A KNOWLEDGE MANAGEMENT FRAMEWORK FOR THE TELECOMMUNICATION INDUSTRY: THE KMFTI MODEL

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Abstract

Recent years have witnessed a continuing growth of developments in knowledge management systems to capture the information flows within organisations and turn them into exploitable management databases. Examples to this are such as the Total Quality Management and the Business Process Reengineering models. There is no doubt, that during the last few years there has been a broad interest of exploiting knowledge. However, traditional Knowledge Management (KM) systems and frameworks do not necessarily take into account the specific nature of the telecommunication industry, particularly those related to capturing, sharing and exploiting unconventional data flows that occur between the personnel on the move such as technicians and engineers. Thus, a large amount of these data is lost and will never be able to benefit the organisation or its employees in any way.

Therefore, this research addresses the development of a new KM framework to fill in this gap and provide the telecommunication organisations in general and the General Post and Telecommunication Company (GPTC) in Libya in particular with a solid base where bulk and rough data will become exploitable and manageable in a concise and intelligent way.

The main questions being posed by this research are as follow:

- Could the Existing Knowledge Management Systems help the GPTC in Libya in particular and the telecommunication industry in general to better manage their data flows and turn them into an exploitable knowledge base? and

- How a strategic Knowledge Management Framework (KMF) could contribute to establishing adequate guidelines and policies in such telecommunication environment?

In this regard, the investigations in this research will stress on the identification of the broad range of issues that are preventing the adoption of KM systems within the GPTC or any given telecommunication organisation rather than trying to focus on a specific and unique question about the exploitation of KM. This approach is justified by the fact that no specific KMS appear to be developed for such industry. Furthermore, the various parameters are described under this common framework which is expected to benefit the telecommunication sector as a whole.

DECLARATION

I declare that the research contained in this thesis was carried out by me. It has not been previously submitted to this or any other Institution for the award of a degree of any other qualification.

Mokhtar S. Elashaheb.

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To my dear parents,
my wife, and my children.

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Chapter 1: Introduction

1.1 Introduction

Recent years have witnessed a continuing growth of developments in knowledge management systems to capture the information flows within organisations and turn them into exploitable management databases. Examples to this are such as the Total Quality Management and the Business Process Reengineering models. During the last few years there has been a broad interest of exploiting knowledge. However, traditional Knowledge Management Systems (KMS) and frameworks do not necessarily take into account the specific nature of the telecommunication industry, particularly those related to capturing, sharing and exploiting unconventional data flows that occur between the personnel on the move such as technicians and engineers. Thus, a large amount of these data is lost and will never be able to benefit the organisation or its employees in any way.

Therefore, this research addresses the development of a new KM framework to fill in this gap and provide the telecommunication organisations in general and the General Post and Telecommunication Company (GPTC) in Libya in particular with a solid base where bulk and rough data will become exploitable and manageable in a concise and intelligent way. The Knowledge Management Framework for the Telecommunication Industry (KMFTI) is a framework developed by this study following a special request by the GPTC which is entirely sponsoring this research

Furthermore, the investigations in this research will stress on the identification of the broad range of issues that are preventing the adoption of KM systems within the GPTC or any given telecommunication organisation rather than trying to focus on a specific and unique question about the

exploitation of KM. This approach is justified by the fact that no specific KMS appear to be developed for such industry. Moreover, the various parameters are described under this common framework which is expected to benefit the telecommunication sector as a whole.

1.2 The Need for this research

The need for this research and the development of the Knowledge Management Framework (KMF) in the General Post and Telecommunication Company (GPTC) in Libya can be justified by several factors summarised as follow:

- Improving the understanding of KMS activities in GPTC by presenting empirical and analytical study to expand the existing literature in relation to KM;
- Increasing awareness of the important of KM process, and to attempt to project a better understanding of how KM could be approached effectively;
- Encouraging policy makers and top management in telecommunication industry to apply and implement KMS to improve the skill of the organisation and make them more effective and efficient;
- To improve the exploitation of the existing knowledge within GPTC;
- To share Knowledge and improve decision making;
- To provide access to existing flowing information;
- To render lost or non exploited knowledge accessible to the personnel at their different levels;
- To enable the conversion of such information into knowledge; and

- To disseminate in order to make it easy to transfer.

1.3 Research Outline

1.3.1 Aim

The aim of this research is to establish a KMF that will contribute to the development and enhancement of the overall services in the GPTC in Libya, and to further provide a working framework for the implementation of the existing Knowledge Management Systems (KMS) within such environment. Such framework will take into consideration the different social, cultural, financial and political factors to determine their influence on the exploitation of the information flows within the GPTC on similar telecommunications environments.

1.3.2 Objectives

Several objectives have been initially defined in order to conduct this research with as much precision and closeness as possible and to maintain a straightforward focus on the main aim set in section 1.3.1 above. These objectives are presented as follow:

- Explore the need and benefits of knowledge management and how it can improve the efficiency of the telecommunications sector in general and in the GPTC in particular;
- To explore existing KMF and identify critical success factors to implement KM in the GPTC;
- Develop KMS and frameworks that help top management to improve the decision making process; and

- Develop KMS to help organisation in empowering its operation by sharing and exchanging knowledge within the GPTC.

1.3.3 Research Questions

The following research questions need to be addressed:

- Could the existing Knowledge Management Systems help the GPTC in Libya in particular and the telecommunication industry in general to better manage their data flows and turn them into an exploitable knowledge base? And
- How a strategic Knowledge Management Framework (KMF) could contribute to establishing adequate guidelines and policies in such telecommunication environment?

1.3.4 Research Methodology

This study has adopted a number of research strategies and techniques for developing the theories contributing to the building of the Knowledge Management Framework for Telecommunication Industry (KMFTI) and further to test its validity. A triangulation approach was established to eliminate the biases inherent in the case study strategy if such strategy had to occur. Both positivist and phenomenological paradigms have been adopted where appropriate to meet the requirements of this research.

Further, this study sought to gain a better insight, initially through a questionnaire survey, and subsequently through interviews. Data analysis on carried out to test a number of assumptions related to the development of the KMFTI and its implementation within the GPTC.

1.3.5 Scope

This research has the profile to be of an exploratory nature rather than an explanatory one. An exploratory study is undertaken when not much is known about the situation at hand, or when no information is available on how similar problems or research issues have been solved in the past (Sekaran, 2000). Nevertheless, it attempts to understand how certain factors could determine whether the telecommunications industry is likely to adopt or on the contrary dismiss the implementation of KM S and frameworks.

Furthermore, the investigations in this research will emphasise the identification of the broad range of issues that are preventing the adoption of KMS rather than trying to focus on a specific and unique question. This approach is justified by the fact that KMS does not appear to the author to have been implemented in the telecommunications industry in Libya. Therefore it is important to raise issues that could be further investigated by future research. In this regard, the KMFTI will be taking a generic shape that could offer benefits to the telecommunication industry as well as the research body of knowledge alike.

1.4 Guidelines to the thesis

1.4.1 Schematic guidelines

The diagram presented in Fig. 1.1 provides a summary of each of the nine chapters in this thesis. Each chapter is materialised by one separate category which refers to its main points or headlines. Also the reader could refer to the textual presentation of these guidelines presented in subsection 1.4.2.

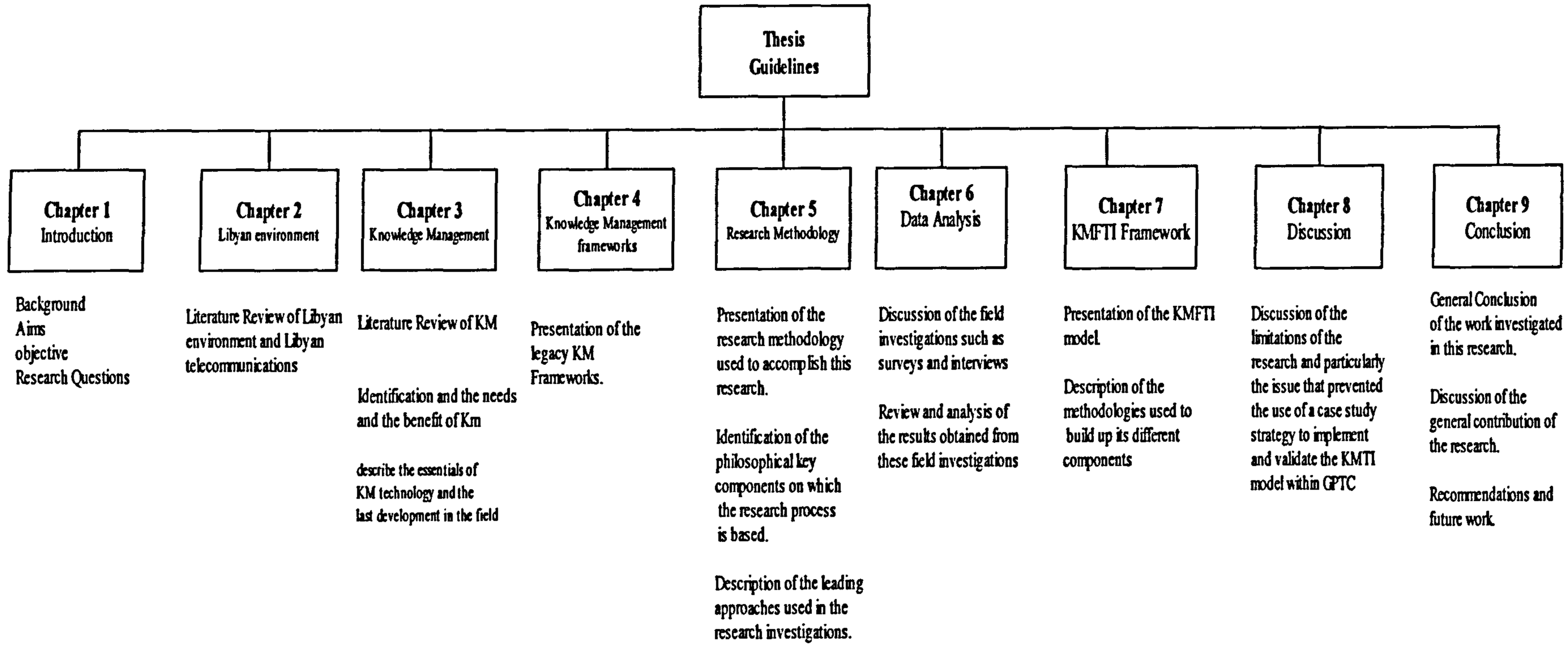

Figure 1-1: Thesis Guidelines

1.4.2 Organisation of the study

This study is organised into nine chapters. Each chapter leads into the development of an important part of this work.

Chapter one: "Introduction" is the introduction to the essence and problems that necessitate this study and the needs for this research. It addresses the rational of this research, and the scope that highlights the confines of the study.

Chapter two: "The Libyan Environment" This chapter presented an overview of the Libyan economical and political environment and also introduces the General Post & Telecommunications company (GPTC) in Libya.

Chapter three: "Knowledge Management" this chapter will discuss the literature review of knowledge, knowledge management, and the identification of the needs and benefits of KM, it also describe the essentials of KM technology and the latest development in this field.

Chapter four: "KM Frameworks" This chapter describes a number of frameworks related to Knowledge Management. The KMFTI described in this thesis is developed to fill in the gaps and address the limitations of existing models. The aim of this chapter is to learn from the issues of the actual frameworks and use the observations and findings to develop and enhance the compilation of the Knowledge Management Framework for the Telecommunication Industry (KMFTI).

Chapter five: "Research Methodology" introduces the research methodologies adopted in this work. It further defines the philosophical key components on which the research process is based and describes the leading approaches used in the investigations.

Chapter six: "Data Analysis", reports on the use of Knowledge Management Systems (KMSs) within the General Post & Telecommunications Company (GPTC) in Libya and discusses the results of the empirical investigations of the research surveys and interviews conducted in the GPTC to contribute to the adjustment and final development of the KMFTI.

Chapter seven: "The KMFT" discusses the development of the Knowledge Management Framework for the Telecommunication Industry (KMFT) and investigates the different parameters that represent its building blocks.

Chapter eight: "Discussion" This chapter discusses the most significant limitations of this research and emphasises on the issues that have prevented the use of a case study strategy to implement the KM Framework in a telecommunication organisation. It further explains how the presentation of the Framework to a number of professionals in the telecommunications sector and with academic People in Libya at three events held in Europe; the Far-East and Libya have to some extent filled-in the validation gap resulted from the non-use of a case study strategy as it was initially intended in this research. The chapter also presents the different implications of this research on the Telecommunications industry and academia alike.

Chapter nine: "Conclusion" provides a summarised description of the research. It focuses on showing how the results of the study relate to the original research questions and describes the limitation of this research and the objectives set out in this thesis.

Chapter 2: 'The Libyan Environment'

2.1 Introduction

The chapter presents an overview of the Libyan economical and political environment. It addresses the changes that took place within the Libyan economy which strives to move away from heavy dependence on the oil sector for revenues. Further, it touches on some developments within the telecommunication industry discussing the distinctiveness underlying the Telecommunication sector. Finally, it introduces the General Post & Telecommunication Company (GPTC) as the validation site for this research thesis.

2.2 The Libyan Environment

The overall objective of the economical development programme was to accelerate the rate of growth to break the stagnation outside of the oil industry, and to maximize social welfare in the shortest possible time. Libya is going through an era of substantial change. The country is quite different today than it was twenty years ago. The Libyan economy depends heavily on the oil sector for revenue, and remains largely state controlled and regulated. In 2002, the authorities initiated steps to liberalise the economy which had an impact on the developments e.g. communications, construction, health, housing, and education.

The telecommunication infrastructure is still very poor; as a result, the majority of Libyan organisations have suffered from a lack of ICT investment. For instance, the first Internet services started in September1998 (GPTC report, 2002).

The structure of the economy has been profoundly affected by oil wealth and the political changes that have taken place since 1969. The Libyan economy is dominated by the hydrocarbon sector, which now accounts for one-third of national output and generates more than 95% of total foreign exchange earnings.

The service industry contributes to an equal share in GDP, while the contribution of agriculture has remained negligible despite government efforts to promote this sector and achieve self-sufficiency in food production. From early 1988 Libya has moved towards liberalization, exemplified by the greater scope allowed to private enterprise in the retail trade, small-scale industries and agricultural businesses. However, the abolition of state export and import companies remains confined to trade in consumer goods, while large purchase items such as cars still controlled by state purchasing companies. In September 1992, a privatisation law was passed allowing the sale of state assets to private interests and for private sector participation in the economy. To date, however, little progress has been made in implementing the new law. Libya exports crude oil, refined petroleum products and natural gas, and imports machinery, transport equipment, food and manufactured goods (Libyanet report, 2000).

The country is attempting to reduce its dependency on oil as a sole source of income and to increase investment in agriculture, tourism, fisheries

mining, and natural gas. Libya encourages foreign investment in order to develop certain underdeveloped regions, improve technology, diversify its economy and help aid its internal markets. In 1997, the Authority for the Encouragement of Foreign Investment was established to facilitate foreign investment and oversee the application process. Foreign investment was approved for the following industries: telecommunications, agriculture, health and the services sectors, in form of currency and equipment (Libyanet report, 2000).

2.3 The Telecommunication Industry

Tam and Tummala, (2001) stated that the telecommunication industry is characterized by the following features:

- It operates in highly dynamic market. It has a worldwide customer base in developed & developing countries, and exhibits a mass-customisation appeal;
- Time to market & product Life Cycle is short – Rapid technological innovation continually brings down the costs whilst raising the quality standards; and
- Manufacturing aspects is hybrid- some features are dependent on highly skilled people and some are totally automated. Overall production is flexible for high volumes and predominantly capital intensive.

Companies competing in the telecommunications industry need to stay at the forefront of technology and stay close to their customers to be able to meet their needs. The international Engineering Consortium (Anon, 2001) summaries that "In a half trillion dollars industry defined by information and characterized by fierce competition, the telecommunication companies must find ways to monitor, measure and deploy their vast knowledge assets effectively."

It is beneficial to understand why it is important to consider the human aspect of KM. It was observed in the KPMG survey that failing to convert individual knowledge and know-how into corporate knowledge could lead to problems such as: knowledge of best practice being lost; relationships with key client/supplier being damaged; information vital to the running of the business being lost and ultimately significant business may be lost (KPMG, 1998). Furthermore, the highest goal is that information, decision and resources should flow freely between the trading partners of an extended supply chain to enable the commercialization of the soundest product in terms of fitness for purpose, quality, cost etc. in this regards, the author argues that the important solutions towards this goal would be provided by a deeper and integrated understanding of the critical role that suppliers play in the new product development (Minhahan, 1998). It has been identified that by managing knowledge between companies and allowing it to flow effectively to the right people, this would increase the provision of high quality goods at lower cost.

2.4 The Telecommunications industry in Libya

The telecommunication sector in Libya has been one of the important strategic sectors; it is also one of the main pillars for economic and social promotion and development. Telecommunication systems and services provided are considered one of the liveliness utilities due to their correlation with the native and the different national and private corporations.

2.4.1 General Post and Telecommunication Company (GPTC)

The telecommunication sector in Libya is completely publicly owned and operated by the State.

The GPTC is the only public company that is authorized to operate and maintain the telecommunications networks in Libya. As well as dealing with postal services throughout the country. It employs more than 16000 employees in more then 35 departments across the organisation (See Appendix 3).

It uses a large backbone network that consists of microwave links, satellite, coaxial, submarine and optical fibre cables, to interconnect cities and villages scattered throughout the country, and with the rest of the world.

The GPTC is also authorized to build the main internet backbone network to provide services to the public.

2.4.2 Master plan of telecommunications in the GPTC

The General Post and Telecommunication Company (GPTC) has adopted in 1990 a master plan for the development of telecommunications in Libya covering the period from 1993-2020 (see appendix 2), and which aims of achieving the following:

- Establishment of operations and maintenance of the telecommunications systems at the local and international levels.
- The development of services and the adoption of modern digital technology to replace old technology;
- The reduction of the wait period of applicant subscribers for telephone services;
- Securing fully automatic telecommunications services to allow efficient services for subscribers;
- To make telecom services available to all and provide services to remote zones;
- To achieve a telephone density of 10% by the year 2000 and 37% by 2020;
- The provision of data transmissions such as the internet;
- The provision of GSM services (mobiles) and third generations; and
- Make necessary provisions to execute projects in accordance with medium and long-term programs and laying out financial plans.

2.4.3 What has been achieved?

There have been additions of projects in different fields in order to achieve the aim of the plan, which can be summarized in the following:-

- Importing and installing of several digital exchanges in different parts of Libya with the total capacity exceeding 660000 telephone lines;
- Execution of national and international transmission networks is currently under way in order to make pace with the innovation of digital technology and securing telephone and data telecommunications as well as TV & Radio transmission.

2.4.4 Futuristic projects and required expenditure plan.

In order to achieve the aims of the master plan of the telecommunication for medium and long terms, the necessary estimated budgets have been laid out of execution for the period 2010 and 2020, whereas those budgets have shown that the estimated expected expenditure for these projects according to the plan are as follows:

- A- System part that consists of:-

Subscriber equipment – Cable networks – Exchanges – Transmissions (Carrier networks)

- B- Construction and auxiliary services part and consists of:-

Building – Services canters equipment – Transportation means – Training – Consultancy and technical support.

The following table shows the expenditure program (in million us$)

Table 2.1: expenditure program (in million us$) from 2000 to 2020 (GPTC, 2002).

Item	*2000-2010*	*2011-2020*	*Total*
A- Systems part			
Subscriber equipment	1376.71	2207.79	3584.5
Cable networks	2390.57	1989.07	4379.64
Exchanges	903.25	1320.43	2223.68
Transmission (Carrier networks)	1497.57	1085.07	2582.64
Construction and auxiliary services			
Total	1335.04	1359.25	2694.29
	7503	7961.61	15464.75

The financing of above mentioned project will be as follows:-

- Contribution from treasury executing these projects;
- The support of partnership with local and foreign companies to execute these projects;
- Borrowing for the execution of these projects; and
- Using GPTC's income.

2.5 Conclusion

This chapter has provided an insight of the Libyan environment as the country is attempting to reduce its dependency on oil as a sole source of income and to increase investment in agriculture, tourism, fisheries mining, natural gas and telecommunications. It has shown that Libya

encourages foreign investment in order to develop certain underdeveloped regions, improve technology, diversify its economy and help aid its internal markets. Finally, it concluded by explaining the master plan of the telecommunication and the necessary estimated budgets for the period extending from 2010 and 2020.

The next chapter will discuss the literature review of knowledge, knowledge management, and the identification of the needs, and benefits of KM, it also describe the essentials of KM technology and the latest development in this field.

Chapter 3: Knowledge Management

3.1 Introduction

Every few years, a new technological development or management philosophy captures the attention of many strategic thinkers in organisations. First, there was the total quality movement, and then Business Process Re-engineering. There is no doubt that the last couple of years have seen a surge of interest in knowledge management.

According to Schoenhoff (1993), Knowledge is humanistic because it is essentially related to human action. Knowledge has the active and subjective nature represented by such terms as 'commitment' and 'belief' that are deeply rooted in individuals' value systems. Information becomes knowledge when it is interpreted by individuals. Knowledge is increasingly being recognised as a vital organisational resource that gives market leverage and competitive advantage (Nonaka and Takeuchi, 1995).

This chapter will discuss the literature review of knowledge, knowledge management, and the identification of the needs and benefits of KM, it also describes the essentials of KM technology and the latest developments in this field.

3.2 What is Knowledge?

According to Shiyamini (2005), 'Knowledge', has become the central capital, the cost centre and the crucial resource of the economy over the last decade.

This section provides a review of various definitions of knowledge; and types of knowledge from literature.

3.2.1 Definition of Knowledge

Distinctions are often made between data, information, knowledge and wisdom. Knowledge is information combined with experience, context, interpretation, and reflection (Davenport, 1998). Knowledge is a renewable, re-usable and accumulating asset of value to firms that increases in value with employee experience and organizational life (Kambil and Ginsburg, 1998).

Spender (1996) argues that knowledge is posited to provide a competitive advantage through the resource-based view because it is one of the resources of the firm that is difficult, if not impossible, for other firms to imitate. Further, Davenport and Prusak (1998) view knowledge as 'fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluation and incorporating new experiences and information'. It originates and applied in the minds of knower. In organisations, it often becomes embedded not only in documents or repositories, but also in the organisational routines, process, practices, and norm.

Knowledge seems to be best described by Alert (1992) where he defines it as a much broader concept than data, data that still drive many organisations. He further states that knowledge goes even

beyond the concept of information, which is generally defined as data being aggregated and processed into a more usable form.

For the purposes of this research, the Bollinger (2001) definition of knowledge will be used as "The understanding, awareness, or familiarity acquired through study, investigation, observation, or experience over the course of time". Furthermore, it is an individual's interpretation of information based on personal experiences, skills, and competencies.

3.2.2 Knowledge Management Strategy

Knowledge is considered to be one of the most important strategic resources. KM strategy is the knowledge manager's plan of action for developing, applying, and increasing the organisation's knowledge assets (Radding, 1998). Knowledge strategy itself defines how the organisation intends to use knowledge to achieve business objectives.

Skyrme (2002) argues that there are two thrusts for strategy. The first is to make better use of the knowledge that already exists within the firm, for example by sharing best practices. The second major thrust of knowledge-focused strategies is that of innovation, creation of new knowledge, and turning ideas into valuable products and services. It is the most difficult, but it ultimately has the best potential for improving organisations performance.

According to Zack (1999), the most important context for guiding KM is the firm's strategy. This helps to identify KM initiatives that support its purpose or mission, strengthen its competitive position, and create shareholder value. Therefore, the firm that knows more about its customers, products, technologies, markets and their linkages should perform better. Companies that do not have strong strategic models struggle to clarify the relationship between their intellectual resources and capabilities, and their competitive strategy. Moreover, Morten (1999) noted that the consulting business employs two different KM strategies. First, regarding IT infrastructure, such as codifying knowledge and storing it in databases, where it can be accessed and utilised easily by anyone in the organisation, and that is called codification strategy. And second, concerning people, that knowledge is closely tied to the person who developed it and is shared knowledge, mainly through direct person-to-person contact by face-to-face, over the telephone, by e-mail, and via video conferences (Morten, 1999).

Newman (1999) stated that probe consulting presents how each of the separate department of Human Resources (HR) and Training & Development (T&D), information system, and the business unit sees its contribution to the organisation. Each of these groups would merge and share the goal of developing strategic knowledge, which builds customer and shareholder value as shown in Figure 3-1.

