.037	.029	1.75992

a. Predictors: (Constant), IT Infrastructure

b. Decendent Variable: PU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.534	1	13.534	4.370	.039[a]
	Residual	349.996	113	3.097		
	Total	363.530	114			

a. Predictors: (Constant), IT Infrastructure

b. Decendent Variable: PU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.768	.809		9.607	.000
	IT Infrastructure	-.205	.098	-.193	-2.090	.039

Model		95% Confidence Interval for B		Correlations		
		Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	6.166	9.370			
	IT Infrastructure	-.399	-.011	-.193	-.193	-.193

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	IT Infrastructure	1.000	1.000

a. Dependent Variable: PU

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
PU	6.1130	1.78574	115
EDUCATION& TRAINING	8.0870	1.68359	115

Correlations

		PU	EDUCATION &TRAINING
Pearson Correlation	PU	1.000	-.193
	EDUCATION& TRAINING	-.193	1.000
Sig. (1-tailed)	PU	.	.019
	EDUCATION& TRAINING	.019	.
N	PU	115	115
	EDUCATION& TRAINING	115	115

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	EDUCATIO N& TRAINING[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PU

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.193[a]	.037	.029	1.75992

a. Predictors: (Constant), EDUCATION&TRAINING

b. Dependent Variable: PU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.534	1	13.534	4.370	.039[a]
	Residual	349.996	113	3.097		
	Total	363.530	114			

a. Predictors: (Constant), EDUCATION&TRAINING

b. Dependent Variable: PU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.768	.809		9.607	.000
	EDUCATION& TRAINING	-.205	.098	-.193	-2.090	.039

Model		95% Confidence Interval for B		Correlations		
		Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	6.166	9.370			
	EDUCATION& TRAINING	-.399	-.011	-.193	-.193	-.193

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	EDUCATION& TRAINING	1.000	1.000

a. Dependent Variable: PU

Regression

Model	Variables Entered	Variables Removed	Method
1	PEOU, PU[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: ATU

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.414[a]	.171	.156	.835

a. Predictors: (Constant), PEOU, PU

b. Dependent Variable: ATU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.118	2	8.059	11.571	.000[a]
	Residual	78.004	112	.696		
	Total	94.122	114			

a. Predictors: (Constant), PEOU, PU

b. Dependent Variable: ATU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.317	.313		1.013	.313
	PU	.059	.073	.115	.810	.420
	PEOU	.091	.041	.316	2.216	.029

Model		95% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	-.303	.936
	PU	-.085	.202
	PEOU	.010	.173

Model		Correlations			Collinearity Statistics	
		Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)					
	PU	.367	.076	.070	.364	2.745
	PEOU	.408	.205	.191	.364	2.745

a. Dependent Variable: ATU

Regression

Model Summary

Model	Change Statistics				
	R Square Change	F Change	df1	df2	Sig. F Change
1	.038	4.437	1	113	.037

a. Predictors: (Constant), PU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.453	1	2.453	4.437	.037[a]
	Residual	62.469	113	.553		
	Total	64.922	114			

a. Predictors: (Constant), PU

b. Dependent Variable: BI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.124	.248		4.527	.000
	PU	.082	.039	.194	2.106	.037

a. Dependent Variable: BI

Regression

Model Summary

Model	Change Statistics				
	R Square Change	F Change	df1	df2	Sig. F Change
1	.482	105.205	1	113	.000

a. Predictors: (Constant), ATU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.301	1	31.301	105.205	.000[a]
	Residual	33.620	113	.298		
	Total	64.922	114			

a. Predictors: (Constant), ATU

b. Dependent Variable: BI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.603	.112		5.387	.000
	ATU	.577	.056	.694	10.257	.000

a. Dependent Variable: BI

One-way

Descriptive

Actual Use

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Strongly agree	62	1.0161	.12700	.01613	.9839	1.0484
Agree	34	1.0294	.17150	.02941	.9696	1.0893
Neutral	19	1.3158	.47757	.10956	1.0856	1.5460
Total	115	1.0696	.25553	.02383	1.0224	1.1168

	Minimum	Maximum
Strongly agree	1.00	2.00
Agree	1.00	2.00
Neutral	1.00	2.00
Total	1.00	2.00

Test of Homogeneity of Variances

Actual Use

Levene Statistic	df1	df2	Sig.
58.531	2	112	.000

ANOVA

Actual Use

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.384	2	.692	12.788	.000
Within Groups	6.060	112	.054		
Total	7.443	114			

Robust Tests of Equality of Means

Actual Use

	Statistic[a]	df1	df2	Sig.
Welch	3.617	2	36.624	.037
Brown-Forsythe	6.332	2	23.553	.006

a. Asymptotically F distributed.

Actual Use

Tukey HSD[a,b]

BI	N	Subset for alpha = .05	
		1	2
Strongly agree	62	1.0161	
Agree	34	1.0294	
Neutral	19		1.3158
Sig.		.973	1.000

Means for groups in homogeneous subsets are displayed.