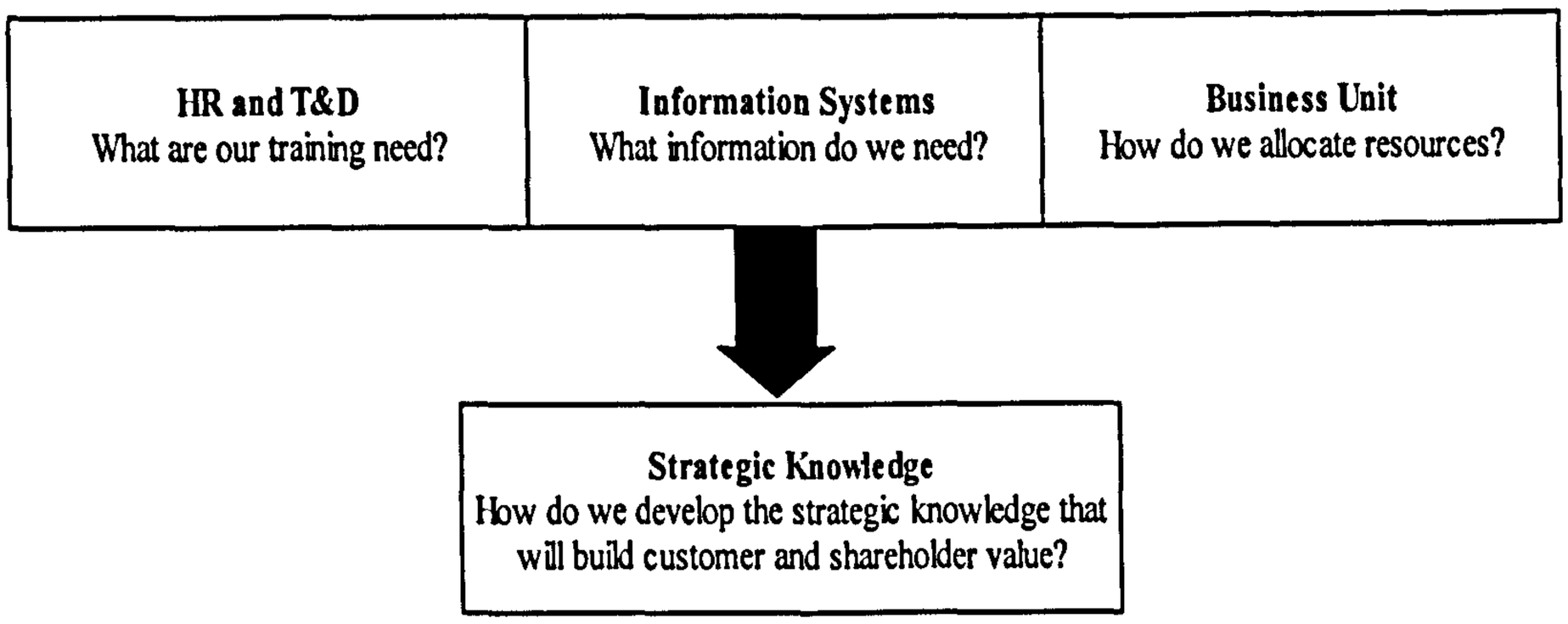

Figure 3-1 Merging of separate departments to share knowledge (Newman, 1999)

3.2.3 Knowledge Process

According to Radding (1998), Bassi (2000), Bednar (2000), Egbu (2001) and Mertins (2001), there are some processes in KM which are useful to focus on in developing a KM strategy, these include creating, capturing, transferring, and sharing knowledge. Further Macintosh (1998) adds some process such as developing knowledge, preserving knowledge, and using knowledge, and the success or failure of companies depended on how well they developed and use these processes. Radding (1998) has also added two more processes which are storage and processing (i.e. comparing, storing, analysing, organising) any of a variety of techniques.

KM focuses on understanding these processes as well as how they are to be acquired, stored and utilised within an organisation. Technology has to support all activities involved in the knowledge life cycle and supporting KM process suggested by Duffy (2000).

In this study KM processes have been considered as KM systems, and as being the heart of KM, because if an organisation exploits and manages them correctly, it will obtain maximum competitive advantage, as well as being a successful company in terms of disseminating and managing its knowledge resources.

3.2.4 Types of Knowledge

The distinction between data, information and knowledge is not always obvious. This is partly due to the human habit of taking information, accepting it, and treating it as knowledge. While information is interpreted data, knowledge is more than information. Knowledge implies the ability to generate patterns based on some forms of cognitive framework. Figure 3-2 shows the two main types of knowledge: explicit knowledge and tacit knowledge (Davenport & Prusak, 1998).

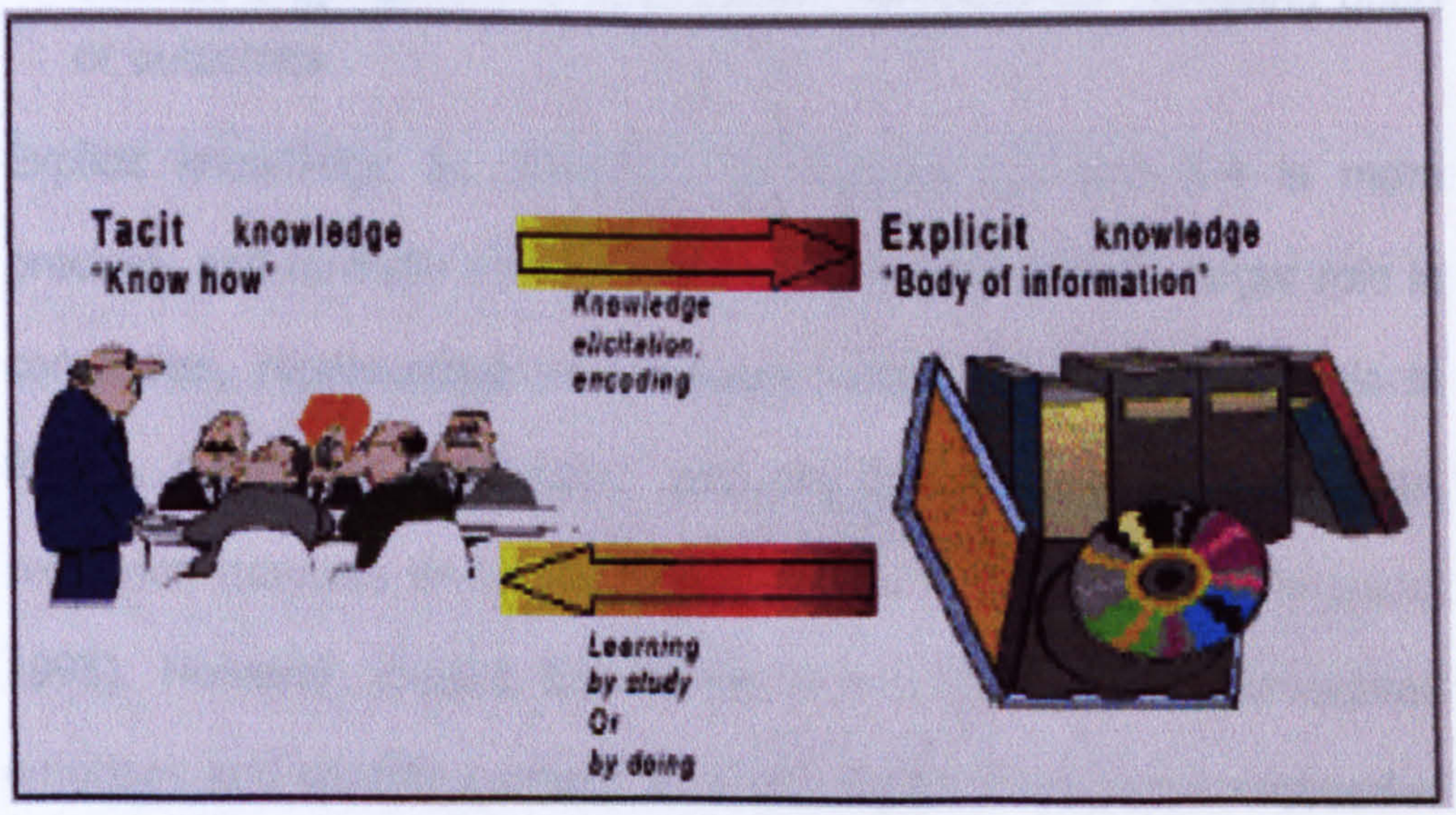

Figure 3-2: The two main types of knowledge (Davenport & Prusak, 1998)

These two types of knowledge can be described as follow as follows:

Explicit knowledge

Explicit knowledge can be expressed in formal and systematic language and shared in the forms of data, scientific formulas, specification, manuals and such. It can be processed, transmitted and stored relatively easily. In contrast Cohen and Bacdayan (1994), Schon (1983) and Zack (1999), argues that knowledge maybe of several types, all of which can be made explicit as follows:

- Declarative knowledge is about describing something. A shared, explicit understanding of concepts, categories, and descriptors lays the foundation for effective communication and knowledge sharing in companies.
- Procedural knowledge is about how something occurs or is performed. Shared explicit procedural knowledge lays a foundation for efficiently co-ordinated action in companies.
- Causal knowledge is about why some thing occurs. Shared explicit causal knowledge, often in the form of organisational stories, enables organisations to co-ordinate strategies for achieving goals or outcomes.

Explicit knowledge as presented in Figures 3-3 and 3-4 is more precisely and formally articulated, playing an increasingly larger role in companies, representing the 'knowing about'. It is "transmittable in formal, systematic languages" and can be stored in specifications, reference manuals and company handbooks (Nonaka and Takeuchi, 1995). However, explicit knowledge cannot transfer the "associated emotions and specific context" in which that information is embedded (Nonaka, Takeuchi, 1995). Still, many consider it the most important factor of production in the knowledge economy (Zack, 1999).

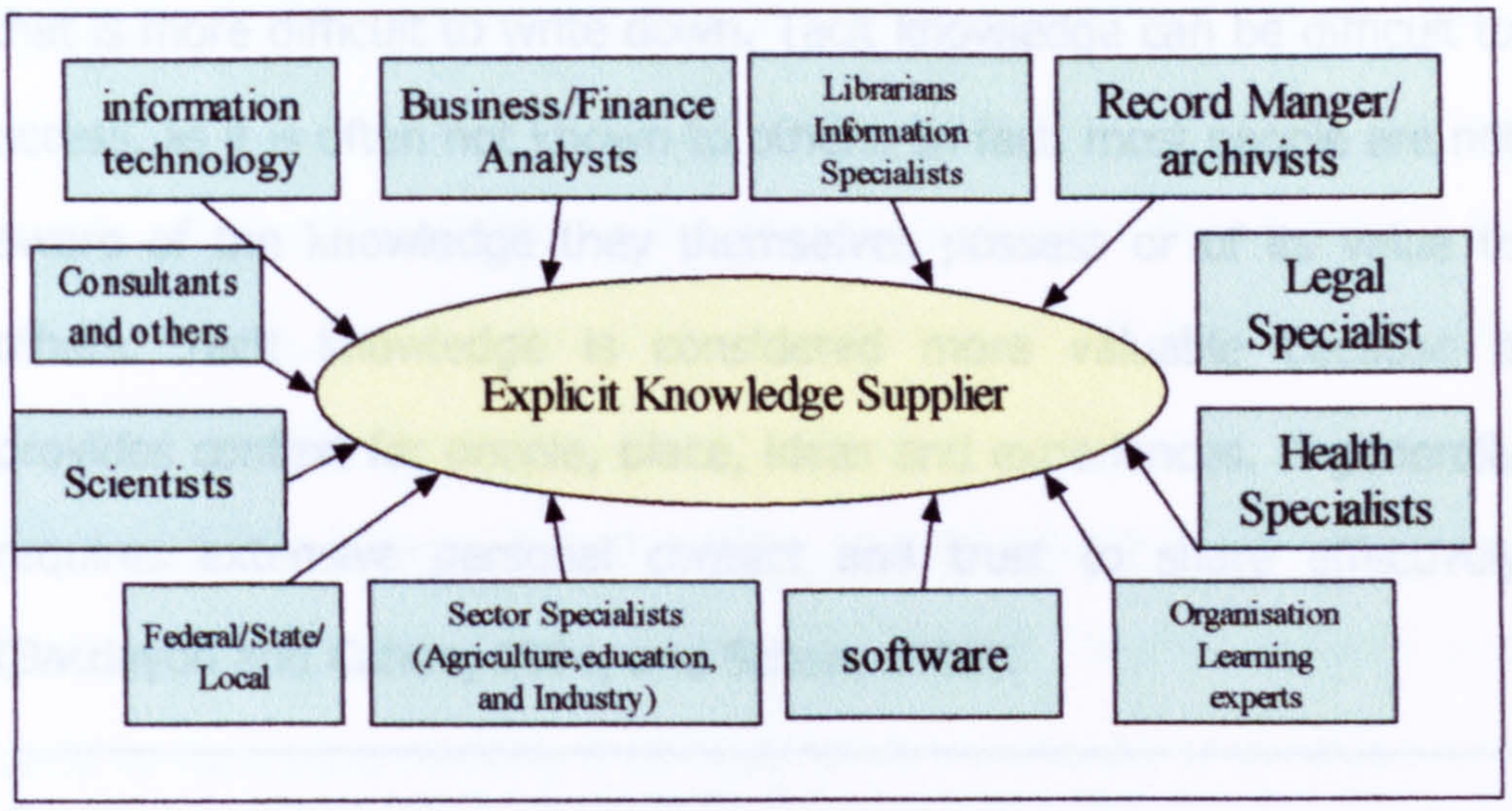

Figure 3-3: Explicit knowledge-Supplier (Kanti & Koenig, 1999)

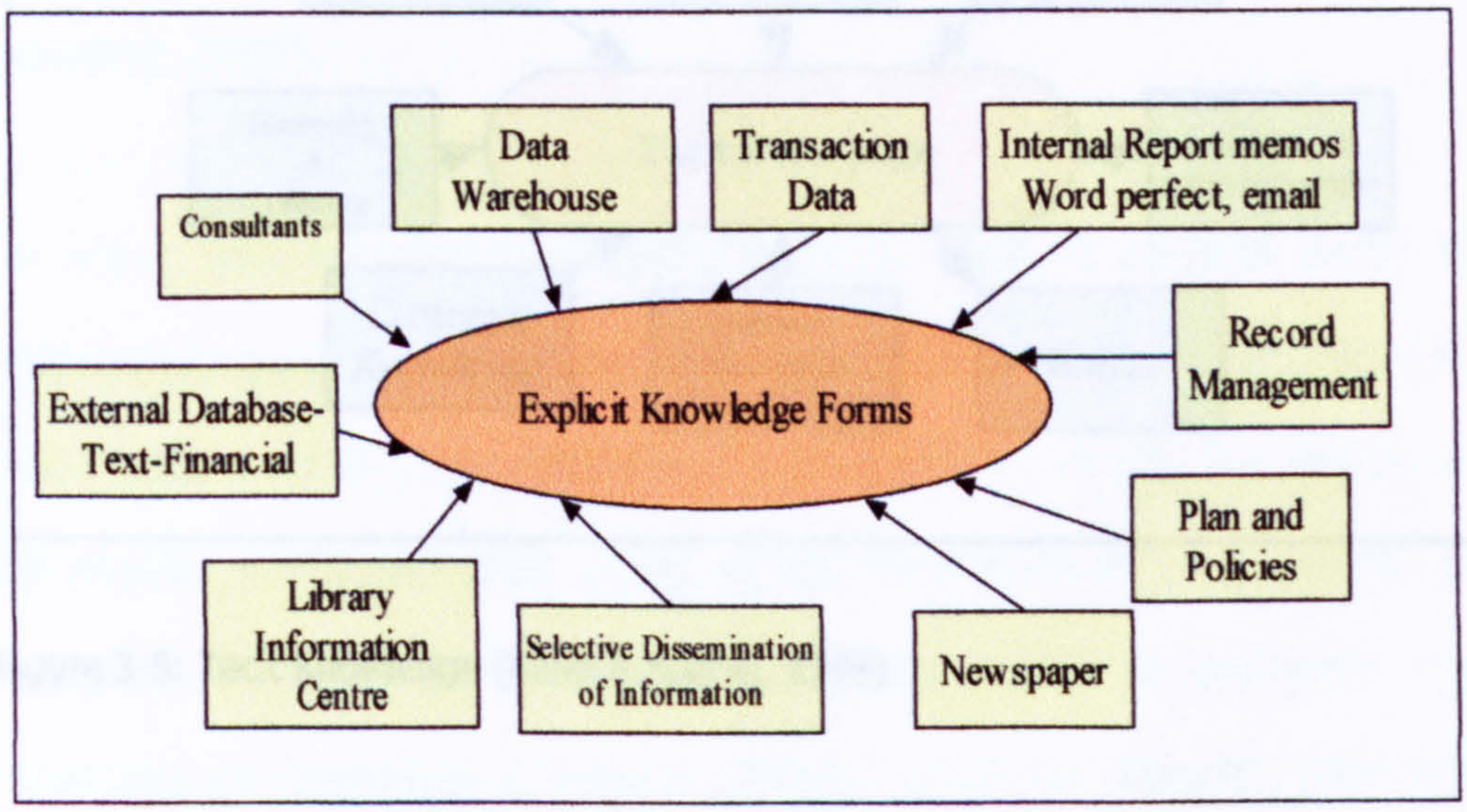

Figure 3-4: Explicit Knowledge- Forms (Kanti & Koenig, 1999)

Tacit knowledge

Tacit knowledge as shown in Figure 3.6 is highly personal and hard to formalise. Subjective insights, intuitions and hunches fall into this category of knowledge. Tacit knowledge is the knowledge that people have in their minds it's much less 'concrete' than explicit knowledge. It is more of an 'unspoken understanding' about something, knowledge

that is more difficult to write down. Tacit knowledge can be difficult to access, as it is often not known to others. In fact, most people are not aware of the knowledge they themselves possess or of its value to others. Tacit knowledge is considered more valuable because it provides context for people, place, ideas and experiences. It generally requires extensive personal contact and trust to share effectively (Bacdayon and Cohen, 1994, and Schon, 1993).

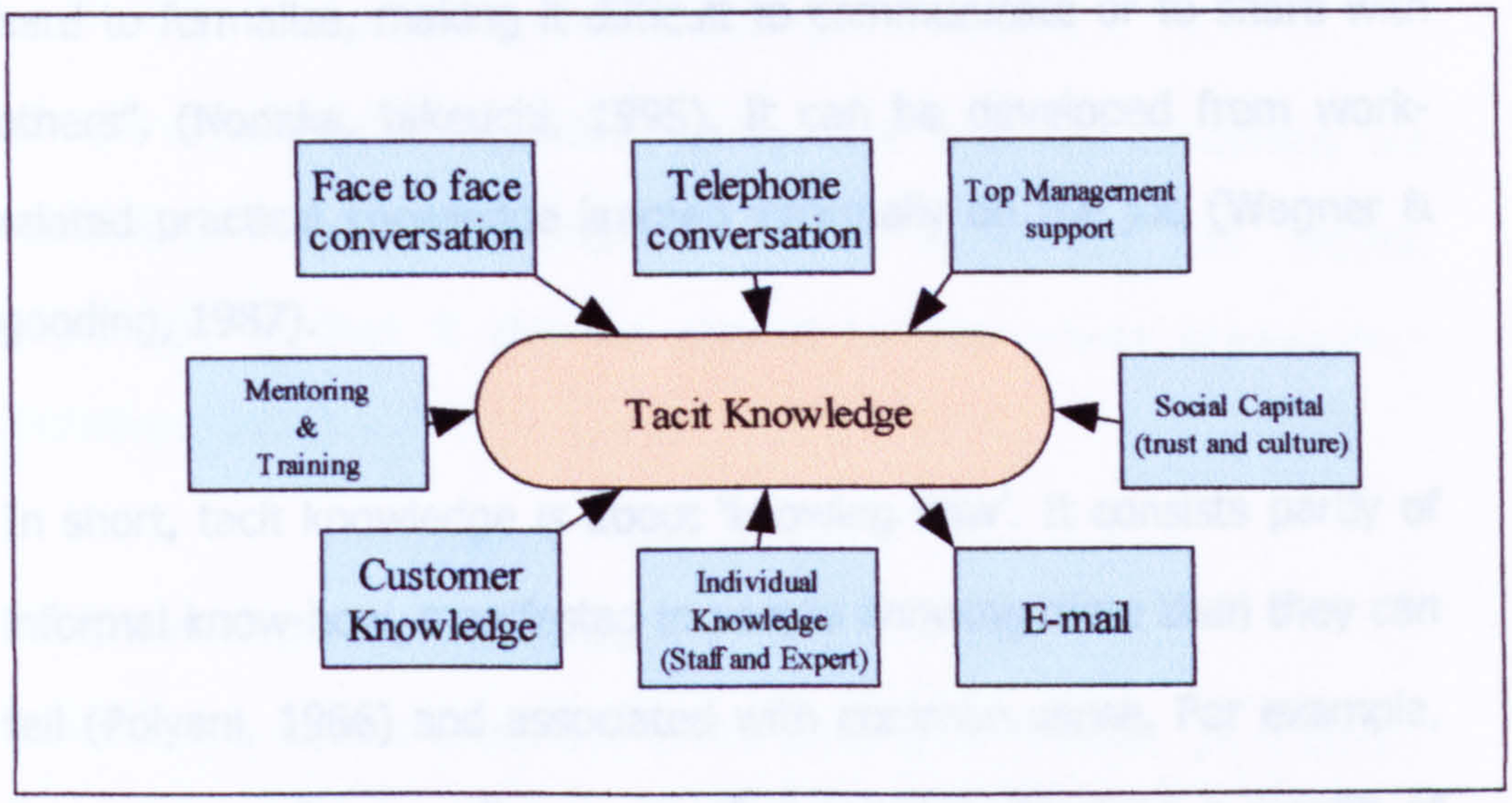

Figure 3-5: Tacit Knowledge (Kanti & Koenig, 1999)

The most complicated definition of tacit knowledge derives, from an extensive study of the concept as it relates to factors making for success in military leadership. First, tacit knowledge is knowledge that is generally acquired from one's own personal experiences rather than through instruction. Second, tacit knowledge is knowledge that people may not know they possess and /or may find it difficult to articulate (Horvath et al., 1996).

Moreover, it is knowledge that guides behaviour without being readily available to conscious introspection. Obviously, the hidden or opaque quality of tacit knowledge is the feature that gives the construct its name. Finally, tacit knowledge is action-oriented knowledge with practical value to the individual (Horvath et al., 1996).

The model in Figure 3-5 describes individual's tacit knowledge is subconsciously understood and applied, and is "highly personal and hard to formalise, making it difficult to communicate or to share with others", (Nonaka, takeuchi, 1995). It can be developed from work-related practical knowledge learned informally on the job (Wagner & gooding, 1987).

In short, tacit knowledge is about 'knowing how'. It consists partly of informal know-how, manifested in people knowing more than they can tell (Polyani, 1966) and associated with common sense. For example, "a master craftsman after years of experience develops a wealth of expertise at his fingertips. But he is often unable to articulate the scientific or technical principles behind what he knows" (Nonaka, Takeuchi, 1995).

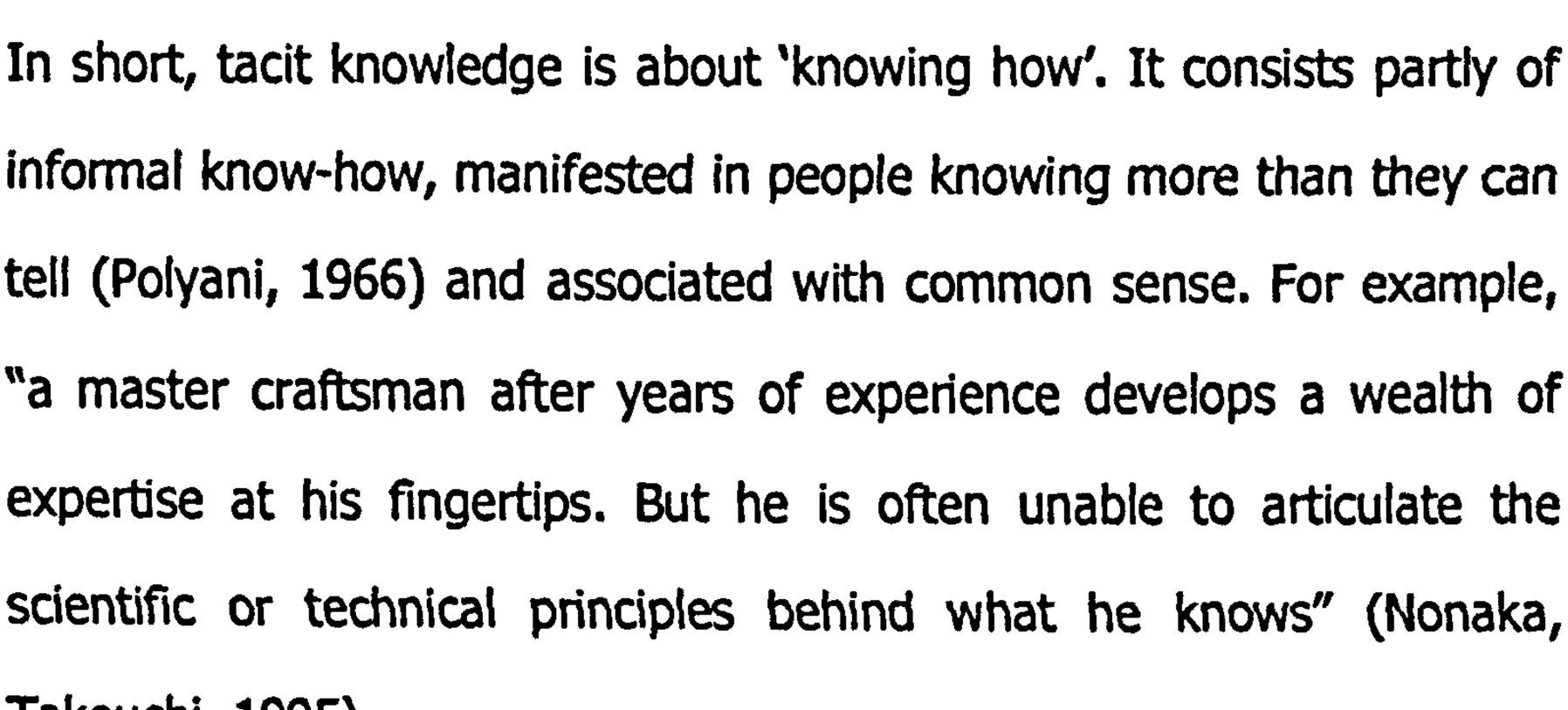

Figure 3-6: Illustrating knowledge Conversion (Nonaka and Takeuchi, 1995).

The knowledge process, consisting of mental models, beliefs and perspectives is so embedded that we take it for granted, and it is therefore difficult to articulate.

Sometimes we are aware of knowledge only after we use it in attending to a problem. It is this after-the-fact awareness that is inherent to tacit knowledge (Polyani, 1966).

In light of the advantages offered by tacit learning, companies are attempting to convert, employees' tacit knowledge into explicit knowledge so that it can be shared by the whole organisation (Durrance, 1998).

3.3 Knowledge Management

Knowledge is equally important to the production process, as is labour and capital. The reduction in cost and the increase in efficiency in information processing and telecommunications are speeding the creation and dissemination of knowledge. Knowledge is therefore seen as the centre to major paradigm shift in the way information is processed and disseminated.

This section of work identifies the importance, benefits and critical success factors to the dissemination of Knowledge Management.

- Definition of KM Framework;
- Functions of KM;
- The need of KM;

- The critical success factors for KM and
- The benefits of KM.

3.3.1 Definition of Knowledge management

Knowledge management is still new and evolving in that many academic researchers as well as practitioners have yet to fully grasp what it is and what it does. Moreover, different perspectives on the definition of knowledge management have emerged in part because researchers and practitioners in their various fields tend to define the concept of knowledge based on their fields and interests.

Table 3.1 summarises some authors' views on the definitions of KM.

Table 3.1 summarises some authors' views on the definitions of KM.

Authors	Definition
Wiig (1993)	Knowledge management is the systematic, explicit, and deliberate building, renewal, and application of knowledge to maximize an enterprise's knowledge-related effectiveness and returns from its knowledge assets.
Petrash (1996)	Knowledge management is getting the right knowledge to the right people at the right time so they can make the best decision.
Brooking (1997)	KM is the activity that is concerned with strategy and tactics to mange human centred assets.
Alavi et al (1997)	Knowledge is a justified personal belief that increases an individual's capacity to take action.

Hibbard (1997)	KM is the process of capturing a company's collective expertise wherever it resides in databases, on paper, or in people's heads and distributing it to wherever it can help produce the biggest payoff.
Beckman (1997)	Knowledge management is the formalisation of and access to experience, knowledge, and expertise that create new capabilities, enables superior performance, encourages innovation, and enhance customer value.
Qunitas et al (1997)	KM is the process of critically managing knowledge to meet existing needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities.
Skyrme (1997)	KM is the explicit and systemic management of vital knowledge and its associated processes of creating, gathering, organisation diffusion, use and exploitation. It requires turning personal knowledge into corporate knowledge that can be widely shared throughout an organisation and appropriately applied.
Van der Spek (1997)	Knowledge management is an explicit control and management of knowledge within an organisation aimed at achieving the company's objectives.
Davenport et al (1998)	KM is concerned with the exploitation and development of the knowledge assets of an organization with a view to furthering the organisation's objectives. The knowledge to be managed includes both explicit, documented knowledge and tacit, subjective knowledge.
Malhorta (1998)	KM embodies organisational process that seeks synergistic combination of data and information processing capacity of information technology, and the creative and innovative capacity of human beings.
APQC (1999)	KM is a conscious strategy of getting right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organisational performance

Turner (1999)	KM as the emerging management discipline which involves locating, organising, disseminating and using the knowledge and expertise within the organisation to perform its business activities.
Chong et al (2000)	KM is a process of leveraging and articulating skills and expertise of employees, supported by information technology.
Meso and Smith (2000)	KM can be viewed as the creation of sustainable competitive advantage through continued organisational learning.
Gupta et al (2000)	KM is a process that assists organisations to find, select, arrange distribute, and transfer important information and expertise essential for activities such as problem solving, lively learning, strategic planning and decision making.
Holm (2001)	KM is getting the right information to the right people at the right time, helping people create knowledge and sharing and acting on information.
Bhatt (2001)	KM as a process of knowledge creation, validation, presentation, distribution and application.
Horwitch et al (2002)	KM is the practice of creating, capturing, transferring, and accessing the right knowledge and information when needed to make better decisions, take actions, and deliver results in support of underlying strategy.
Bounfour (2003)	KM as a set of procedures, infrastructures, technical and managerial tools, designed towards creating, sharing and leveraging information and knowledge within and around organization.
Hung et al (2005)	KM is a systemized and integrated managerial strategy which combines information technology with the organisational process, activity which develops, transfer,

	transmits stores and applies knowledge, as well as providing the members of the organisation with real information to react and make the right decision, in order to attain the organisation's goals.

For the purposes of this research, the Horwitch et al. (2002) definition of knowledge management will be used with modification:

Therefore KM is considered as the practice of creating, capturing, transferring, and accessing the right knowledge and information when needed to make the right decisions, in order to attain the organisation's goals, take actions, and deliver results in support of underlying strategy.

3.3.2 Functions of Knowledge Management

Wiig (1997) describes four separate functions of knowledge management. These functions are shown in Figure 3-7. They deal with how knowledge makes its way from where it originates (i.e. experts, R&D Programme, etc.) to where it finally can be used (thin line arrow). The dotted line arrow shows the information that is being reused throughout the process. The last function is where the knowledge is being applied during delivery of product or services (thick line arrow). The details of each function are as follows:

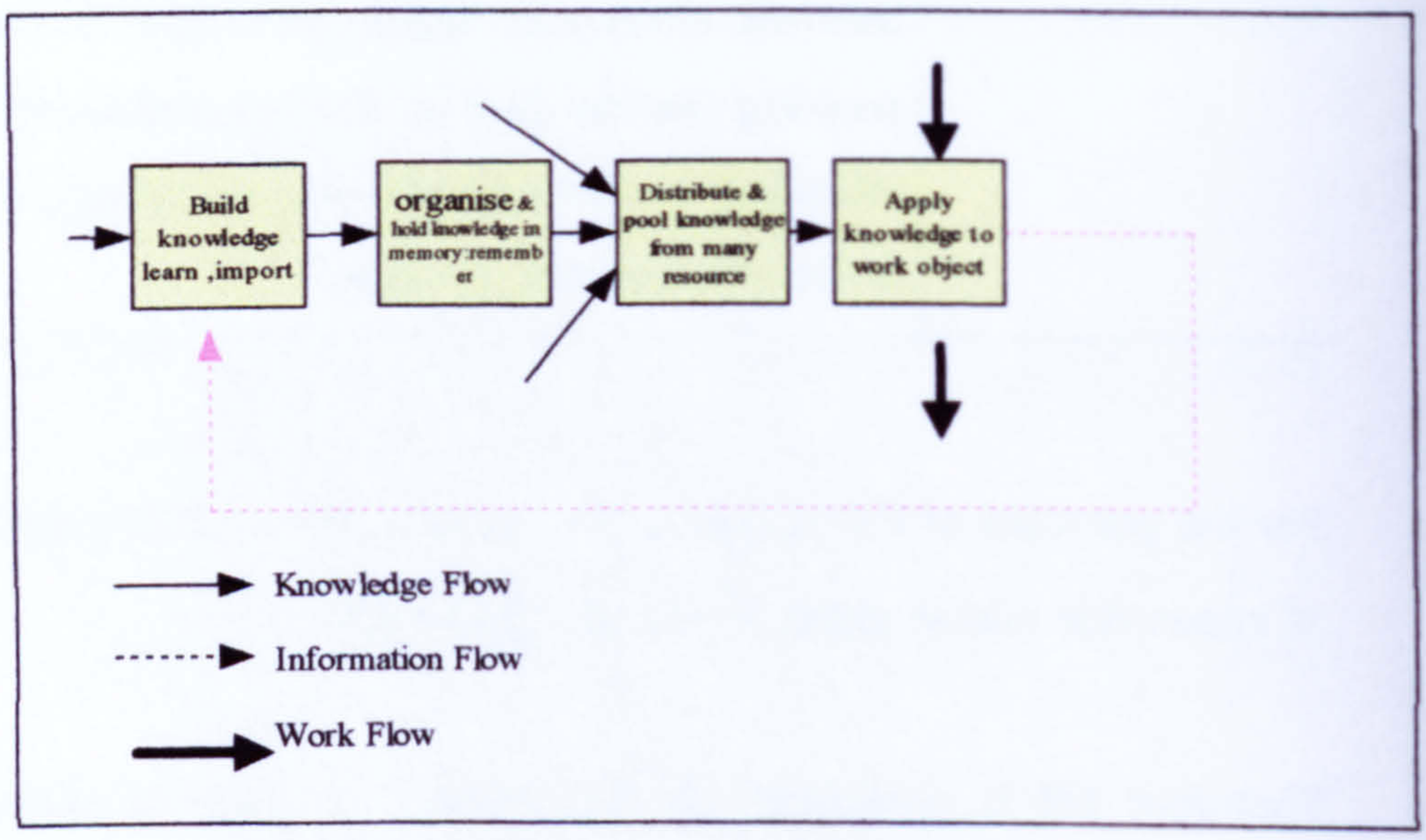

Figure 3-7: Four stages of knowledge Transition from source to use (Wiig, 1997)

- Knowledge creation and sourcing Build knowledge from innovation, learning and importation. Assemble knowledge from external and internal experts, lessons learned from programmes, books, articles etc.;
- Knowledge compilation and inventory obtained by Organising it, weeding out outdated and wrong knowledge;
- knowledge dissemination – distribute and pool knowledge from many sources and dissemination knowledge to where it is needed, either to people or embed it in system; and
- Knowledge application and value realisation - apply knowledge to work objects. Use knowledge to create and deliver products and services.

3.3.3 The need for Knowledge Management

Many companies discover knowledge as a resource. They realise that, in addition to soil, work and capital, knowledge becomes more and more important as a production factor (Studer, 1999). They expect to improve their competitive position in relation to other companies by

optimising the management and use of knowledge. There are two reasons for the rapidly increasing interest in knowledge management concepts.

One motive lies in several business trends. Development cycles become shorter and shorter; the time-to-market increasingly makes the difference between a profitable product and a loss making one on a more and more dynamic and global market. For competitive companies, it is important to use first mover advantages or at least to a fast and clever second mover (Gemunden, 1990). To realise this, companies need to use their knowledge about their customers, market, competitors and technology to a full extent. For other companies, knowledge is already the product they are selling (e.g. information brokers or management consultancies) (Studer, 1999). All companies need to learn from best practices and to avoid making the same mistakes again. So they need to organise this knowledge and to find ways to distribute it to the relevant person. Other situations where companies deeply rely on knowledge are new strategic orientations, which generate knowledge needs in business processes, restructuring, downsizing and mergers. In these processes, it is a challenge to bring the knowledge of the partners into the new organisation. By this, companies recognise that knowledge is important for their short-term profitability and long-term survival prospects.

The second reason why knowledge management concepts are becoming more and more important for the companies is the vast potential of new technologies (Osterle, 1999). Modern information technology systems offer an incredible amount of data (stored

whenever a transaction is made) and the same time offer a relative easy access for everybody to these information sources. Hence the companies must address the topic of knowledge management and examine what it means to them and how they can gain competitive advantages by applying it to their business model.

According to (skyrme, online) there are some factors that make KM fundamental in today's organisation:

- The value of an organisations wealth is increasingly in its intangible assets –its people, know-how, brands, patents, licences, customer relationships etc.
- Knowledge can command a premium price in the market – applied know-how can enhance the value of products and services.
- As suppliers and consumers get more globally connected (e.g. through the internet), access to critical knowledge becomes easier and more cost effective.
- As organisations become more efficient at what they do, they need to apply new learning and talent to help them differentiate themselves in the marketplace.
- By retaining knowledge as organisations downsize or restructure, organisations can save costly mistakes and prevent it.

3.3.4 Critical Success Factors for KM

With the importance of KM being realised, businesses are viewing KM as a critical success factor in today's dynamic borderless society. Making knowledge available to the right people at the right time is crucial for building and sustaining an organisation's competencies.

Successful KM must be founded on an understanding of how people learn, how they implement what they learn, and how they share their knowledge (Bassi, 2000). On the other hand, Haxel (2001), highlights that using knowledge in a structured and organised way is one of the key factors that determine corporate success. The goal is to share and apply knowledge faster and more efficiently than your competitors.

It this section, an attempt will be made to highlight the factors that are critical towards the successful implementation of KM. table 3.1 summarises the diverse perspectives on Critical Success Factors (CSFs) of some authors.

Table 3-2: Critical success factors

Author	Critical Success Factors of KM
Wiig (1996)	1. Knowledge assets - to be applied or exploited - must be natured preserved, and used to the largest extent possible by both individuals and organisation. 2. Knowledge-related processes to create, build, compile organise, transform, transfer, pool, aspply, and safeguard knowledge - must be carefully and explicitly managed in all affected areas.
Davenport (1998)	1. Link to economic performance or industry value. 2. Technical and organisational infrastructure. 3. Standard, flexible knowledge structure. 4. Knowledge-friendly culture. 5. Clear purpose and language. 6. Change in motivational practices. 7. Multiple channels for knowledge transfer. Senior management support.
Finneran (1999)	1. Creation of culture 2. Sharing of information and knowledge. 3. Creative knowledge.
Liebowitz (1999)	1. KM strategy with support from senior leadership. 2. Chief knowledge office 3. Knowledge ontologies and knowledge repositories to serve as organisational/corporate memories in core competencies. 4. KM systems and tools (technology) 5. Incentive to motivate employees to share knowledge. 6. Supporting culture for

Manasco (1999)	1. Knowing community. 2. Creating context. 3. Overseeing content. 4. Supporting infrastructure (proper technology). 5. Enhancing process (creating and sharing knowledge)
Bassi (2000)	1. People learn (how, what). 2. People implement (how). 3. Sharing.
Choi (2000)	1. Employee training. 2. Employee involvement. 3. Teamwork. 4. Employee empowerment. 5. Top-management leadership and commitment. 6. Organisation constraints. 7. Information systems infrastructure. 8. Egalitarian climate, benchmarking. 9. Knowledge structure
Skyrme and Amidon (2000)	1. Strong link to a business imperative. 2. Compelling vision and architecture. 3. Knowledge leadership. 4. Knowledge Creation and sharing culture. 5. Continuous learning. 6. Well-developed technology infrastructure. 7. Systematic knowledge process.
Streele (2000)	1. Staff must buy into the new model. 2. Lines of communication must be kept open. 3. Sharing information 4. Writing weekly update 5. Management supporting.
Haxel (2001)	1. Knowledge structured. 2. Knowledge organised (goal is to share and apply knowledge faster and more efficiently than competitors).
Heisig (2001)	1. Keeping it simple, like using video-tapes to store experiences from experts. 2. Building on existing process like underwriting process and exiting e-mail culture (Culture corporate). 3. Internal branding and naming metaphors for internal marketing and achieving commitment support. 4. Senior management support. 5. Success as success factor. 6. External recognition helps internal coordination. 7. IT director business-focused and business process-oriented. 8. Integrated among KM process (create, store, distribute, and apply, Knowledge). 9. KM task must be combined with daily work tasks and Integrated into daily business processes.

Skyrme (2002)	1. Top management support. 2. Clear and explicit links to business strategy. 3. Knowledgeable about knowledge. 4. Compelling vision and architecture. 5. Knowledge leadership and champion. 6. Systematic knowledge processes (supported by specialists in information management (librarians)but close partnership between users and providers of information). 7. Well-developed knowledge infrastructure (hard & soft). 8. Appropriate bottom line measures. 9. Creation of culture that supports innovation, learning and knowledge sharing. 10. Technical infrastructure that supports knowledge work.

The factors mentioned above are aimed at creating a KM environment which provides the company with sustainable competitive advantage through the continued creation of knowledge, maintenance of current knowledge resources, and creating an environment in which the KM function can survive and grow. Alazmi and Zairi (2003) stated that organisations must take account of these factors in order to exploit as much as possible the KM advantage, as well as how people learn, how they important what they learn, and how they share their knowledge.

From these factors, some are more important than others, such as technology, top management commitment, culture, and KM process which "contain creating, transferring and sharing" of knowledge.

3.3.5 The Benefit of Knowledge Management

Malhahorta (1998) and Mansco (1999) believe that KM is necessary for companies. For Malhorta (1998), this is very important, because what worked yesterday may or may not work tomorrow. He considered a simplistic example: companies that were manufacturing the best quality of buggy whips became obsolete, regardless of the efficiency of

their process, since their product definition did not keep up with the changing needs of the market. The same holds for assumption about the optimal organisation structure, the control and coordination systems, the motivation and incentive schemes, and so forth. To remain aligned with the dynamically changing needs of the business for ongoing effectiveness. That is the only feasible means for ensuring that today's 'core competencies' do not 'core rigidities' of tomorrow (Malhorta, 1998).

Skyrme (2001) focused on knowledge strategy, and stressed that as a result of developing a knowledge strategy and effective implementation, firm will typically achieve some benefits listed in table 3.3. APQC (2000) believes that knowledge supports the ability of every organisation to prosper. Every action and every output that delivers value must be aligned with one of the three platforms all business competes around: cost, time, and differentiation. KM will help the organisation to short-cycle internal process, cut costs, and operate more effectively upon successful implementation. Table 3.3 summarises some authors' views on the benefits of KM.

Table 3.3: summary of some authors' views on the benefits of KM

Authors	KM Benefits
APQC (1996)	1. Greater customer intimacy and satisfaction. 2. Improve cycle time and operational excellence 3. Better use of organisational knowledge to improve operations and deliver products and services.

Grey (1996)	1. Serve customer well 2. Reduce cycle time. 3. Operate with minimum fixed assets and overhead. 4. Empower employees 5. Innovate and deliver high quality products 6. Capture information and create knowledge 7. Share and learn
Radding (1998)	1. Prevention of knowledge loss. 2. Improved decision 3. Competitive advantage 4. Assets development
Pervaize et al. (1999)	1. Reduce loss of intellectual capital from employees who leave. 2. Reduce cost of development of new product/services 3. Increases employee satisfaction.
Uit Beijers (1999)	1. Improve efficiency. 2. Improve market position. 3. Enhance profitability of company. 4. Provide better foundation for making decisions. 5. Improve communication between knowledge-worker 6. Ensure knowledge-workers stay with company' 7. Make company focus on core business and on critical company knowledge.
APQC (2000)	1. Short-cycle internal processes. 2. Cut cost 3. Operate more effectively.
Santosus and Surmacz (2001)	1. Foster innovation by encouraging the free flow of ideas. 2. Improve customer service by streamlining response time. 3. Boost revenues by getting products and services to market faster. 4. Enhance employee retention rates by recognising value of employees' knowledge and rewarding them for it. 5. Streamline operations and reduce costs by eliminating redundant or unnecessary processes,
Skyrme (2001)	1. Faster and better solution to customer problems. 2. Improve innovation and new product development. 3. Early warning of potential market change 4. Identify new business opportunities through better (KM). 5. Improved alignment between business strategy and technology infrastructure for knowledge sharing and development,

These benefits could be missing unless the organisation takes into account KM implementation, including people's needs, such as how people learn, and how to they implement what they learn, and how

they share their knowledge. It is easy to understand why a multitude of factors become important in implementing a KM function.

3.4 Knowledge Management Technology and Tools

Knowledge management requires enabling information technologies that allow the capturing and transference of knowledge within the organisation, however technology itself is not enough (McDermott, 1999). Organisations also need to develop social or soft systems that will assist in the culture change process, building an open knowledge sharing culture is a major factor in the success or failure of any knowledge management initiative (Clarke and Rollo, 2001). The required social or soft systems for knowledge management system will be covered in the next section.

The goal for knowledge management technology is to create a linked environment for knowledge exchange. This linked environment acts as the technical embodiment of corporate memory. The links that knowledge management software must facilitate are between people as much as they are between people and information technology systems. In particular, the software must support the exchange and transformation from tacit to explicit knowledge as well as the transformation of individual knowledge into organisational knowledge, moreover, the actors need to be supported by a technological system in knowledge processes and in performance (Burstein and Linger, 2002).

Networks as technology are instrument for knowledge management, because the network structure includes the ability to connect knowledge agents (knowledge owners) in the organisation. Therefore, networks provide a platform for knowledge exchange among their members, employees as a part of network share information, experience and insights and are supported by various tools. The Employees are part of the network, because they have tacit knowledge that is valuable for the organisation. Usually the network is divided into two platforms-one strategic, one operational (Probst and Romhardt, 1997; Seufert et al, 1999; Back et al, 2001; von Krogh et al, 2002).

Knowledge Networks have been successfully used by many international, knowledge management experienced companies during the last four years (see the finding of an international survey to knowledge Networks by Enkel and Wicki (2002)).

Software tools play an important part in facilitating the implementation of KM. The number of software applications has increased considerably in the last three years. Solutions provided by software vendors take many forms and perform different tasks. However, the large number of vendors that provide KM solutions makes it extremely difficult to identify the most appropriate applications. This has resulted in organisations adopting different models for establishing KM systems (AL-Ghassani et al, 2002).

3.4.1 Intranet

Intranet is an internal network or communication system that is dedicated for the sole purpose of an organisation. It provides the organisation with electronic communication and storage services, which can only be accessed by authorised users, i.e. employee or partners of the organisation (Burdet et al, 1998). From knowledge management perspective it can be used to disseminate valuable information and knowledge about employee roles, job descriptions and skill sets, so that individuals can be easily linked from around the world to share their expertise and knowledge regarding organisational work. Furthermore, corporate intranets can also be used to hold "best practices", allowing employee at different branches to share valuable knowledge about carrying out particular tasks more efficiently, which inevitably saves time and money for the organisation.

3.4.2 Data Warehouses

Data warehouse refers to the vast amounts of information that is stored together, essentially in a single location for further processing. Large businesses that have many sites are able to store information and data in a central location, which can then be efficiently analysed for future use. Data warehouses fundamentally provide an archive for corporate data and data mining tools which are used to analyse these data to provide new information (Burdett et al, 1998).

3.4.3 Groupware

Groupware is essentially about enabling group work. It includes the informal ad hoc communication that occurs between people in adjacent

offices or people in different countries and time zones (Smith, 2000, Ellis et al, 1991).

3.4.4 Communities of practice

Communities of practice are informal groups of people who share a common practice or common interests. They can often cross many organisations are and often related to a specific domain or topic. The purpose of such communities is to allow people with common interest to share ideas and knowledge in order learn and solve problems related to their field of work or study (Wegner and Snyder, 2000, Stewart, 1997). This concept can be particularly useful for creating a knowledge environment within an organisation. If implemented properly, employees will readily share their ideas and knowledge through these communities of practice and have the specific knowledge needed to carry out their work efficiently. Examples of communities of practice might include technicians, researchers, legal professionals, salespeople, designers and engineers (Biren, 2000)

3.4.5 Knowledge Based System

Knowledge-based system also referred to as an expert system or intelligent knowledge-based system. Essentially, it is an application of artificial intelligence for a particular area of activity, where firstly expert human knowledge and experience is inputted into a computer package and then it is applied to real life situations. The purpose of such knowledge-based systems is to perform at or near the level of human

experts, therefore taking over their role whenever they are not available (Burdett et al, 1998).

However, knowledge based systems do have their obvious limitations for example they cannot fully incorporate the expertise or knowledge of human experts such as medical doctors and experienced emergency service workers. Since, every real life situation is not necessary always the same and only human experts would be better suited to make crucial judgements rather than a technological system (Gumbley, 1998). From knowledge management perspective, such systems are ideal for capturing routine information, which can be made readily available to everyone through a central knowledge base for a particular area of activity.

3.4.6 Intelligent Agents

Intelligent agents or software agents use artificial intelligence to build personalised knowledge to perform tasks with little human intervention. Generally, there are two types of software agents, firstly there is the collaborative agent, and this tends to exist in societies and has the purpose of collaborating with both people and other agents to achieve its objectives (Ferneley, 2001). They can also increase organisational productivity as employees will have the relevant information and knowledge needed to carryout their tasks more quickly and in an organised manner. Hence saving the employer time and money that is often wasted through employees not having the correct information or knowledge when it is most needed.

The second type of software agents are the personal agents that analyse and learn user preferences. They use profiling technologies to compile and adapt user information in order to meet their needs more accurately, the automated process of profiling means that the longer the software agents are used the more accurate their model becomes of their user (Ferneley, 2001).

3.5 Social or soft system for KM

Technology as a key enabler for knowledge management must consider the social or soft systems that can assist in the cultural transformation needed to support a knowledge-sharing environment within an organisation. As mentioned earlier, a major element in the success or failure of any knowledge management initiative is the degree to which a sharing culture can be established (Macdonald, 1999). This section aims to highlight the systems and techniques that can be used to assist in the cultural change process for knowledge management.

3.5.1 Change Management

To introduce any new framework or knowledge management into an organisation there must be a clear framework of change management. Without a clearly defined change management plan or team, it is likely that the proposed new systems will be rejected by employees due to factors of resistance to change (Vakola, 2000).

Organisations firstly need to select an appropriate change management team ideally from within the organisation; the purpose of

this team must be to prepare the actual plan for successfully introducing knowledge management. Therefore, the team must identify how they are going to initiate the change from their current business practices to ones that are based on knowledge management (Macdonald, 1999).

The team members selected will be acting as change agent to help introduce the new system, ideally the team members should represent all the key functional areas of the business "administration, design, IT, production, delivery, service, and finance". By identifying and involving the right problem owners and people that will be directly affected by the change will ensure that the introduction of change is more accepted upon implementation (Vakola, 2000).

Understanding the nature of the change is vital to the success of any knowledge management initiative. Organisation must remember that each knowledge management project is unique to their particular organisation, therefore they must be clear on the purpose of introducing knowledge management and on what they hope to achieve from it. Nevertheless, there are many analytical tools that can be applied to help identify the nature of change (Vakola, 2000).

3.5.2 Knowledge Management Plan

Knowledge management plan should be a complete framework for its implementation; it should cover all areas of the business and the people that will be directly affected by the change. Hence, it should be carefully prepared (European community, 1995).

Typically there are no "quick fix" solutions for drawing up a knowledge management plan, however Macdonald (1999) highlights the numbers of key components and actions that should be addressed within a plan, and these are as follows:

- Strategy, principles and values for the initiative;
- Management structure and recruitment for change;
- Education and training for everyone;
- It systems and other tools to support the process;
- Key opportunities and priorities for knowledge capture and creation;
- Implementation launch and actions;
- Goals and criteria for success for both the technological and the culture change, including regular auditing; and
- Timetable and resources required.

3.5.3 Employee Education and Training

The most effective means of achieving cultural change within an organisation is employee education and training. Although these two terms have similar meanings, they are however fundamentally different and they must be both applied fully to achieve culture change (Macdonald, 1999).

Firstly, employers must provide training to help employees to learn appropriate knowledge management skills and tools. This will enable them to get hands on experience of working with new knowledge system and allow them to get familiar with the different methods of

working. Although education maybe sufficient in some cases, on the job training would be necessary for complicated new system and IT tools.

Secondly, employee must use education to influence their staffs thinking and mind set by teaching them about the potential benefits of knowledge management and how it could directly help them and their organisation. Only when employees fully understand the concept and its benefits will they take common interest and ownership for the need to change and share their individual knowledge for the purpose of the organisation.

According to smith (2000) successful knowledge management organisations have the following notable characteristics:

Leading-edge firms maintain a culture which promotes knowledge creation by encouraging information sharing, openness and trust, cooperation and collaboration, continual search for knowledge and truth, risk taking, experimentation and respect for others.

3.5.4 Benchmarking

For organisations that are embarking on knowledge management for the first time there is an effective support measure that can be applied to achieve the desired results, namely benchmarking. Benchmarking can be comprehensively defined as:

The process of identifying understanding and adopting outstanding practices and procedures from organisations anywhere in the world in order to help an organisation improve its performance (Macdonald, 1999).

Organisation can identify and adopt proven practices and procedures of knowledge management from other organisation and learn from them to help improve their own organisational performance (Chase, 1997). In particular, benchmarking can be useful in identifying how firms collect, store, and exploit their knowledge within the organisation.

3.5.5 Implementation Strategies

Before implementing knowledge management within the organisation it is imperative to select the right type of implementation strategy. There are three fundamentally different strategies of introducing change into organisation: 'a pilot study, parallel running, and big bang' (Vakola, 2000).

Firstly, a pilot study is a small version of the actual system that eventually leads to the change, this can be very effective since there is often not much resistance to change and problems can be ironed out before the real system is implemented. However, this strategy can be costly and time consuming for an organisation.

Secondly, the parallel running implementation strategy allows an organisation to run its new proposed system alongside the old system until it can eventually take over the old system. In using this strategy, organisations can expect relatively low resistance to change and can have a means of comparing the new systems performance against the old system. However, running two systems simultaneously can be costly and demanding for an organisation.

Finally, the big bang approach to change allows an organisation to introduce the new system and remove the old system in one big phase. In doing so, this strategy can save time and money for an organisation. However, with this strategy organisations can expect high resistance to change and if the new system is not accepted it will be difficult to go back to the old system. Therefore, it is recommended that this type of strategy should only be applied when an organisation is fully certain about the outcomes of its new systems, in terms of its acceptance and suitability.

3.6 Conclusion

Knowledge management was introduced in this chapter in its broad sense by giving an overview of its terms and concepts. In addition to this, the research examined some of the theories that lie behind the function of knowledge and the need of knowledge management in today's organisations. This chapter also identified the critical success factors for KM implementation and the benefits associated with them.

The chapter ends with introducing the tools and techniques used in the implementation of KM.

The identified CSF's of KM implementation were based on the four factors; technology, top management commitment, culture, and KM process. These include 'creating', 'transferring' and 'sharing' of knowledge to carry out the pre-field investigation to create a conceptual framework to be enhanced and detailed in a post-field investigation.

It was also concluded that the benefits of KM could be missing unless the organisation takes into account KM implementation, including people's needs, such as how people learn, and how to they implement what they learn, and how they share their knowledge. It is easy to understand why a multitude of factors become most important to the Knowledge Management implementation.

The next chapter describes six different frameworks. A Knowledge Management Framework is used to improve the previously described deficiencies of knowledge management. The aim of the next chapter is to learn from the issues of the actual frameworks and use the observations and findings to develop the Knowledge Management Framework for the Telecommunication Industry (KMFTI) that represent the focus of this research.

Chapter 4: KM Frameworks

4.1 Introduction

The KM frameworks should provide not only a unified view of KM phenomena but also it should help investigators study the field of KM in an organised way. There have been few efforts to develop a framework of knowledge management. However, none of the frameworks can provide a complete and generalised frame for KM by defining fundamental attributes and their interrelationships because KM can be viewed differently based on one's background and interests.

This chapter describes a number of frameworks related to Knowledge Management. The KMFTI described in this thesis is developed to fill in the gaps and cure the deficiencies found in the existing models. The aim of this chapter is to learn from the issues of the actual frameworks and use the observations and findings to enhance the compilation of the Knowledge Management Framework for the Telecommunication Industry (KMFTI) I.

4.2 Knowledge Management Framework

The term framework is used in a variety of situations that are often different enough to necessitate a clear understanding of what is meant by the framework in this work (Beyh & Kagioglou, 2003). A knowledge management framework is used to improve the previously described deficiencies of knowledge management found in the existing frameworks such as those described in the following subsections

4.2.1 Prescriptive Framework

Beckman (1997) has introduced a prescriptive framework comprising of eight stages including:

- Identify;
- Capture;
- Select;
- Store;
- Share;
- Apply;
- Create; and
- Sell.

In the "Identify" stage, an organisation should determine its core competencies, recognise its strategic capabilities and knowledge domains corresponding to the core competencies; assess the expertise level for each knowledge domain, and lastly focus on bridging the gap between the existing needed knowledge and the new ones. Further, in the "Capture" stage, the organisation should attempt to obtain the needed Knowledge from both internal and external knowledge sources and attempt to formalise and document the obtained knowledge. In the "Select" stage, the organisation should assess the value of the collected and formalised Knowledge and filter it to obtain Knowledge that seems the most appropriate. In the "Store" stage, the organisation should classify the filtered knowledge and adds it to the organisation memory.

In the "Share" stage, the organisation should classify retrieved knowledge from organisational memory and make it available for the knowledge users. In the "Apply" stage, the organisation's knowledge worker should use the retrieved knowledge in performing tasks such as solving problems, making decisions, researching ideas, and learning. However, in the "Create" stage,

the organisation should detect new knowledge through a variety of processes such as observing customers, best practices, experimentation, and data mining, and in the "Sell" stage, the organisation should produce new products and services, and output them into environment by using organisational knowledge.

4.3 Broad Framework

There are four broad frameworks for knowledge management. These frameworks differ not only in their focus, but also in their breath and depth in characterising the nature of knowledge management phenomena.

4.3.1 Framework of Knowledge Management Pillars

Wiig (1993) is one of the pioneers who developed a KM framework. He framed KM based on three pillars. As figure 4-1 shows, the first pillar represent the nature and appropriateness of knowledge containing the following attributes:

- Surveying and categorising knowledge,
- Analysing knowledge and related activities and
- Eliciting, codifying, and organizing knowledge.

The second pillar concerns the appraisal and assessment of knowledge value and knowledge related action. The final pillar involves managing, organising, and controlling KM activities. This pillar's attributes are

- Synthesizing knowledge-related activities,

- Handling, using and controlling knowledge and
- Leveraging, distributing and automating knowledge.

All three pillars are based on the understanding of the creation, manifestation, use, and transfer of knowledge as shown in figure 4-1 hereinafter.

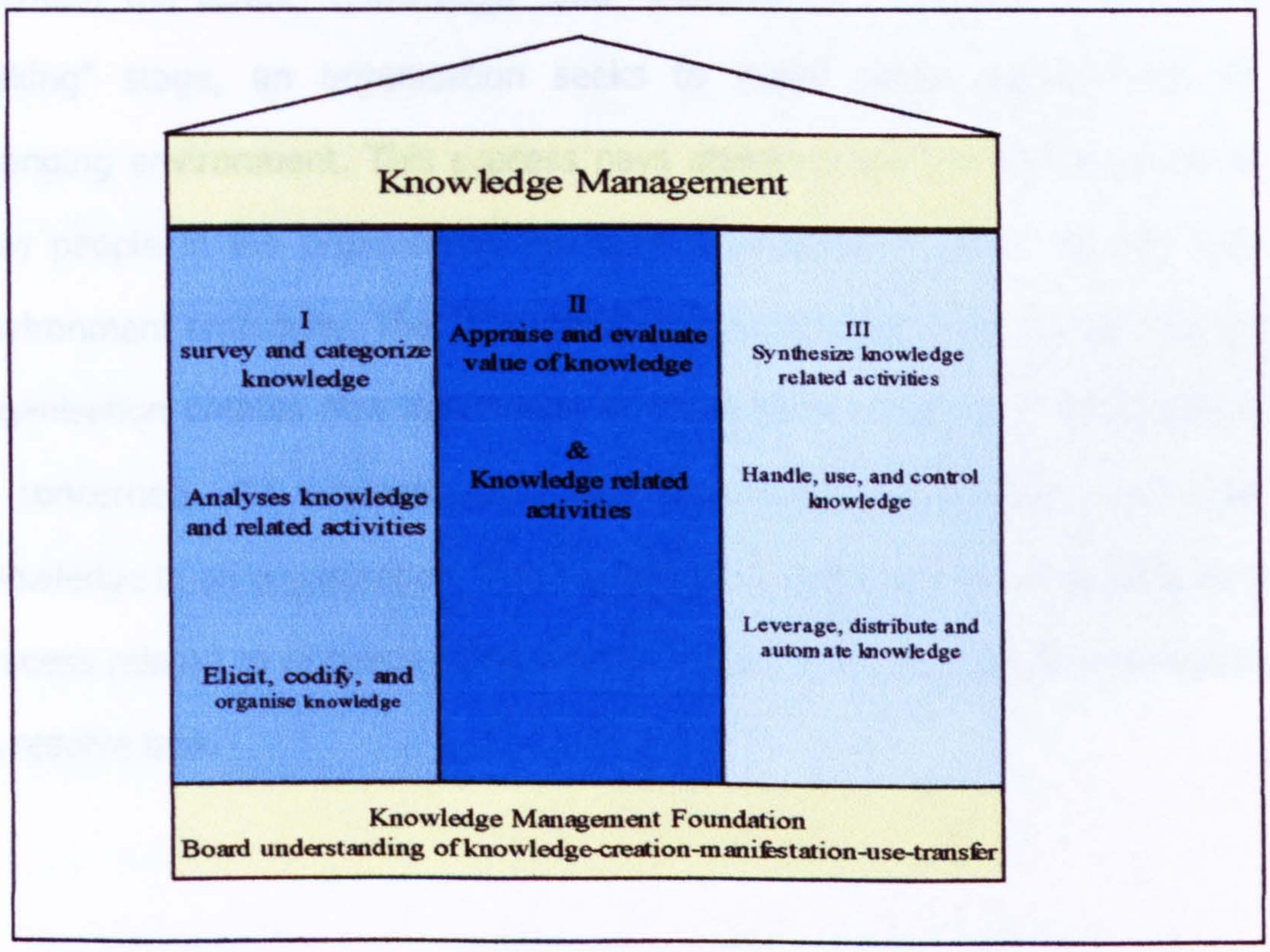

Figure 4-1: Knowledge Management Pillars (Wiig, 1993)

4.3.2 Framework for the Knowing Organisation

The model of the " Knowing Organisation" has been presented by Choo (1996) as illustrated in figure 4-2. This model suggests that organisations use information strategically through three processes:

- Sense making,
- Knowledge creation, and

- Decision making.

These three process are "linked as a continuum of nested information activities that define an organisation which possess the information and knowledge to act intelligently"

The model does not comment on the existence or nature of any distinction between the terms "Knowledge" and "Information". Further, the "Sense Making" stage, an organisation seeks to make sense (understand) its changing environment. This process pays attention to the understanding of how people in the organisation interpret information in order to deal with environment ambiguity. The "Knowledge Creation" stage investigates how an organisation creates new knowledge in the path of innovation. This process is concerned with understanding how information is changed into new knowledge in an organisation. The model below regards decision making as a process related to understanding how an organisation processes information to resolve task.

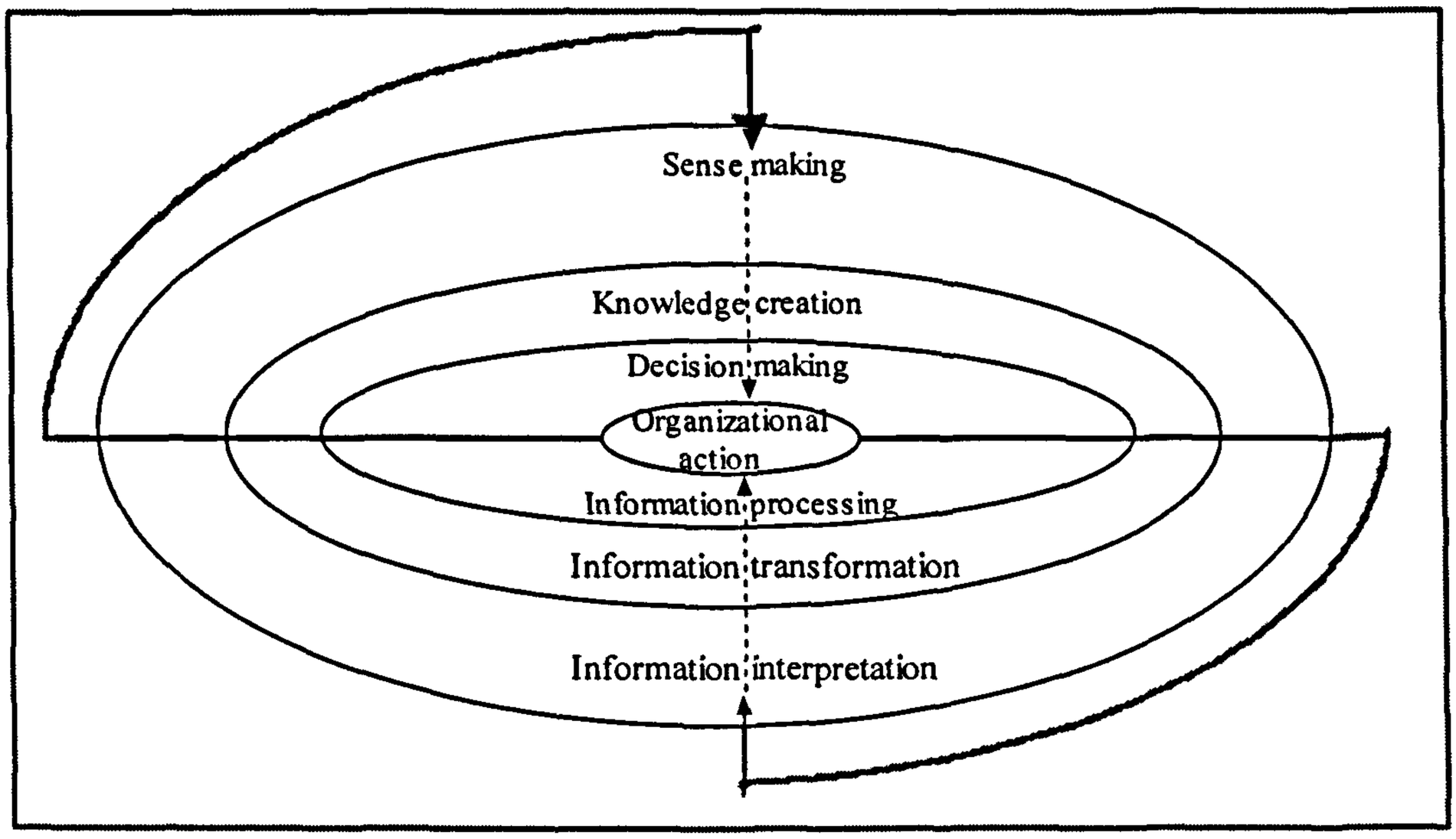

Figure 4-2: Model of knowing organisation (Choo, 1996)

4.3.3 Framework of Knowledge Management Stages

Van der Spek and Spijkervet (1997) introduced the framework presented in Figure 4-3 which identifies a cycle of four Knowledge Management stages:

- Conceptualise,
- Reflect,
- Act, and
- Retrospect.

These stages control the basic operations on knowledge. The "conceptualise" stage focuses on acquiring insights into knowledge resources. This is achieved through researching, classifying and modelling existing knowledge. During the "Reflection" stage, the "Conceptualised" Knowledge is evaluated using a variety of criteria, required improvements are established and an improvement process is planned. During the "Act" stage, actions to improve

the knowledge are taken. This involves developing new knowledge, plus distributing, combining and holding this developed knowledge. The last stage, "Retrospect", recognises the effects of the "Act" stage, and compares old and new situations.

The configuration of knowledge management stage is oriented towards a problem-solving cycle. Therefore, this arrangement can be seen as one way of coordinating knowledge manipulation activities within a problem-solving incident. The stage in the cycle is influenced by internal and external developments. Internal factors that influence the knowledge management organisation include: culture, motivation of employees, organisation, management, and information technology. External factors are acknowledged as influences; however examples of this factor are not recognised in the framework.

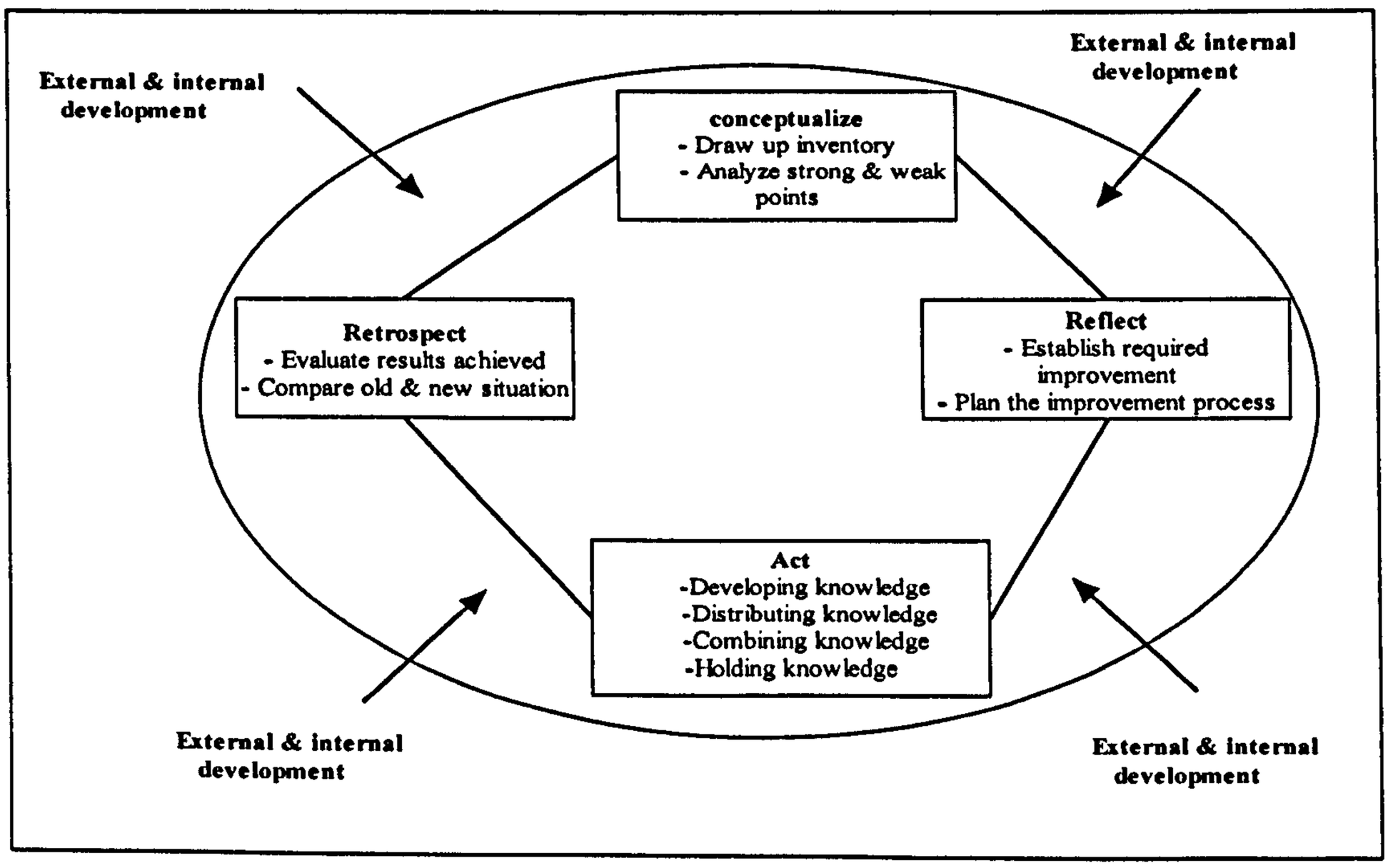

Figure 4-3: A Framework of KM (Van der Spek & Spijkervet, 1997)

4.4 Precise Framework

In addition to the broad descriptive framework, the literature also contains some specialized descriptive frameworks. Three examples are selected as representative of the variety of specific frameworks related to knowledge management.

4.4.1 Framework of Knowledge Conversions

Nonaka (1994) suggested a different KM framework, in terms of a Knowledge Creation perspective which is based on four types of knowledge conversions:

- Socialisation: the process of creating knowledge based on tacit knowledge;
- Externalisation: transforming tacit knowledge into explicit knowledge;
- Internalisation: transforming explicit knowledge into tacit knowledge; and
- Combination: creating a process of Explicit Knowledge based on existing explicit knowledge.

Through these four conversion interactions and processes and through transfer of knowledge from individual, group and organisational levels, an organisation can therefore create knowledge. Nonaka's perspective of the KM framework as a knowledge process conversion is presented in Figure 4-4.

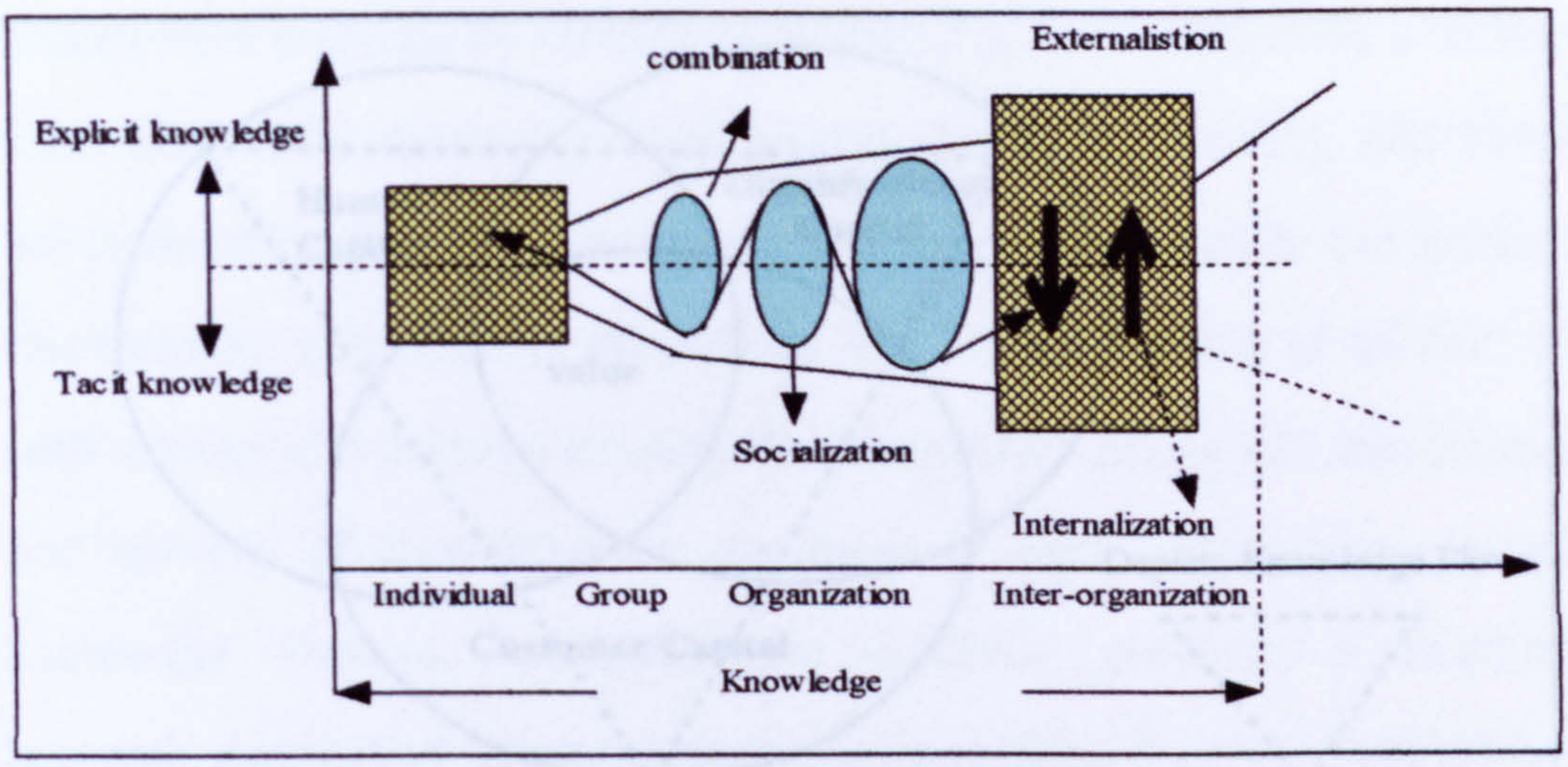

Figure 4-4: Spiral of Organizational Creation (Nonaka, 1994)

4.4.2 Model of Intellectual Capital

Petrash (1996) has introduced a model involving three types of organisational resources that are referred to as Intellectual Capital: Human capital is the knowledge that each individual generates. Organisational capital is the knowledge that has been captured / institutionalised as the structure, process and culture of an organisation. Customer capital "is the perception of value obtained by a customer from doing business with supplier of goods and/or services".

Figure 4-5 hereinafter illustrates this model and recognises that relationships among the three major types of intellectual capital lead to financial outcomes (i.e. value). The dotted lines represent the Management of Intellectual assets. Maximizing the interrelationships among the three kinds intellectual capital increases the organisation's "value-creating" space. This is illustrated by creating maximum overlap amongst the three rings of capital (Bukowitz, & Petrash, 1996).

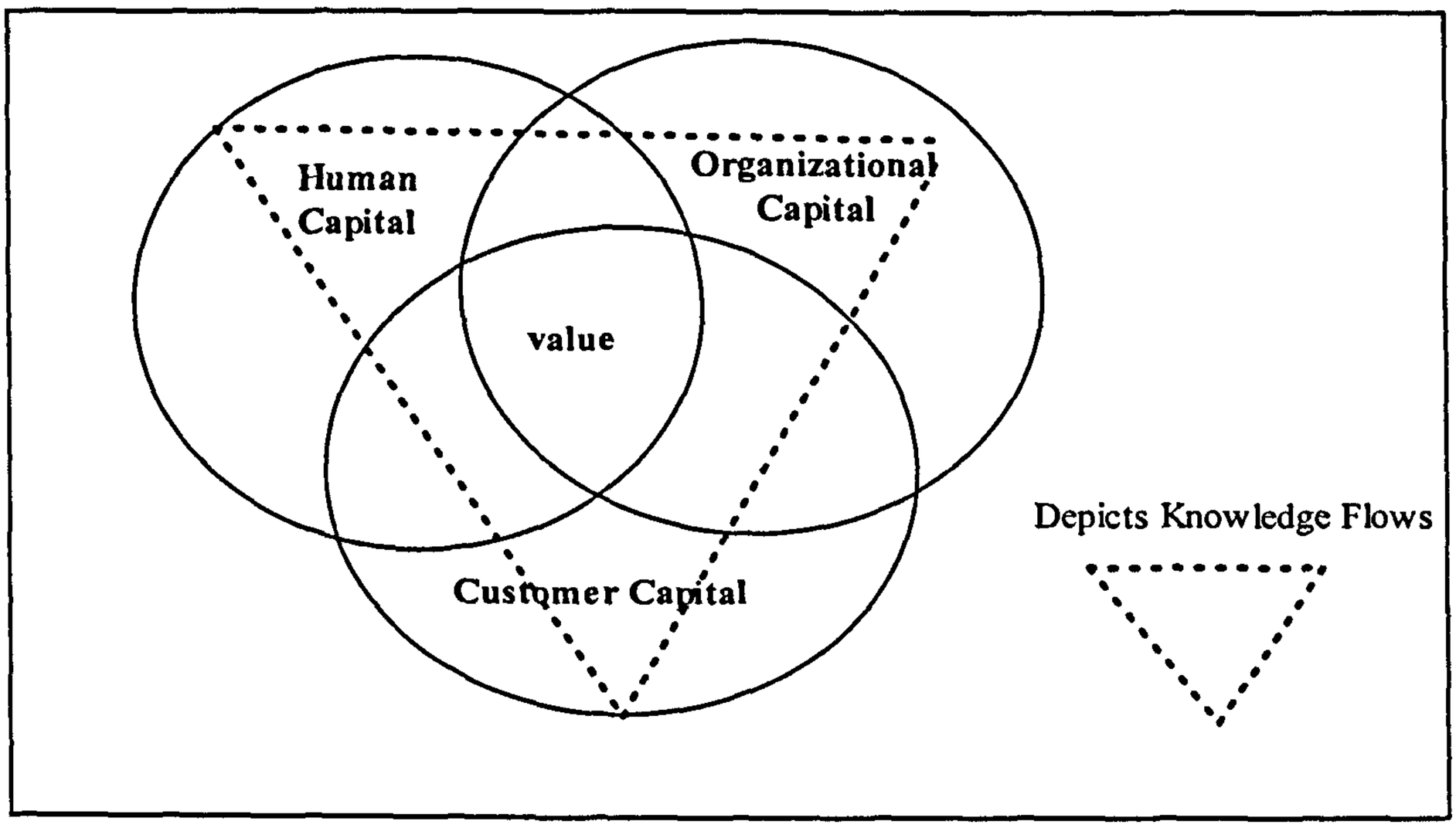

Figure 4-5: Intellectual capital model (Petrash, 1996)

4.4.3 Model of Knowledge Management Process

This model describes the Knowledge Management process in a consulting firm, KPMG Peat Marwick (Alavi, 1997). KM is defined as the creation, leveraging and sharing of know-how and intellectual assets by all individuals across the firm in order to better serve clients. The Knowledge Management process model developed by KPMG consists of a sequence of six phases as shown in figure 4-6:

- Acquisition,
- Indexing,
- Filtering,
- Linking,
- Distribution, and
- Application

Acquisition refers to knowledge creation and content development. This is accomplished by distilling experiences and lessons learned from client

engagement projects, by collecting synthesising, and interpreting a variety of information. The remaining three phases (Indexing, Filtering, and Linking) are referred to as Library Management activities and include the screening, classification, cataloguing, integrating, and interconnecting of content from both internal and external sources. The distribution phase includes packaging and delivery of knowledge in the form of web pages (e.g., designing knowledge displays, templates and graphics; creation of multimedia formats). Application refers to, using the knowledge that has been collected, captured, and delivered to produce products and services.

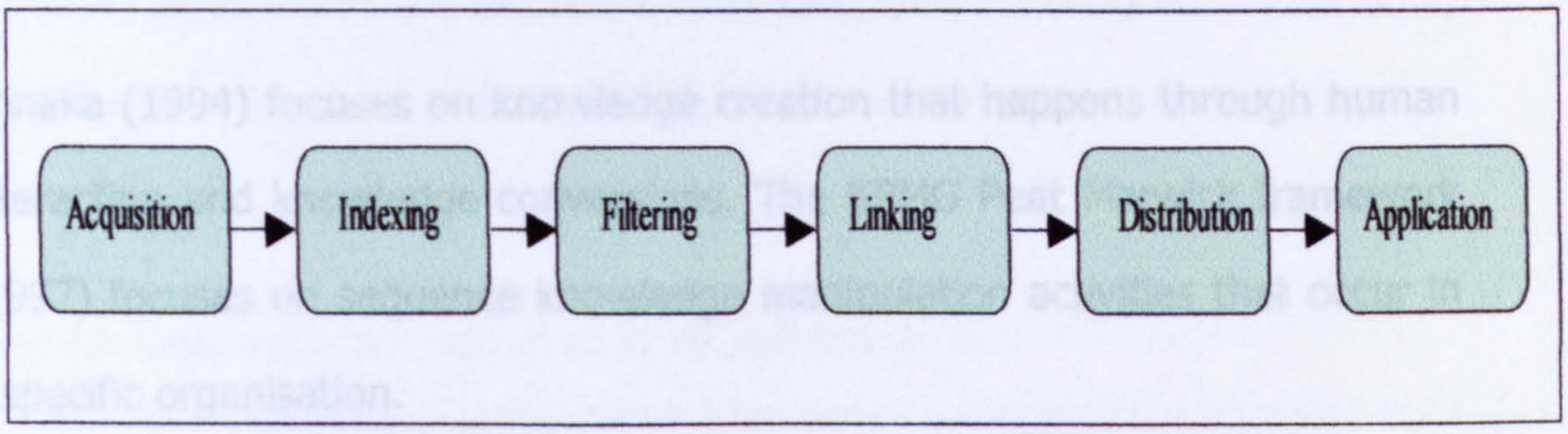

Figure 4-6: KPMG knowledge management process (Alavi 1997)

4.5 Comparative analysis of the Descriptive Framework

Descriptive frameworks are compared on three Dimensions, two of which are context dimensions: focus and framework genesis, the third one is content dimension: knowledge manipulation activities.

4.5.1 Focus

Each Framework focus reveals which of the content dimensions are emphasized and the orientation of that emphasis as summarized in Table 4.1. The Wig's framework (1993) focuses on managerial issues (i.e., managerial influences) that affect the conduct of KM in a given organisation.

In doing so, this framework identifies knowledge manipulation activities that are subjected to such influences. Choo (1996) identifies knowledge manipulation activities that operate in a "Knowing Organisation". The frame of Van der Spek and Spijkervet (1997) focuses on a cycle of stages that governs the conduct of KM (i.e. the pattern knowledge manipulation activities) in an organisation.

The model described by Petrash (1996) focuses on identifying types of intellectual capital. As such it is oriented towards characterising knowledge resources of an organisation.

Nonaka (1994) focuses on knowledge creation that happens through human interaction and knowledge conversions. The KPMG Peat Marwick framework (1997) focuses on sequence knowledge manipulation activities that occur in a specific organisation.

Table 4.1: Comparative Summary of the Descriptive Framework

Broad Frameworks				Specials Frameworks		
Authors Dimensions	Wiig, 1993	Choo, 1996	Van der Spek Spijkervet, 1997	Perash, 1996	Nonaka, 1996	Alavi, 1997
Focus	identifies management influences on the conduct of KM.	describes the working of "knowing" organisation	characterise a conceptualize -reflect-act-retrospect cycle for governing the conduct of KM.	Characterizes and measure intellectual capital	Characterizes knowledge creation through interaction of tacit & explicit knowledge and among individual, group, and organisational entities	Using technology to accomplish KM at KPMG Peat Marwick

4.5.2 Framework genesis

The frameworks originated from both academic and practitioner sources. Have their roots in various practitioner sources. They also have their roots in various development methodologies as summarised in Table 4.2. Some have grown out of academic studies of organisations, ranging from field research into KM phenomena across multiple organisations to a case study examination of an individual organisation. Other frameworks have evolved out of first-hand experiences of practitioners, some in a consulting capacity and others in a management capacity.

Yet other frameworks are the result of synthesizing concepts from previously published works. In one case, this synthesis was followed by an empirical evaluation of the resultant framework.

Table 4.2: Comparative Summary of the Descriptive Framework

Broad Frameworks				Specials Frameworks		
Authors Dimensions	Wiig,1993	Choo,1996	Van der Spek Spijkervet, 1997	Perash, 1996	Nonaka, 1996	Alavi, 1997
Genesis	Not indicated	synthesis of past research	Not indicated	Practical organisational experiences	Not indicated	Case Study

4.5.3 Knowledge Manipulation Activities

Most of the frameworks explicitly identify knowledge manipulation activities. These are summarized in Table 4.3. Some frameworks treat these activities at a relatively elemental level, while others deal with relatively higher-level knowledge manipulation activities. For instance, these activities are mostly

identified by Wiig (1993); van der Spek and Spijkervet (1997); Alavi (1997); Choo (1996); and Nonaka (1994).

Table 4.3: summary knowledge manipulation activities identified in the frameworks

Author	**Knowledge Manipulation Activities**
Wiig 1993	1. Creation, 2.Manifestation, 3. Use, 4. Transfers
Choo 1996	1. Sense making (includes "information interpretation") 2. Knowledge creation 3. Decision making (includes "information process")
Van der spek and Spijkervet 1997	In the Act Process 1. Develop, 2. Distribute 3. Combine and 4. Hold
Nonaka 1996	1. Socialisation (conversion of tacit to tacit knowledge) 2.internalisation (conversion of explicit knowledge to tacit knowledge) 3. combination (conversion of explicit knowledge to explicit knowledge) 4. externalisation (conversion of tacit knowledge to explicit knowledge)
Alavi 1997	1. Acquisition (knowledge creation and content development) 2. Indexing, 3. Filtering,4., Linking. (activities 2,3, and 4 involve screening, classification, cataloguing, integrating, and interconnecting internal and external source) 5. Distributing (packaging and delivery of knowledge in form of web pages) 6. Application (using knowledge)

4.6 Conclusion

This Chapter examined a number of traditional Knowledge management models. The study shows that this would function in such a manner that, at given point in time, a model will be found in a particular state. The fact that the model is in a given state will then in turn simplify the process of root cause analysis. Also, to learn from this idea of actual frameworks and use the observations and findings to enhances the knowledge management framework for the telecommunication industry (KMFTI).

The analysis of the different origins of the frameworks in this chapter indicated a number of issues relating cultural, decision making and knowledge process and transfer aspects in implementing KMS within a given organisation that are important in developing a KM framework which serves the essential business needs for a telecommunication organisation. Therefore the development of any such framework should take into consideration the factors and parameters that have been solely ignored by the traditional generic and broad frameworks.

The next chapter will discuss the methodologies adopted for the development of the KMFTI model and the state of the art of the used techniques for collecting the necessary data is provided and the choice of the appropriate strategies are defined and solely justified for this research.

Chapter 5: Research Methodology

5.1 Introduction

Knowledge management (KM) has evolved into one of the most important topics of the management discussion. Organisations in a broad range of industries are trying to improve the way knowledge is shared and created. The concept is based on the idea that firms have both knowledge and physical assets, and just like physical assets, knowledge assets must be managed.

Few people doubt the immense power of knowledge, but how do they apply and share it? Many of these organisations use Internet and intranet technologies as catalysts for change. They have amassed huge amounts of information, which often remain unused (e.g. on the intranet). These knowledge sources are badly used since it is quite difficult for employees to find their way around these large amounts of unstructured information. It is hard for them to find the required information quickly. Hence the task is to make sure that the employees can easily find the required information in order to apply it and increase its value for the organisation.

The focus on knowledge assets results from the fact that much of what firms do in an information economy is knowledge work. The quintessential knowledge firms are the large consulting houses which sell what they know. Many of these firms recognise that they need to institutionalise their knowledge so that it could be shared by all their consultants. Once they had built their own knowledge management systems, the consulting firms

realised that they possess a saleable product. They were aided in their efforts by the rapid turnover of knowledge workers as companies' downsized and top employees left. Whether an employee is made redundant or leaves for better opportunities are immaterial, the knowledge that these employees have, leaves with them.

Technology plays a vital role in this information retention process and in the development of Knowledge Management Systems (KMS). It should permit the user to access all required information independently of the source. However, without a well defined structural framework, a given organisation will not be able to develop an adequate KM system that takes into account the large amount of data that support its structure. Furthermore, a well defined KM framework should be able to improve access to heterogeneous, distributed and semi-structured information sources as they are present in the environment of the given organisation.

This chapter discusses the methodologies adopted for the development of the Knowledge Management Framework for the Telecommunication Industry (KMFTI) detailed in chapter seven. The state of the art of the used techniques for collecting the necessary data is provided and the choice of the appropriate strategies are defined and solely justified for this research.

5.2 The Research Problem

Knowledge Management is rapidly being introduced to organisations and is becoming a key element of leading enterprises (O"Dell, 1998, Ahmed et al, 2002). It has a strong potential to become foundational in regards to:

- The transfer of knowledge and best practices;
- Intellectual asset management;
- Innovation and knowledge creation;
- Solving enterprise problems and fewer mistakes;
- Improving decision making; and
- Improving customer service and satisfaction.

There is a critical need for formal and well organised Knowledge Management development within technical enterprises (Liebowitz, 1999). The new business environment demands foresight, conversion, innovation, and adaptation in contrast to the traditional emphasis on optimisation (Malhorta, 1998). It is an environment in which organisational theories of business need to be continuously re-examined for their alignment and validity. Current business literature states that in lieu of today's globally competitive environment with rapid technology insertion, technical enterprises must maintain a focus on their firm's core business while at the same time repositioning for the future if markets become saturated with limited potential (Leonard, 1995). Clients now demand products and services to be better, faster, and more affordable (Kotter, 1996). As technology grows by leaps and bounds, the enterprise should exercise care

in the insertion of technology and stay within the limits of the firm's financial and technical capability to control the inherent risks (Kotter, 1996).

Previous Knowledge Management solutions are generally ad hoc and are characterised by reiteration and memorisation of best practices (Malhorta, 1998). They tend to define the knowledge assumptions that are embedded in information databases. These assumptions based on the embedded information in organisational knowledge bases may lead to the erosion of a firm's capability to meet the challenges of the changing environment (such as new emerging technological innovations, new competitors, and new client needs) (Malhorta, 1998).

The telecommunication sector in general suffers from a lack of adequate Knowledge Management systems where organisations are unable to develop, manage and keep alive their best practice bases. It was observed by KPMG (1998) that telecommunication organisations can be instrumental in synchronizing the organizational best practice with the external reality of business environment, but this can be done only if they understand the implications of change in their work context upon the business enterprise and are able to manage their best practice assets. In the General Post and Telecommunication Company (GPTC) in Libya for example, thousands of employees remain without an appropriate procedure that could properly provide the management and development of their skills and the need for a change management plan is vital for their success and this can only be done through a well structured KM system.

5.3 Research methodology

This research addresses the development of knowledge management systems within the General Post and Telecommunications Company in Libya (GPTC). The GPTC was chosen as a single case with a large volume of unstructured data flows cumulated during the last five or more decades, leading to a significant loss in knowledge assets due to the absence of any sort of KMS or tools. The research will also analyse the various processes within the GPTC. The result of this research will lead to the creation of a framework that could significantly enhance the development of knowledge management tools related to information capturing, sharing and management within the telecommunications environment in particular.

A new framework (see chapter seven) will be provided to improve the shortfalls of previously developed models and fill in the gap that none of these models covers the telecommunication sector or similar environments. The research methodology is a system of explicit rules and procedures, upon which research is based, and against which claims for knowledge are

evaluated (Nachmias, 1996). Adam and Healy (2000) state that "methodology is the overall approach, and within that, the individual research methods and tools are used to meet a given research objective. A clear and unambiguous statement of the research objective is therefore necessary to enable the selection of an appropriate research methodology and data collection techniques". According to Berry (1983), a research methodology is not just about data collection and the evidence that rules them, it is more about the nature of explanation and the means by which explanations are produced. However, there is no one universally accepted scientific methodology, but rather a combination of methodological paradigms used to form the methodology of the research undertaken. In such a way, every methodology is unique and applicable only for its intended purpose (Beyh, 2004).

Therefore, considering the above statements, it becomes clear that the methodology used for the research needs to be as relevant as possible to the issues being investigated, in effect to "... suit the method to the problem and not the problem to the method" (Michail, 1999). However, a research methodology needs to describe the overall approach used to generate new knowledge, based on research philosophies in order to enable the generation of such knowledge.

In this regards, Easterby-Smith et al. (2002) indicate that there are at least three reasons why an understanding of philosophical issues is very useful. Firstly, this can help clarifying research designs which include the kind of

evidence required and how such evidence will be gathered and interpreted. It will further provide good answers to the main research questions that are being investigated in the research. Secondly, this can help the researcher recognising which design will work better for the research under investigation whereas it should indicate the limitations of specific approaches or otherwise, the advantages of other approaches. Thirdly, it should make sense for identifying and avoiding the creation of inappropriate designs that may sit outside the experience of the researcher.

Based on the above discussion, and knowing the main philosophy behind this research, we will therefore provide an overview of the types of research paradigm, research design, research approaches and research methods which will lead the main investigations in this study. Yin (1994), states that the strategy of every research should be chosen as a function of the research situation with its specific approach to empirical data collection and analysis. Each strategy however, has its own advantages and drawbacks. Therefore, the choice of the strategy is conditioned by the type of question posed, the control over actual behavioural elements and the degree of focus on historical or contemporary events. The following subsections discuss these philosophical and methodological choices in more detail.

5.3.1 Research Philosophies

Philosophers of science and methodologists have been engaged in a long-standing epistemological debate about how best to conduct research. This debate has centred on the relative value of two fundamentally different and

competing schools of thought or inquiry paradigms (Amaratunga et al., 2002):

- Logical positivism uses quantitative and experimental methods to test hypothetical-deductive generalisations; and
- Phenomenological (Interpretive) Science inquiry uses qualitative and naturalistic approaches to inductively and holistically understand experience in context specific settings. This approach tries to understand and explain a phenomenon, rather than search for external causes or fundamental laws (Easterby-Smith et al., 1991).

These differences and some of the key features of both approaches are therefore summarised in Table 5.1:

Table 5.1: Key features of positivist and phenomenological paradigms (Easterby-Smith, 1991)

	Positivist paradigm	**Phenomenological paradigm**
Basic beliefs:	The world is external and objective. Observer is independent. Science is value-free.	The world is socially constructed as subjective. Observer is part of what observed. Science is driven by human interests
Researcher should:	Focus on facts ***Look for causality*** and fundamental laws Reduce phenomenon to simplest elements Formulate hypotheses and then test them.	Focus on meanings. Try to understand what is happening. Look at the totality of each situation. Develop ideas through induction from data.

Preferred methods include:	Operationalising concepts so that they can be measured. Taking large samples.	Using multiple methods to establish different views of phenomena. Small samples investigated in depth or over time.

Given the nature of this research along with a deep understanding of the strengths and weaknesses of each of the above paradigms that are summarised in Table 5.2 below, the phenomenological approach is chosen as the main philosophy to conduct the empirical investigations (Saunders et al, 2000). This choice is interpreted by the fact that this study will aim at exploring and understanding the general issues for deploying KMS within the GPTC rather than focusing on one single question.

Table 5.2: Strengths and Weaknesses of Research Paradigms (Amaratunga et al., 2002)

	Strengths	Weaknesses
Positivist or (quantitative paradigm)	They can provide wide coverage of the range of situations They can be fast and economical Where statistics are aggregated from large samples, they may be of considerable relevance to policy decisions.	The methods used tend to be rather inflexible and artificial They are not very effective in understanding processes or the significance that people attach to actions They are not very helpful in generating theories Because they focus on what is, or what has been recently, they make it hard for policy makers to infer what changes and actions should take place in the future.
Phenomenological or (qualitative paradigm)	Data gathering methods seen more as natural than artificial Ability to look at change processes over time Ability to understand people's meaning Ability to adjust to new issues and ideas as they emerge Contribute to theory generation.	Data collection can be tedious and require more resources Analysis and interpretation of data may be more difficult Harder to control the pace, progress and end-points of research process Policy makers may give low credibility to results from qualitative approach.

However, Remenyi et al (1998), argue that both positivism and phenomenological approaches are not wholly different in respect of their impact on research, and in the generalisation of results. The strengths and weaknesses of the phenomenological paradigm and associated qualitative methods are fairly complementary. Phenomenological approach tries to understand and explain a phenomenon, rather than the positivism approach. Therefore, the researcher has selected the qualitative philosophy as the main approach for this research because it will enable him to be better involved in the real life context of the investigations. However, the researcher will not ignore the use of the quantitative approach wherever it is believed to be more appropriate for triangulating the findings during the field investigations.

5.3.2 Research Approach

A case study approach will be endorsed for this research to investigate the different parameters used for the development of the KM framework. The reason for using the case study approach is to ensure an adequate gathering of information flows generated by the different questions built upon the analysis of literature performed in the KM field. One of the main questions concerns the performance of existing KMS and whether they are able to support the exploitation of information flows within a telecommunication organisation such as the GPTC. Therefore, this research aims at initially providing an approach to detailed information on the disciplines of knowledge management in the GPTC in Libya.

The research thereafter will provide a proposal for a knowledge management Framework that will contribute to the development and enhancement of services in the GPTC and then to develop a working model for the implementation of a knowledge management System for the telecommunication industry. In this view, it is understood that different types of research are based on differing conceptions of the nature of science. But the connection between theory and research, epistemological considerations and ontological considerations – quantitative and qualitative research can be taken to form two distinctive clusters of research strategy or paradigm (Bryman, 2001). The term paradigm refers to the progress of scientific practice based on people's philosophies and assumptions about the world and the nature of knowledge and in this context it concerns the way of how the research is conducted. Hussey and Hussey (1997) have classified the different types of research according to:

- The purpose of the research;
- The process of the research;
- The logic of the research; and
- The outcome of the research.

Whereas, the purpose means the reason for the conduct of the research, and the process means the way in which data will be collected and analysed, and the logic refers to whether the researcher is moving from the general to the specific or vice versa, and lastly, the outcome refers to

whether the researcher is trying to solve a particular problem or make a general contribution to knowledge (Hussey and Hussey, 1997). Table 5.3 shows the classification of the main types of research according to specific criteria of evaluation.

Table 5-3: Classification of the main types of research (Hussey and Hussey, 1997)

Basic of classification	Type of research
Purpose of the research	Exploratory, descriptive, analytical (explanatory) or predictive research
Process of the research	Quantitative or qualitative research
Logic of the research	Deductive or inductive research
Outcome of the research	Applied or basic (pure) research

Furthermore, it is worth to show how the quantitative and qualitative approaches benefit the data collection purpose:

1- Quantitative approach

- Separates the phenomenon from the surrounding environment and makes a free standing assessment;
- Maintains distance and objectivity from the research subject; and
- Observes without inter-relating to what is observed (positivistic ideal).

2- Qualitative approach

The qualitative approach tends to take a completely opposite view. It is grounded on the assumption that there is a single objective reality and the

nature of the reality under investigation is related to the interaction of the research with it.

This approach yields rich and complex data where the findings focus on the qualities of the research subject, rather than their numeric measurement. Further, it is observed that qualitative research is a source of well-grounded, rich descriptions and explanations of processes in identifiable local contexts (Amaratunga et al., 2002). However, quantitative research is where the researcher emphasises careful control and measurement by assigning numbers to measurements (Hussey and Hussey, 1997). Easterby-Smith et al. (1991) pointed out that using both methods enables the researcher to study hard facts and human perceptions by quantitative methods, whereas qualitative methods can be used for interpretation. Also Ghauri et al. (1995), state that the main difference between qualitative and quantitative research is rather procedure than quality. In qualitative research, findings are not established by statistical methods or any other procedures of quantification. However, in some social studies, data may be quantified, but the analysis itself is qualitative. To better understand the distinction between both approaches, a summary of the key features is provided in table 5.4.

Table 5-4: Key features of qualitative and quantitative researches (Hussey and Hussey, 1997)

Qualitative	Quantitative
Uses small samples	Uses large samples
Concerned with generating theories	Concerned with hypothesis testing
Data is rich and subjective	Data is highly specific and precise
The location is natural	The location is artificial
Reliability is low	Reliability is high
Validity is high	Validity is low
Generalises from one setting to another	Generalises from sample to population

5.3.3 Research design

When it comes to data collection, a researcher must be willing to use all available sources of evidence including but not limited to interviews, documentation and observation. Yin (1994) emphasises that there is no single source of evidence that has a complete advantage over all the others, however, interviewing is found to be the most widely used data collection technique in a qualitative approach thanks to its high level of flexibility and its capability of producing data of a great depth. Therefore, based on this discussion, the author-investigator has used the interview technique as one of the information sources known to collect the necessary data for this research but without neglecting other available techniques such as questionnaire surveys and workshops that also seemed adequate to the advantage of this research.

Therefore it was concluded that, after reviewing a number of the abovementioned data collection techniques, a questionnaire along with a number of semi-structured interviews would be most appropriate for this study.

The overall process of the findings is therefore represented in Figure 5-1

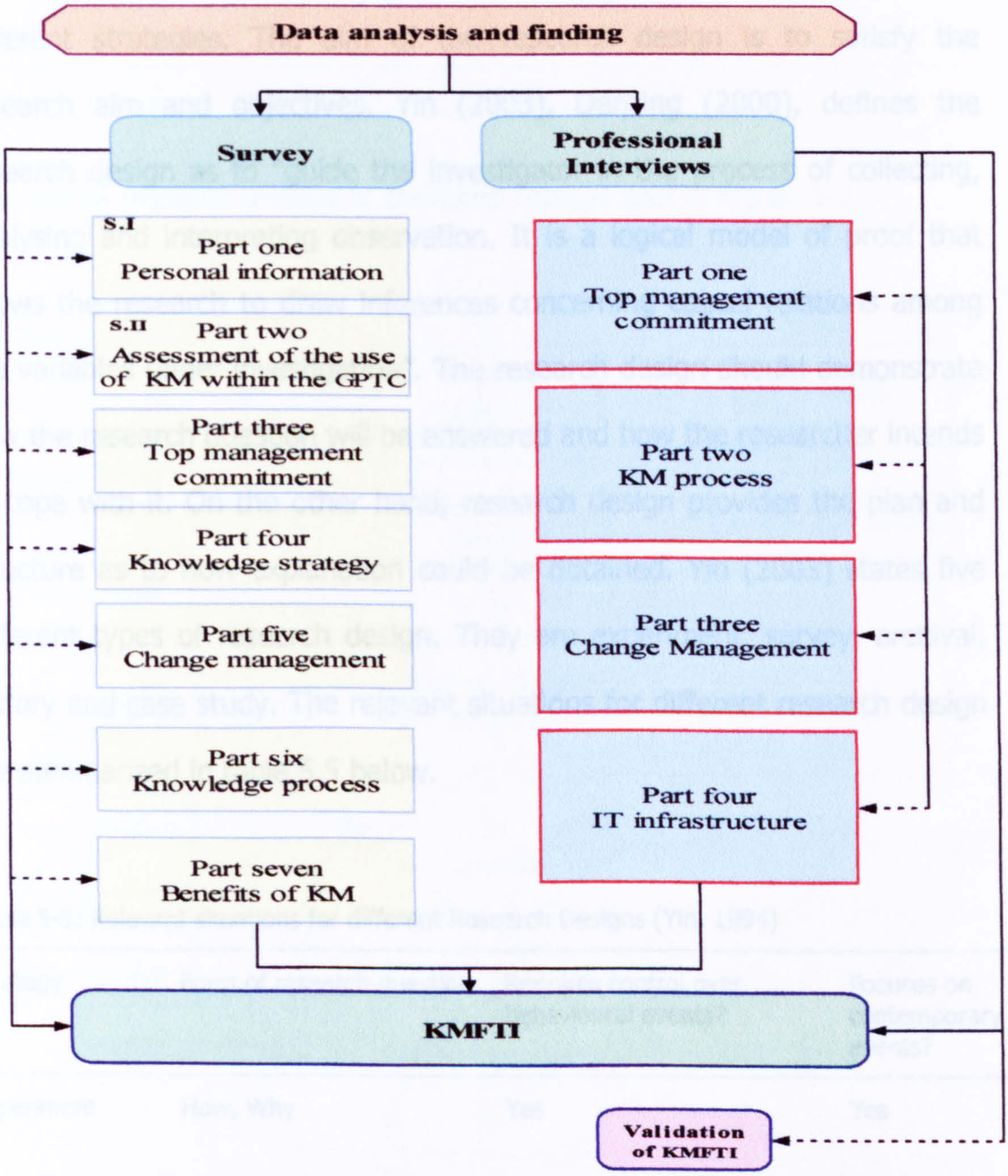

Figure 5-1: Process of the finding

5.3.4 Research Process

The research design is the programme that guides the investigator in the process of collecting, analysing and interpreting observation (Nachmias and Nachmias, 1996). Research design however embraces a number of research strategies. The decision of the choice between different research strategies (Experiment, survey and case study) is based on the specific features of the different strategies. The aim of the research design is to satisfy the research aim and objectives. Yin (2003), Denzing (2000), defines the research design as to "guide the investigator in the process of collecting, analysing and interpreting observation. It is a logical model of proof that allows the research to draw inferences concerning causal relations among the variables under investigation". The research design should demonstrate how the research question will be answered and how the researcher intends to cope with it. On the other hand, research design provides the plan and structure as to how explanation could be obtained. Yin (2003) states five different types of research design. They are experiment, survey, archival, history and case study. The relevant situations for different research design are summarized in table 5.5 below.

Table 5-5: Relevant situations for different Research Designs (Yin, 1994)

Strategy	Form of research question	Requires control over behavioural events?	Focuses on contemporary events?
Experiment	How, Why	Yes	Yes

Survey	Who, What, Where, How many, How much		Yes
Archival analysis	Who, What, Where, How many, How much	No	Yes / No
History	How, Why	No	No
Case study	How, Why	No	Yes

The overall research process is therefore represented in Figure 5-2

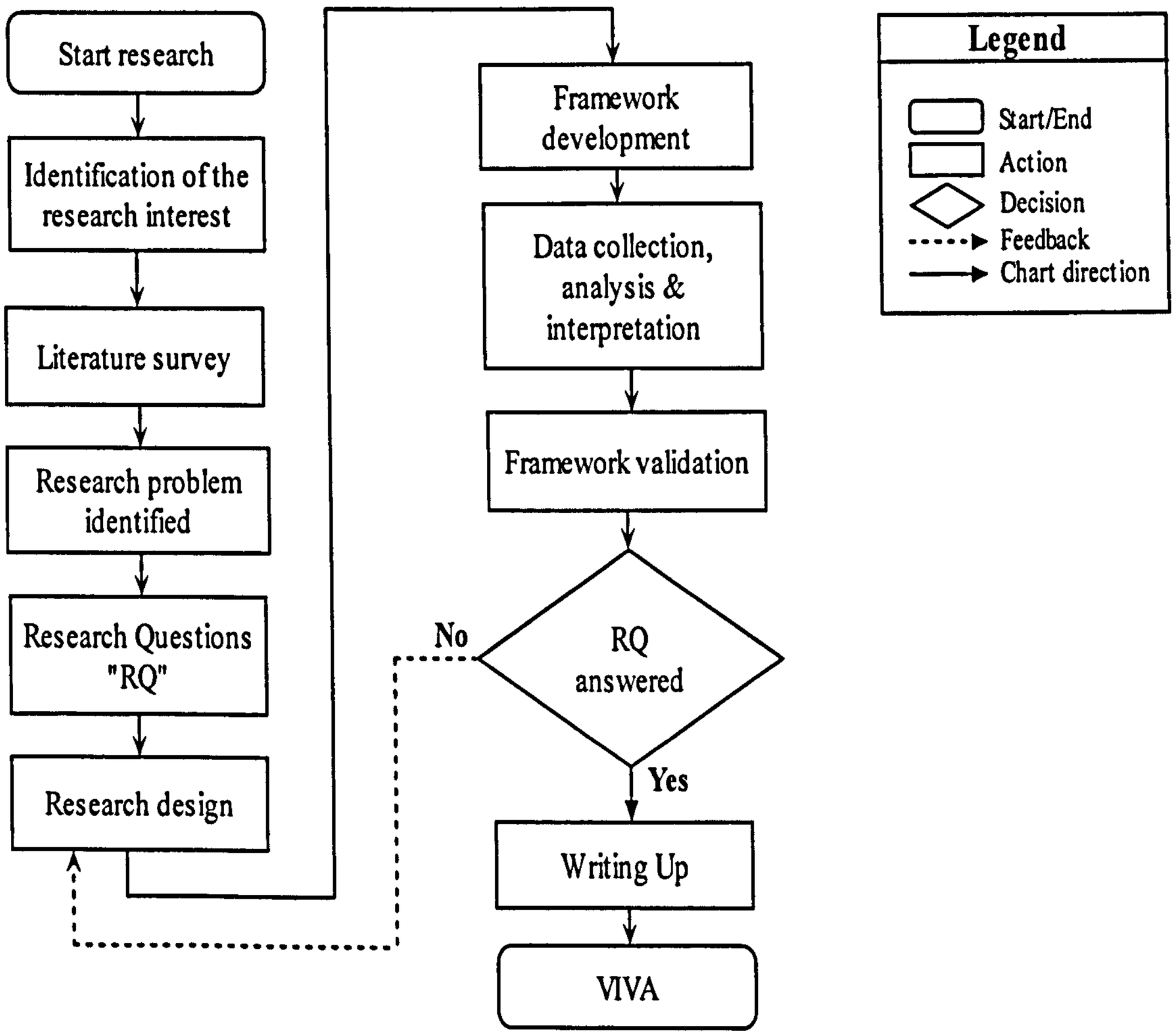

Figure 5-2: Research Process (Beyh, 2004)

5.3.5 Justification of the Case Study Strategy

Yin (1994) appears to operate from realist ontology when he defends the case study method against attacks, especially in relation to the three forms of validity: construct validity, internal validity, and external validity. A key suggestion for dealing with construct validity is to use multiple sources of evidence; for internal validity Yin (2003) stresses the importance of building cases over time in order to eliminate alternative explanation; and for external validity he points out that case studies rely on analytic rather than statistical generalisations.

Sekaran (2003) stated that case studies involve in-depth, contextual analysis of similar situations in other organisations, where the nature and definition of the problem happen to be the same as experienced in the current situation. Further, Remenyi et al (1998) define the case study as: "a detailed investigation of the context and processes that affect a phenomenon within organisations". Yin (2003) defines the case study as "an empirical investigation into contemporary phenomenon operating in a real-life context". He also states that the case study is the preferred strategy when "how" or "why" questions are being posed. This allows the researcher to determine not only what happened but also, why it happened. Therefore, the case study is excellent as a recorder of decisions, reasons, motivations and structural relationships (Leavy, 1994).

Moreover, the case study is one that focuses on understanding the dynamics found within single settings (Amaratunga and Baldry, 2000) and

usually refers to relatively intensive analysis of a single instance of a phenomenon being investigated. Case study method is appropriate when a researcher's concern is directed toward a set of issues in a single organisation, or a single department within it as it applies to the study of KM within the GPTC. Bell (1993) develops an argument that the case study approach is particularly appropriate for individual researchers because it gives an opportunity for one aspect of a problem to be studied in-depth within a limited time scale. He further indicates that the great strength of the case study method is that it allows the researcher to concentrate on a specific instance or situation and to identify, or attempt to identify, the various interactive processes at work.

Case study approach is more appropriate when the researcher wants to understand an organisation's phenomena within their real-life contexts (Stake, 1995; Yin, 1994) as it is the case for the GPTC work environment and the data flows that remained non exploitable to a large extent. Therefore, the case study approach is used in this situation as the researcher wishes to gain a rich understanding of the context of knowledge management system building, and it is a good way of exploring existing theories (Saunders et al., 2000).

Furthermore, Yin (1989) defines a case study as "an objective, in-depth examination of a contemporary phenomenon where the investigator has little control over events. This is in fact the case of the researcher who could be facing an important number of obstacles to collect the necessary

data from within the GPTC departments to build the KM framework for the telecommunication industry. Methods and techniques such as questionnaire surveys and semi-structured interviews in a mixed approach can be used in the given situation. Noteworthy to indicate that Yin (1994) went further in his investigations to categorise the case study as:

- Exploratory: usually focuses on theory development;
- Explanatory: involves hypothesis testing. This may involve demonstrating a theory's applicability under circumstances not previously investigated, or pointing out the theory's inapplicability, it either in specific circumstances or in general; and
- Descriptive case study: as its name implies, it depicts unstudied situations.

Based on the above discussion the researcher will be adopting a case study strategy for the purpose of this research whereas its application will drive more specific data from the GPTC at different organisational levels and within its overall departments. This is considered necessary because it offers the possibility of a more holistic understanding of the nature and contexts of how the different parameters of the KM framework will be established within such environment. However, it is necessary to note that, although, this research along with the research questions posed may seem to be mainly investigated through the use of a case study strategy as explained earlier, we believe that it would be wise to consider different strategies which could seem more appropriate and convenient during the investigations. This, in particular, concerns the use of questionnaire surveys

as they could enhance the collection of data from larger groups within the GPTC.

Although, in the early stages of investigations conducted for this research, it was initiated that the use of a case study strategy will permit an in-depth understanding of the main issues preventing the development, deployment and use of KM systems within the GPTC as this approach was believed to be appropriate for individual researchers because it gives an opportunity for one aspect of a problem to be studied in some depth within a limited time scale as indicated by Bell (1999), it has appeared later, during the field investigations that a case study strategy could not be thoroughly implemented due to a number of constraints which are explained in detail in Chapter 9 (Discussion).

5.4 Research Techniques

When it comes to data collection, a researcher must be willing to use all available sources of evidence including but not limited to interviews, documentation and observation (Beyh, 2004). Yin (1994) emphasises that there is no single source of evidence that has a complete advantage over all the others, however, interviewing is found to be the most widely used data collection technique in a qualitative approach thanks to its high level of flexibility and its capability of producing data of a great depth. Therefore, based on this discussion, the author-investigator has used the interview technique as one of the information sources known to collect the necessary

data for this research but without neglecting other available techniques such as questionnaire surveys and workshops that also seemed adequate to the advantage of this research.

Therefore it was concluded that, after reviewing a number of the abovementioned data collection techniques, a questionnaire along with a number of semi-structured interviews would be the most appropriate strategy for collecting data in this study.

5.4.1 Pilot questionnaire survey

Prior to drafting the final questionnaire, the pilot survey was undertaken to test the validity of the questionnaire and ensure that all the questions addressed are relevant and well defined as to provide answers to the main research questions and the development of the KMFTI. The questionnaire was sent to fifty employees within the GPTC for pre-test. This process has enabled to reach an acceptable level of confidence in the validity and reliability of the questions posed.

The comments obtained from the reviewers have contributed to the improvement of questions designed to better meet the aim of the research questions. In this regard, we aimed at following the "best practice" schema in questionnaire design in order to ensure that its structure was relevant, clearly developed and properly constructed. This technique helped in eliminating unnecessary questions as per MRS (2003) guidelines and to further make sure that:

- The design of the questionnaire is appropriate for the audience being researched;
- The answers are capable of being interpreted in a meaningful and unambiguous way; and
- To reveal weaknesses in the questions posed in order to improve their organisations.

Dillman (1978) further indicates that any pre-test or pilot survey needs to provide evidence about the following questions:

- Is each question measuring what it is intended to measure?
- Are all the words understood?
- Do all respondents interpret questions similarly?
- Does each close-ended question have an answer that applies to each respondent?
- Does the questionnaire create a positive impression, one that motivates people to answer it?
- Are questions answered correctly?
- Does any part of the questionnaire suggest bias on the part of the researcher?

Having fully complied with the abovementioned best practice criteria, the pilot questionnaire survey was distributed to a random sample of fifty

members in different departments within the GPTC to assess quality and relevance. The pilot survey was achieved during November 2003.

The final questionnaire (see appendix 1) was divided into two main sections.

Section one (General Information): This section was concerned with gathering basic demographic information about the respondents (i.e. position, department, education, etc.), and the second part was focused on the questions related to the KMS and their use within the GPTC.

5.4.2 Scaling

The rating of the responses was based on likert scale (Easterby-Smith et al., 1991; Openheim, 1966; Preece, 1994) as this method is believed to be appropriate in this survey due to the nature of the questions asked. In this method, five categories of answers were provided for each question starting either with "Strongly agree" to "Strongly disagree" or "Strongly relevant" to "Strongly irrelevant" which would be scaled from the most negative towards the most positive response accordingly. It is also understood that likert scale is not limited to five categories of answers only, however, in the present study, providing five choices was believed to be the most appropriate situation.

5.4.3 Interviews

Semi-structured interview techniques were adopted to collect data from the interviewees (see chapter 7). McCracken (1988) supports this view and discusses how interviews can draw on the past as well as the present to

extract a deeper understanding of an issue than a simple survey type inquiry. Moreover, there was a possibility to explore secondary issues as they emerged during the meetings with the interviewees established due to the flexible nature of the interviews. Furthermore, in order to maintain a good level of transcription of the data collected and to avoid any possible losses of important information given by the interviewees, the use of a moderator was excluded and therefore, two recording methods for collecting the data and making sure that no loss could occur has been used simultaneously:

- The first method consisted on the use of a high quality digital voice recording tool to maintain a clear replication of the conversation; and
- The second method, which was based on a pre-designed question-response template prepared, was used to record observations and take notes at the time they emerge during the conversation. This method allows the pre-classification of a certain number of important data that seem to be directly related to the aim of the interviews, and further help on their analysis at a later stage.

The main purpose of conducting these interviews was to fill in the information gaps that could not otherwise be collected from the literature search or the questionnaires surveys. The investigated issues mainly included the following questions:

- The assessment of the use and/or exploitation of KM Systems within the GPTC;

- The identification of possible success factors for developing and implementing KMS within the telecommunication organisations; and
- The identification of potential benefits of implementing a KM system in the telecommunication organisations in general.

The conducted open-ended interviews have to some extent, provided most of the missing data needed for this research. The advantage of such open-ended nature is that there is a possibility to ask the interviewees to propose their own insights into certain occurrences and may use such propositions as the basis for future inquiry (Yin, 1994). These types of questions included interpretations, opinions, and feelings of the interviewees about KM implementation and adoption factors. Also, interpretative questions are easier for the interviewees to answer at this point because they follow their own descriptions of the activities or issues in question (Patton, 1987).

5.4.4 Triangulation

Also, triangulation techniques were used between the data obtained from the literature (i.e. the important factors related to the implementation of KMS in a given telecommunication organisation such as the GPTC), the questionnaire surveys and the interviews in order to make sure that the final results are of a real value for this research. Triangulation methods are mainly employed during research to collect data in order to test the validity of the information collected for a case study. This includes the use of multiple sources of data (Berg, 1989; Patton, 1987). Triangulation is based

upon the fact that: "...no single method ever adequately solves the problem of rival casual factors... because each method reveals different aspects of empirical reality, multiple methods must be employed... and should be used in every investigation" (Denzin Norman, 1978). The case studies that adopt triangulation methods are rated more highly than those that rely on single sources of data (Yin et al., 1983). The use of multiple sources of evidence in case studies allows an investigator to address a broader range of historical, attitudinal, and behavioural issues. Thus any finding or conclusion in a case study is likely to be more convincing and accurate if it is based on different sources of information (Yin, 1994).

5.5 Conclusion

This chapter discussed the research methodology and the process used to undertake the research. A number of research strategies and techniques for developing the theories contributing to the building of the KMFTI Model discussed in chapter seven and further to test its validity has been adopted. A triangulation approach was established to reduce the biases inherent in the case study strategy if such strategy had to occur. Both positivist and phenomenological paradigms have been adopted to meet the requirements of this research where appropriate.

The following chapter (ch. 6: Data Analysis) reports on the use of KMS within the GPTC in particular and within the telecommunication industry in general. It further discusses the results of the empirical investigations of the

research surveys and interviews conducted in the GPTC which have significantly contributed to the improvement and development of the KMFTI model presented in chapter seven.

Chapter 6: Data Analysis

6.1 Introduction

This chapter reports on the use of KM within the telecommunications industry and discusses the results of the empirical investigations of the research surveys and interviews conducted in the General Post and Telecommunication Company (GPTC).

Given the nature of the different parameters set out in the KMFTI (see chapter 7), and the need for more accurate information than those obtained from the literature search, it has remained necessary to obtain further specific data from real life contexts (i.e. KM issues, the KM success factors, and the benefits of KM) to validate the theoretical framework as well as to adduce the final and necessary adjustments to it's initial concept. The related data were in fact collected through questionnaire surveys, phone communications, and face-to-face interviews within the overall thirty five departments of the GPTC.

The research methodologies used for conducting these investigations are also illustrated in this chapter in the aim of demonstrating the issues encountered during this work and emphasising on the most commonly observed limitations of the research.

6.2 Assumptions on the adoption barriers of Knowledge Management Systems (KMS)

The survey and interviews were designed to test a number of assumptions related to the barriers of adopting and using KMS within the telecommunications organisations as discussed in the literature surveys in

chapters three and four. Furthermore, in order to assess the current situation for knowledge management in the GPTC in Libya, a questionnaire survey was prepared after a consultation of a number of best practice and survey design publications (De Vaus, 1991; Fowler Floyd, 1995; Hague Paul, 1993; Remenyi et al., 1998) and sent to fifty employees in the company including executives and non executives staff. The questionnaire (Appendix 1) was composed of two main sections as follows:

Section I - General Information: This was composed of two parts; one was concerned with gathering basic demographic information about the respondents, and the second one focused on their educational level as well as on their positions within the company.

Section II – knowledge management: This section was composed of forty four questions. The main objective of this section was to assess the issues of knowledge management, the benefit of knowledge management and the knowledge management critical success factors.

Regarding the interviews, a template of questions was designed to collect further data related to the knowledge management framework, which data, could not be obtained from the questionnaire survey. Thirty five interviews were conducted in order to holistically investigate the current situation of knowledge management within the GPTC and to further establish the appropriate parameters of the Knowledge Management Framework (KMFTI) that represents the main focus of this research.

6.2.1 Questionnaire validation: Pilot Study

The questionnaire was sent to fifty employees within the GPTC for pre-test. The pilot survey was carried out in order to test the validity of the questionnaire and make sure that all the questions posed are relevant and well defined as to provide answers to the main research questions and the development of the KMFTI.

6.3 Description of the survey

The following subsections will explain the results obtained from the survey and interviews conducted between November 2003 and May 2004 in relation to the development of the Knowledge Management Framework for the Telecommunications Industry (KMFTI). Prior to discussing these results in detail, it is suggested that all percentages given in the text will be rounded for a practical reading purpose only. However, the reader has the possibility to look at the exact figures provided in the related tables and graphs.

6.3.1 Survey Summary

As stated earlier in this chapter, thirty five departments within the GPTC were selected for the survey totalising more than six hundred and fifty two staff. However, a random sample of fifty staff was chosen to conduct the pilot survey. The results obtained from the pilot questionnaires were later removed from the statistical analysis database (see table 6-1).

Table 6-1: Survey Summary

Summary	Distributed Questionnaires	Pilot	Initial Survey	Collected Questionnaires	Non Returned	Discarded	Valid Responses
Total	652	50	602	495	167	18	310
%				82%	28%	3%	51%

Therefore, the total number of the distributed questionnaires that will serve as the base for the data analysis was brought down to six hundred and two instead. However, this number was once more decreased to reach three hundred and ten valid units due to the fact that some of the questionnaires were either discarded or unreturned (18 discarded and 167 unreturned).

6.4 Data Analysis: Questionnaire Survey

6.4.1 Section One: General Information

The first question was designed to investigate the profile of the respondents and the positions they hold within their respective departments.

Figure 6.1 informs us that the survey was distributed to the majority of the departments within the GPTC and thus it should be able to cover a very well established representation sample from each of these departments.

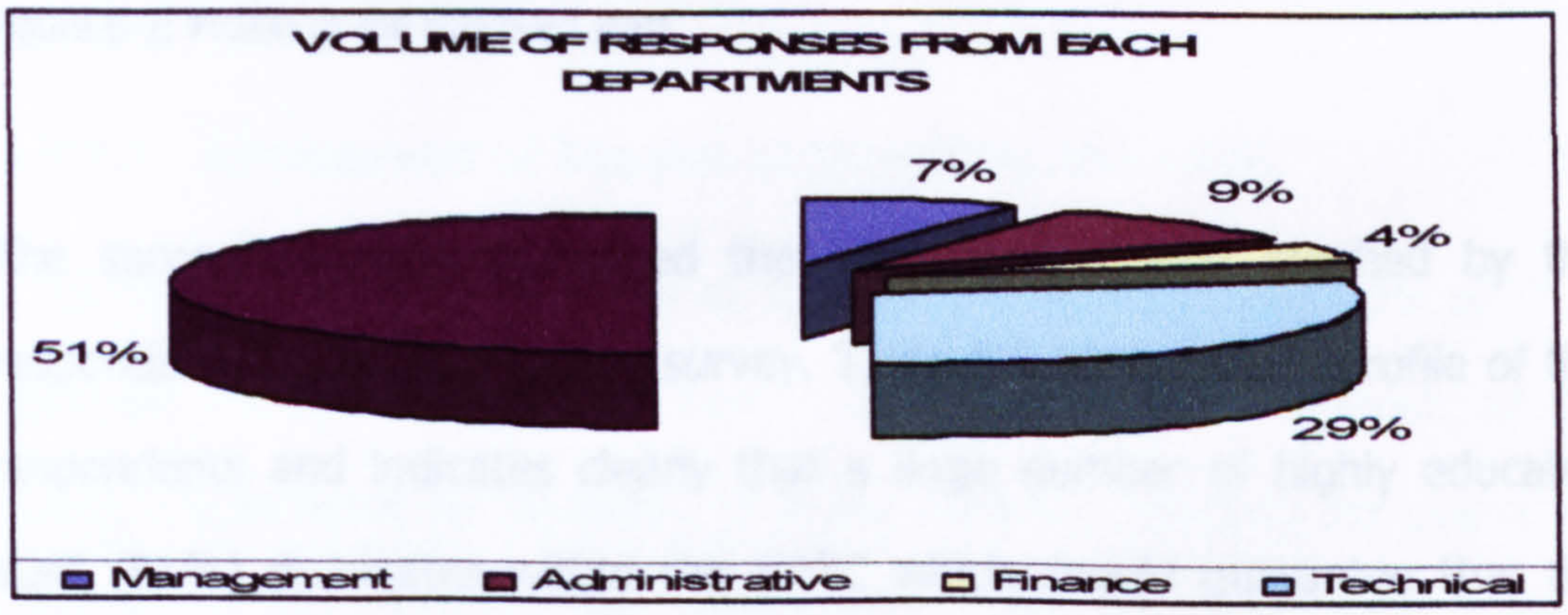

Figure 6-1: Volume of responses

Also, Figure 6.2 indicates what positions are held by the surveyed staff. This information is very important as to maintain a balance of adequate responses aiming at involving all levels of employment at the GPTC that could later influence the development and deployment of the KMFTI where its adoption

could largely vary from one department to another.

Furthermore, the adoption of a KM system and in particular the potential use of the KMFTI within the GPTC could be perceived in various ways according to each of the respondents' positions, own views, understanding, and the level of needs of capturing and exploiting knowledge to better serve their surrounding work environment.

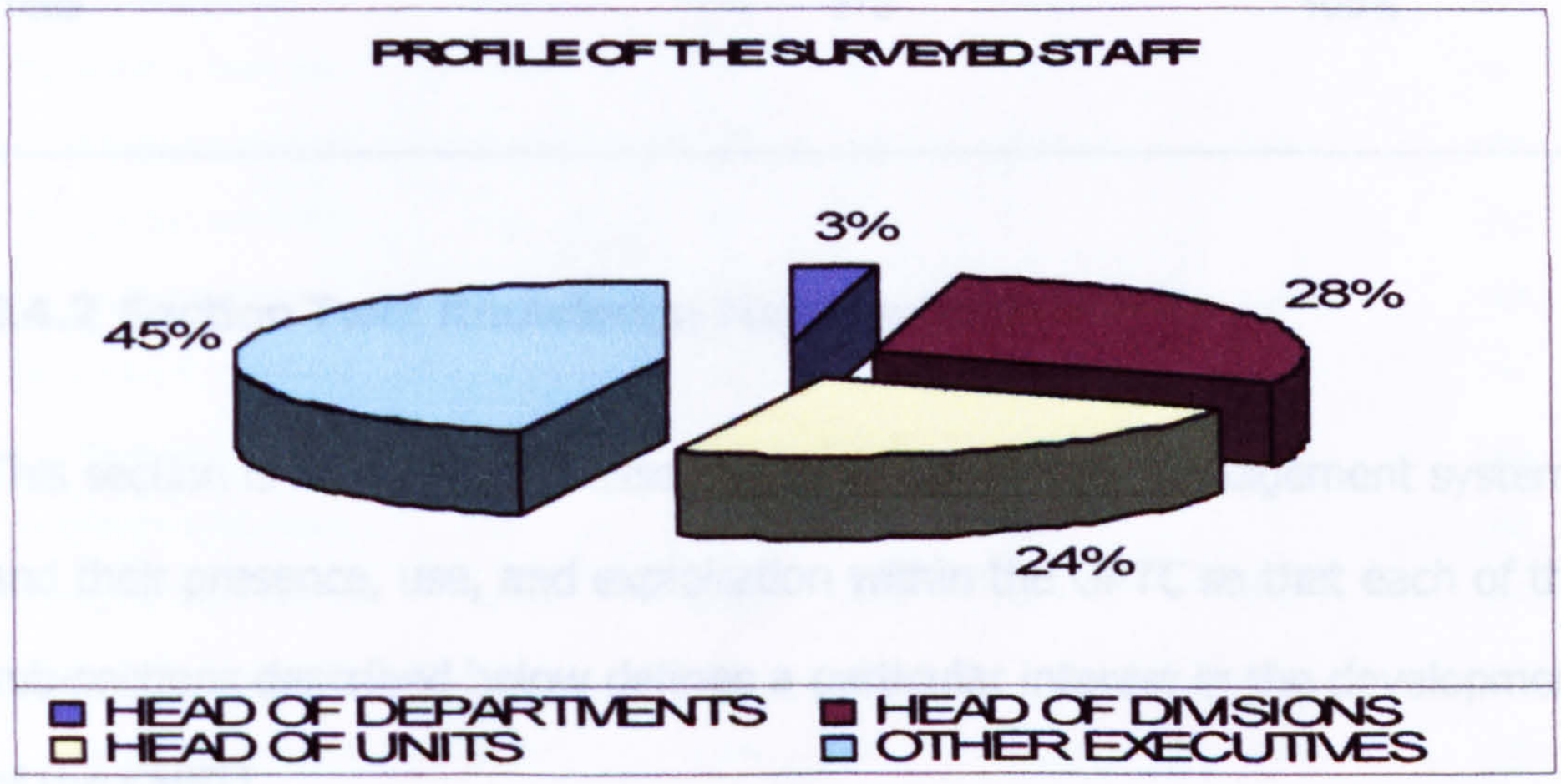

Figure 6-2: Profile of the surveyed staff

The second question addressed the level of education reached by the respondents at the time of the survey. Table 6.2 analyses the profile of the respondents and indicates clearly that a large number of highly educated staff (81%) dominates within the GPTC which should guarantee that the respondents have the ability to understand and discuss the main issues related to KM exploitation within their departments.

Table 6-2: Education Level of Respondents

Education Level of Respondents	No. of Respondents	%
PhD, MSc, BSc, BA.	249	81%
High School and below	61	19%
Total	310	100%

6.4.2 Section Two: Knowledge Management

This section is related to the assessment of Knowledge Management systems and their presence, use, and exploitation within the GPTC so that each of the sub-sections described below defines a particular interest in the development of the KMFTI.

6.4.2.1 Assessment of the use of KM within the GPTC

A thorough analysis of the use of KM Systems (KMS) within the GPTC is gathered through this part. In fact, it identifies the main interests of the overall departments for adopting, or in the contrary, rejecting the use of KM systems. In this regards, the respondents were presented with 9 inter-related questions that describe various issues of KMS. These answers were rated according to Likert scale approach whereas five options were defined starting with "Strongly agree" as being the most positive answer, to "Strongly disagree" as the most negative one.

The results of this analysis are given in Table 6.3 below. It is important however to note that all scales without any result will be dismissed in this analysis, and all percentages will be rounded to the nearest figures:

Table 6-3: Summary of the Results on the Assessment of KM within the GPTC

	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	STRONGLY DISAGREE	TOTAL
Q1: NUMBER OF RESPONSES	249	51	6	3	1	310
PERCENTAGE FROM 310	80.32%	16.45%	1.94%	0.97%	0.32%	100%
Q2: NUMBER OF RESPONSES	182	76	50	2	0	310
PERCENTAGE FROM 310	58.71%	24.52%	16.13%	0.65%	0.00%	100%
Q3: NUMBER OF RESPONSES	235	57	12	4	2	310
PERCENTAGE FROM 310	75.81%	18.39%	3.87%	1.29%	0.65%	100%
Q4: NUMBER OF RESPONSES	37	83	176	9	5	310
PERCENTAGE FROM 310	11.94%	26.77%	56.77%	2.90%	1.61%	100%
Q5: NUMBER OF RESPONSES	91	203	11	5	0	310
PERCENTAGE FROM 310	29.35%	65.48%	3.55%	1.61%	0.00%	100%
Q6: NUMBER OF RESPONSES	224	74	12	0	0	310
PERCENTAGE FROM 310	72.26%	23.87%	3.87%	0.00%	0.00%	100%
Q7: NUMBER OF RESPONSES	178	121	11	0	0	310
PERCENTAGE FROM 310	57.42%	39.03%	3.55%	0.00%	0.00%	100%
Q8: NUMBER OF RESPONSES	278	23	9	0	0	310
PERCENTAGE FROM 310	89.68%	7.42%	2.90%	0.00%	0.00%	100%
Q9: NUMBER OF RESPONSES	98	122	83	7	0	310
PERCENTAGE FROM 310	31.61%	39.35%	26.77%	2.26%	0.00%	100%

Respondents were asked to rate their views as to what extent they do agree or disagree with the following statement:

Q1 - KM is a mean to create, identify, capture and distribute organisational knowledge to people who need it:

This question was meant to establish a first contact with the respondents

and capture their understanding of what KM systems can bring about in terms of benefits to their departments. 80% of the respondents strongly agree with this statement since the remaining 16% have stated that they agree with it (see Fig. 6.3).

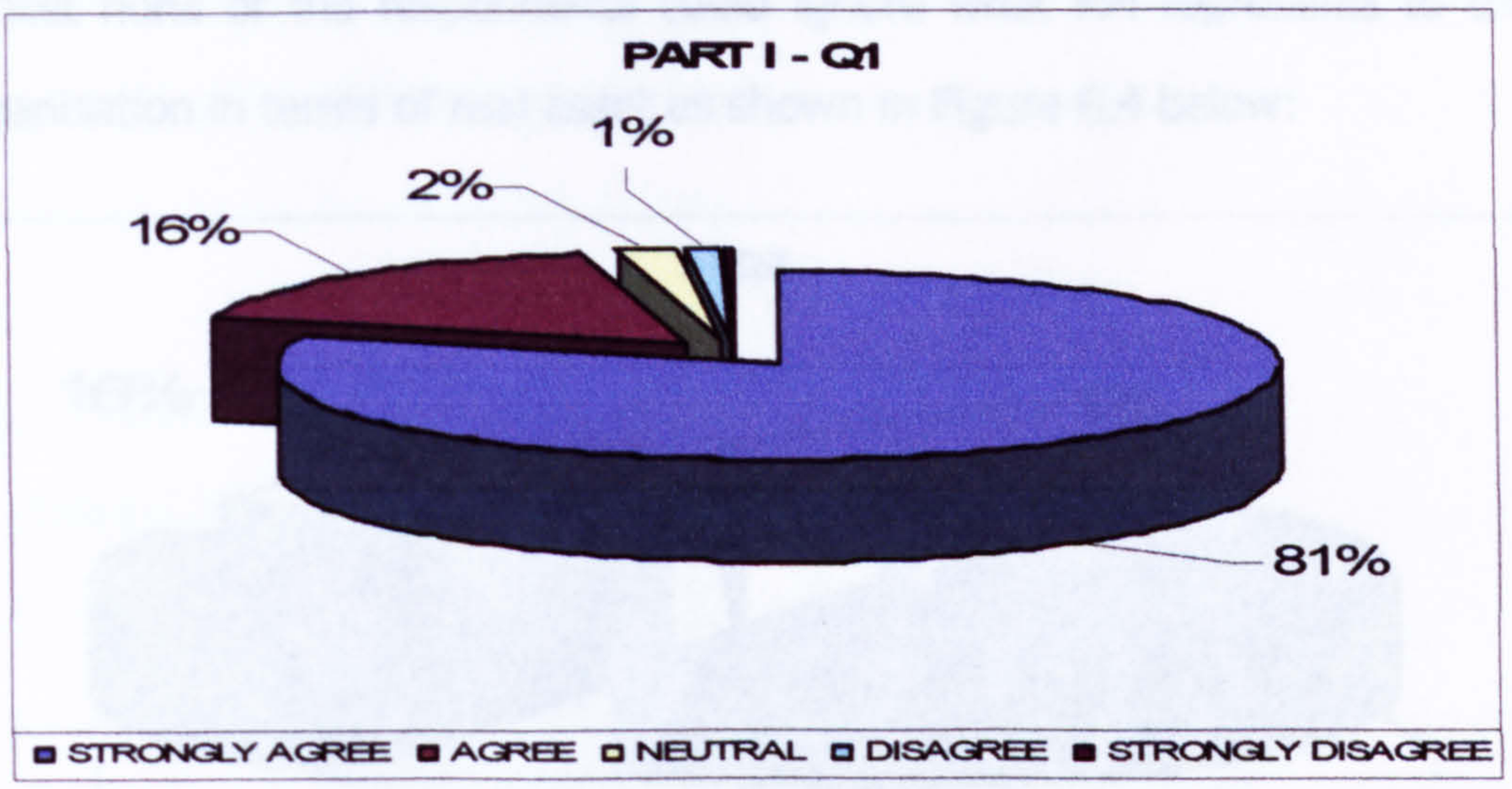

Figure 6-3: KM Assessment – Q1

Therefore, one should understand that KMS is a strong means that helps employees within the GPTC at their varied levels of skills to create, capture, identify and distribute organisational knowledge to people who need it. Furthermore, the "KM Process" will be considered as an important parameter in the development of the KMFTI as strengthened by the results captured from this question.

Q2 – KM is an important asset for the GPTC:

This statement implies that if there is a KM system used to support the overall development of knowledge such as skills, service improvement, employment, market development, etc. within the GPTC, it would establish itself as an important asset that could significantly contribute to the

elimination of loss in knowledge exploitation.

To this question, 58% of the respondents answered that they strongly agree with this statement since 25% answered that they simply agree with it. Almost none of the respondents could ignore what KM represents to their organisation in terms of real asset as shown in Figure 6.4 below:

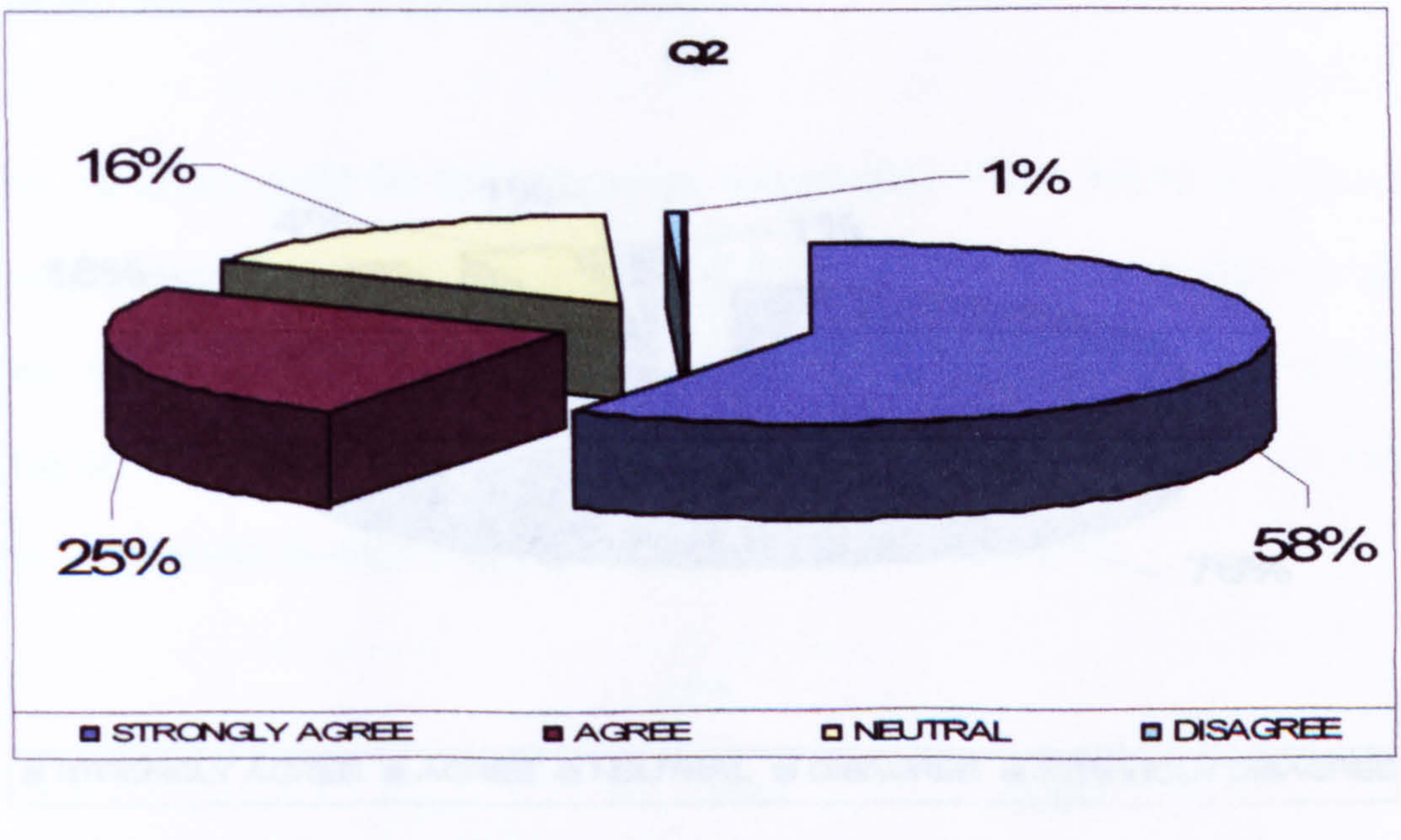

Figure 6-4: KM Assessment – Q2

Furthermore, in line with the development of the KMFTI, this is an important consideration as to maintain such factor in the "KM Process" parameter.

Q3 - KM is vital factor for the success of the GPTC:

A large number represented by 76% of the respondents indicate that they strongly agree with the fact that having a KM system can be viewed as a vital factor for the success of the overall operations of knowledge capturing and exploitation within the GPTC and 18% agree with this statement which brings the importance of deploying a KMS highly desired through the

majority of the departments within the organisation.

These results (see Fig. 6.5) translate an urgent need for the GPTC to possess an adequate and proper KMS. Therefore, such system could rely on the introduction of new procedures related to the telecommunication sector as suggested by the KMFTI (see chapter 7).

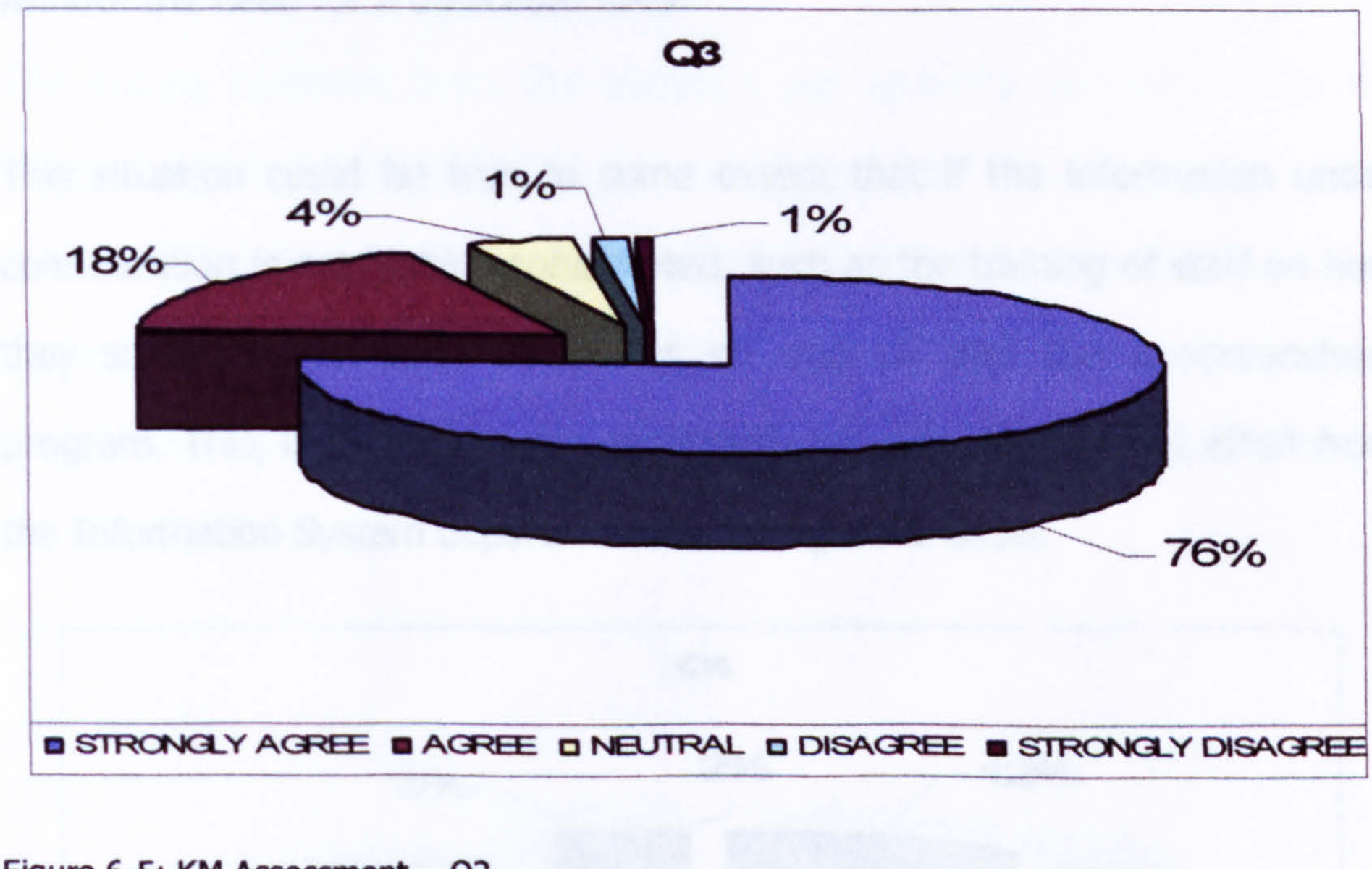

Figure 6-5: KM Assessment – Q3

Q4 – KM will become more and more unmanageable without an adequate system and infrastructure:

It is clear that respondents are well aware of the risk of not having an appropriate KMS to manage their daily operations in terms of capturing the large amount of information flows generated by the employees, customers and suppliers of the GPTC at all levels without exception. The risk can even grow exponentially as many of the exchanged or shared information is stored in a primitive way but without being effectively exploited due to the lack of

an intelligent and solid KMS provided for this purpose.

In this regards, 56% (see Fig. 6.6) of the respondents have expressed their strong agreement to this issue and 27% have simply agreed with. 12% however disagree with statement and believe that with some self organisational skills, any information can be captured, shared and stored without the need for a dedicated KMS.

This situation could be true to some extent that if the information under consideration is not highly sophisticated, such as the training of staff on how they should switch their computers on and off and use a spreadsheet program. This, in fact, does not necessarily require an important effort from the Information System department to manage this issue.

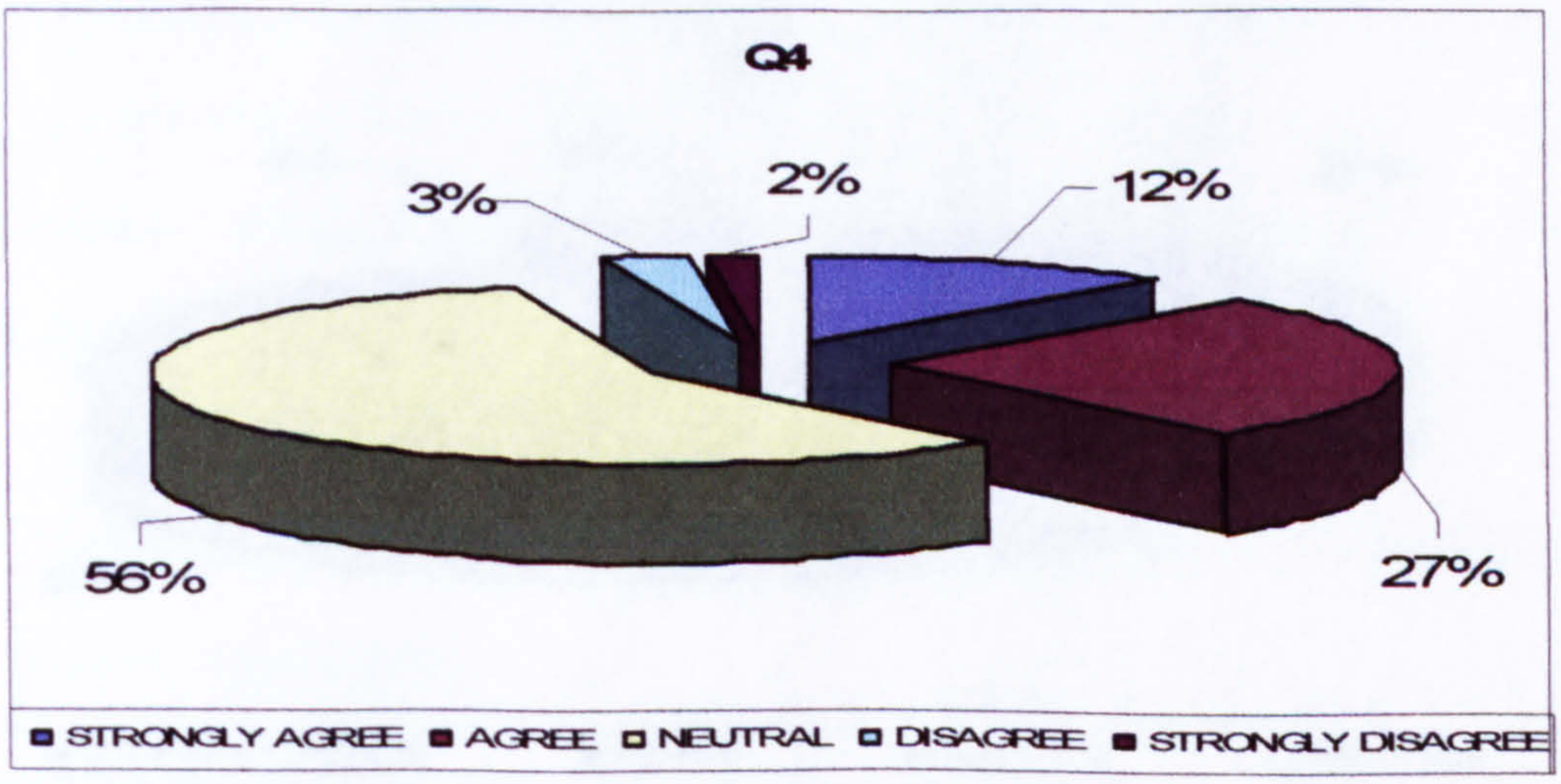

Figure 6-6: KM Assessment – Q4

Q5 – The KM program should fit with the GPTC development plans:

This question was established to insure that no disruptive implementation of new systems such as a KM program should be taking place within the GPTC.

Therefore, the respondents will welcome any such plan to improve their organisation's overall knowledge asset as suggested by the KMFTI .

To this question, 65% agree that a KM program would fit with the GPTC's development plans and 29% strongly agree with it as shown in Figure 6.7 hereinafter.

The results obtained from this question will certainly guarantee that the implementation of the KMFTI model within the GPTC will also be seen as an important step towards the change in management efforts to maintain a long lasting development of the organisation and take advantage of the current and future innovation based on the use of such KM systems.

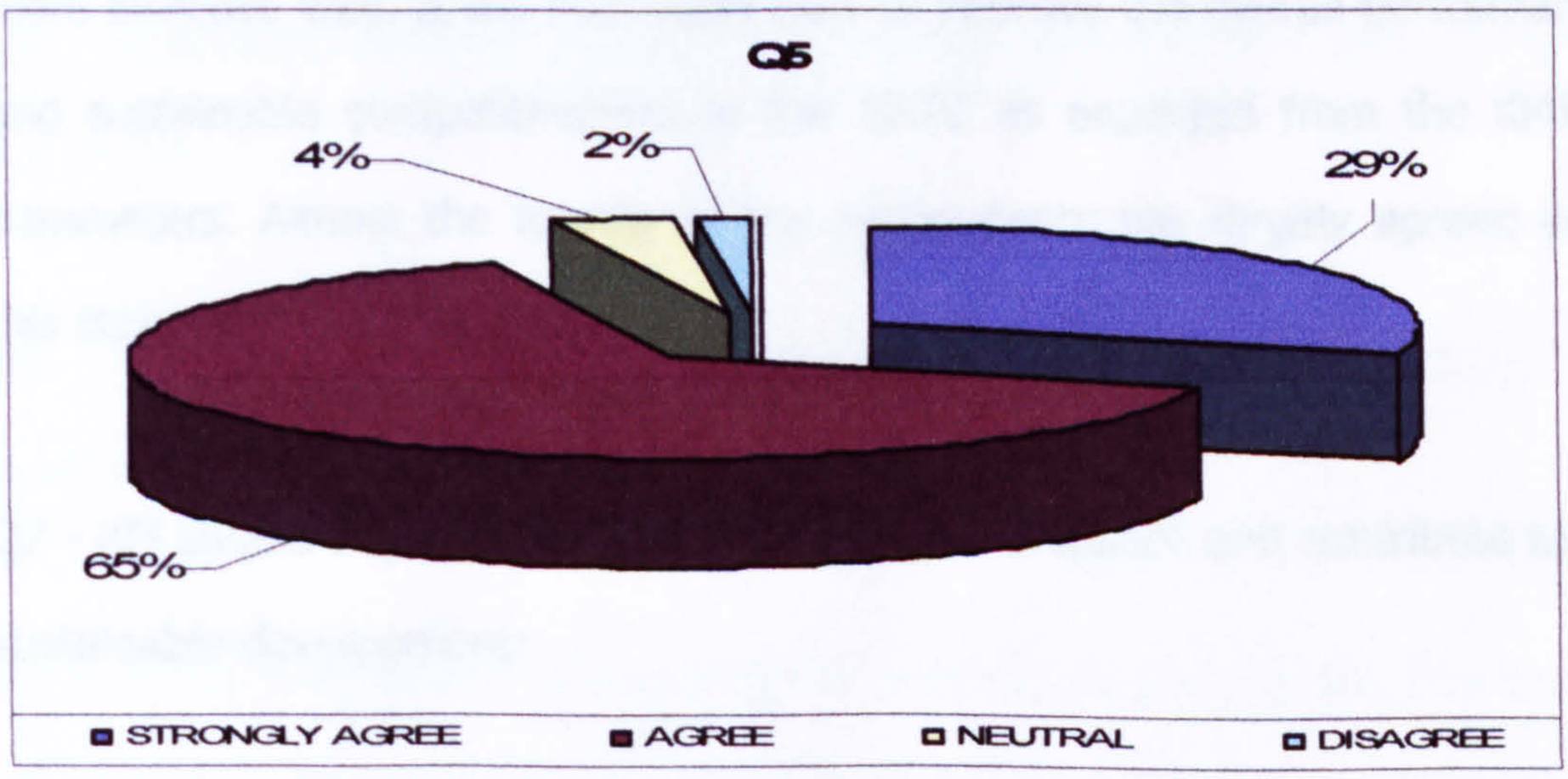

Figure 6-7: KM Assessment – Q5

Q6 - KMS should contribute to the improvement of the GPTC's product and services:

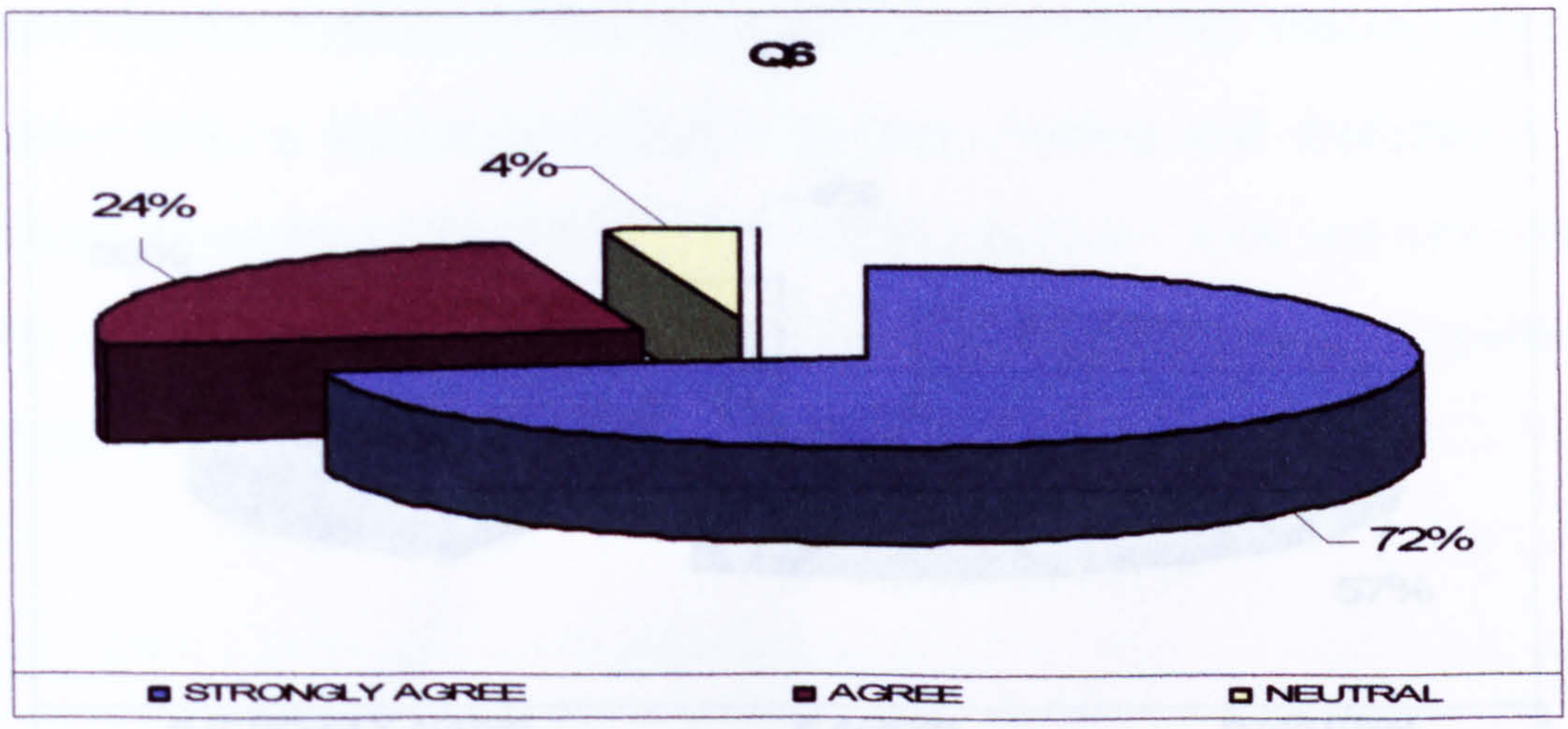

Figure 6-8: KM Assessment – Q6

It is in the same manner as for the previous question, this statement was established to insure that respondents are aware of what a KMS can bring about to their organisation in terms of benefits such as the improvement of exploiting knowledge to develop their products and services in a better and more effective way. It will also show how to improve the overall performance and sustainable competitiveness in the GPTC as expected from the KMFTI parameters. Almost the totality of the respondents has largely agreed with this statement (see Fig. 6.8).

Q7 - KM should improve the GPTC's overall performance and contribute to its sustainable development:

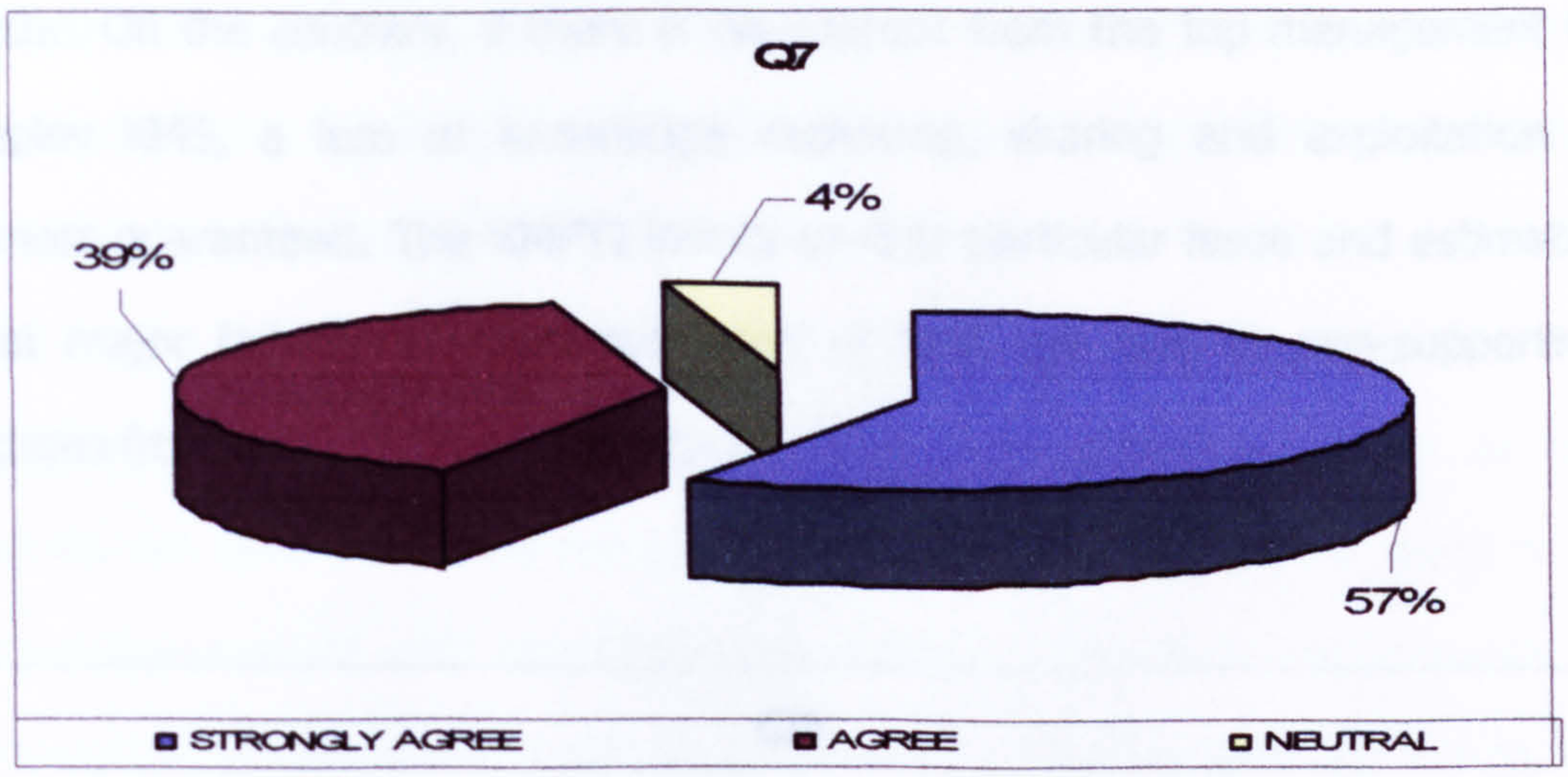

Figure 6-9: KM Assessment – Q7

What should be understood from this question is that without an appropriate and effective KM system, the performance of any given organisation is put at risk. There is no dispute about agreeing with such issue as the majority of the respondents have expressed their opinions about it as shown in figure 6.9 above.

Q8 - Top management commitment is one of the most important factors for successful implementation of KMS:

90% of the respondents strongly agree with this statement and 7% simply agree with it (see figure 6.10). As investigated by the KMFTI in chapter 7, it is believed that top management is the key entry to successful implementation of KM systems within the GPTC.

There is no doubt that if the top management of any given organisation supports the introduction of new systems and encourages their staff to exploit them, a significant boost will be observed and a success is likely to

occur. On the contrary, if there is no support from the top management to deploy KMS, a loss of knowledge capturing, sharing and exploitation is almost guaranteed. The KMFTI insists on this particular issue and estimates that major failures of implementation of KMS are due to non-supportive actions from the top management.

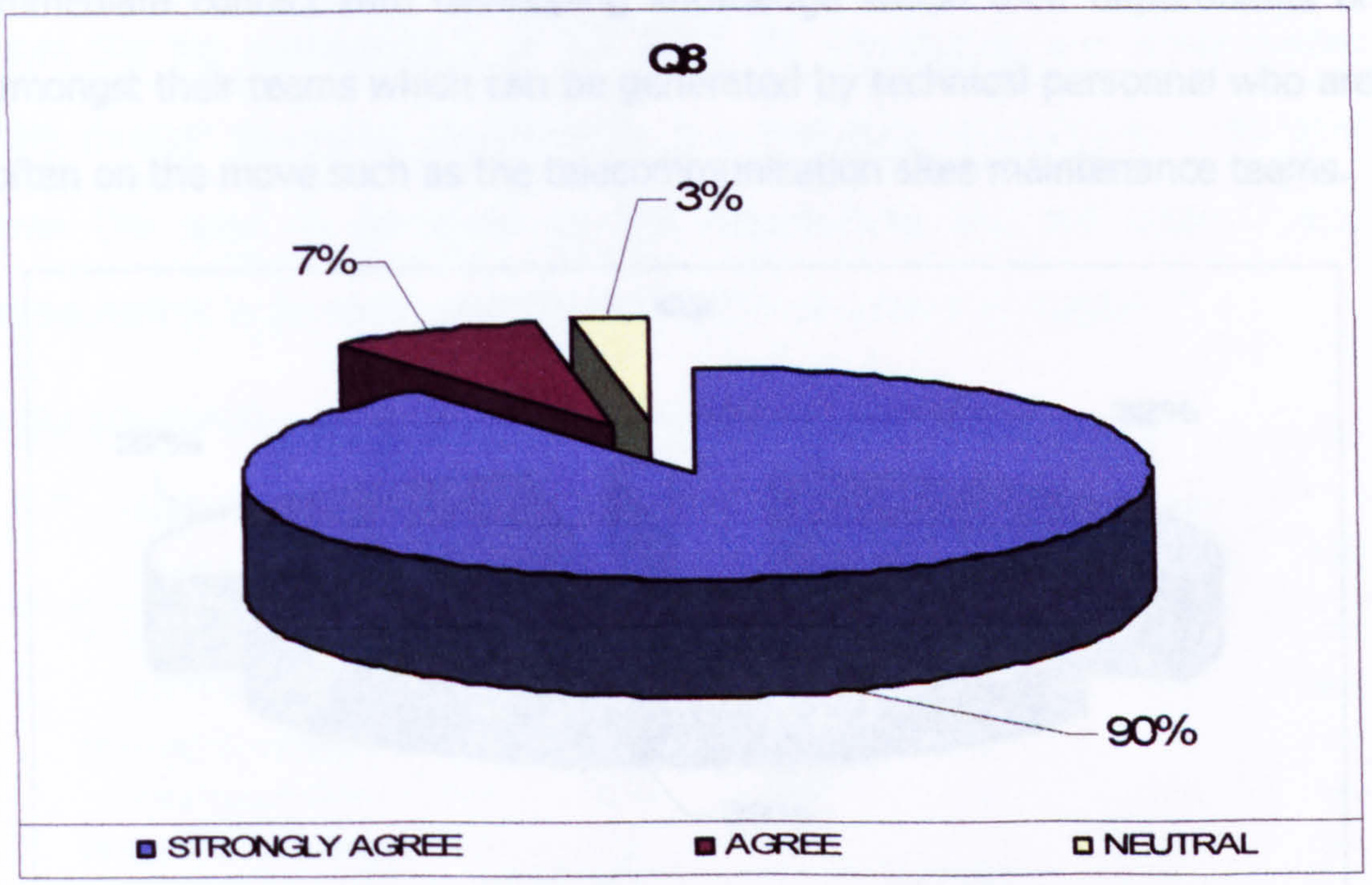

Figure 6-10: KM Assessment – Q8

Q9 - KMS must improve the GPTC business strategy and enhance the infrastructure of knowledge sharing operations:

This question relates to the benefits that could be offered through an appropriate KMS which must provide the building blocks for knowledge sharing infrastructure. The statistics from this question (see figure 6.11) show that over 39% of the respondents agree that the GPTC knowledge

infrastructure needs to be re-defined and permanently maintained. This is also supported by further 32% of the responses that shows a strong agreement of the respondents about this statement.

On the other hand, it appears that 27% of the respondents still do not provide an opinion on this matter due perhaps to the fact that there is no immediate contact with developing knowledge within their departments or amongst their teams which can be generated by technical personnel who are often on the move such as the telecommunication sites maintenance teams.

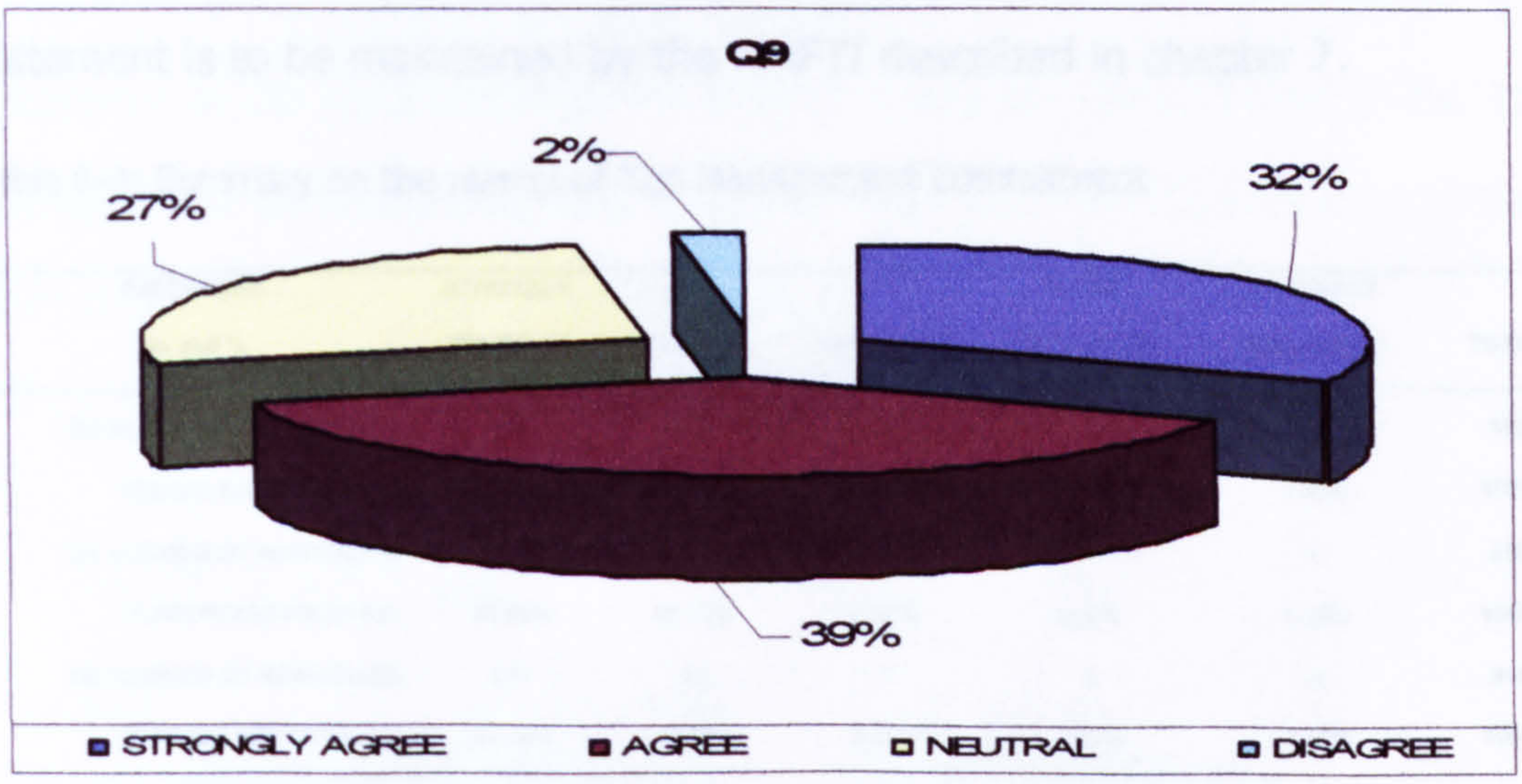

Figure 6-11: KM Assessment – Q9

Section 6.4.2.1 has analysed and assessed the use of KMS within the GPTC as per the responses gathered from the questionnaire survey established through part 1 and containing 9 questions. It has in fact identified the main interests of the overall departments for adopting the use of KM systems. In this regards, the respondents it appears that the majority of the respondents are keen to adopt such system and proceed to the development of the knowledge within their organisation.

The following sub-section will analyse the responses centred on the role of top management in the GPTC in relations to adopting KM systems.

6.4.2.2 Top Management Commitment

The KMFTI stresses on the fact that there is a need for a solid commitment from the top management of the GPTC for introducing and implementing KMS through its overall departments. It is therefore necessary to understand how this issue is perceived by the respondents and will show if such statement is to be maintained by the KMFTI described in chapter 7.

Table 6-4: Summary on the results of Top Management Commitment

RESPONSES No. and %	STRONGLY RELEVANT	RELEVANT	IRRELEVANT	QUITE IRRELEVANT	STRONGLY IRRELEVANT	TOTAL
Q1: NUMBER OF RESPONSES	201	80	29	0	0	310
PERCENTAGE FROM 310	64.84%	25.81%	9.35%	0.00%	0.00%	100%
Q2: NUMBER OF RESPONSES	219	81	9	1	0	310
PERCENTAGE FROM 310	70.65%	26.13%	2.90%	0.32%	0.00%	100%
Q3: NUMBER OF RESPONSES	277	31	2	0	0	310
PERCENTAGE FROM 310	89.35%	10 00%	0.65%	0.00%	0.00%	100%
Q4: NUMBER OF RESPONSES	40	197	61	8	4	310
PERCENTAGE FROM 310	12.90%	63.55%	19.68%	2.58%	1.29%	100%
Q5. NUMBER OF RESPONSES	172	104	29	5	0	310
PERCENTAGE FROM 310	55.48%	33.55%	9.35%	1.61%	0 00%	100%
Q6: NUMBER OF RESPONSES	211	93	6	0	0	310
PERCENTAGE FROM 310	68 06%	30.00%	1.94%	0 00%	0.00%	100%
Q7: NUMBER OF RESPONSES	221	79	7	3	0	310
PERCENTAGE FROM 310	71.29%	25 48%	2.26%	0.97%	0.00%	100%

Respondents were therefore requested to provide answers to what they believe is meant by "Top Management Commitment" as follows:

Q1 – "Provide leadership and commitment towards the implementation of KMS":

It appears from the above results (see table 6.4) that in fact, top management is a commitment itself from the leadership towards the introduction to, and implementation of KMS within the GPTC. This would clearly confirm what was already supported by the KMFTI assumptions as to establish a strong link between top management and the deployment of KMS. Figure 6-12 shows that none of the respondents ignores the existence of such a strong relationship. It is therefore very important to establish this statement in the parameters of the KMFTI where the commitment of the top management to implement KMS could be seen as a condition without which such implementation would not take place.

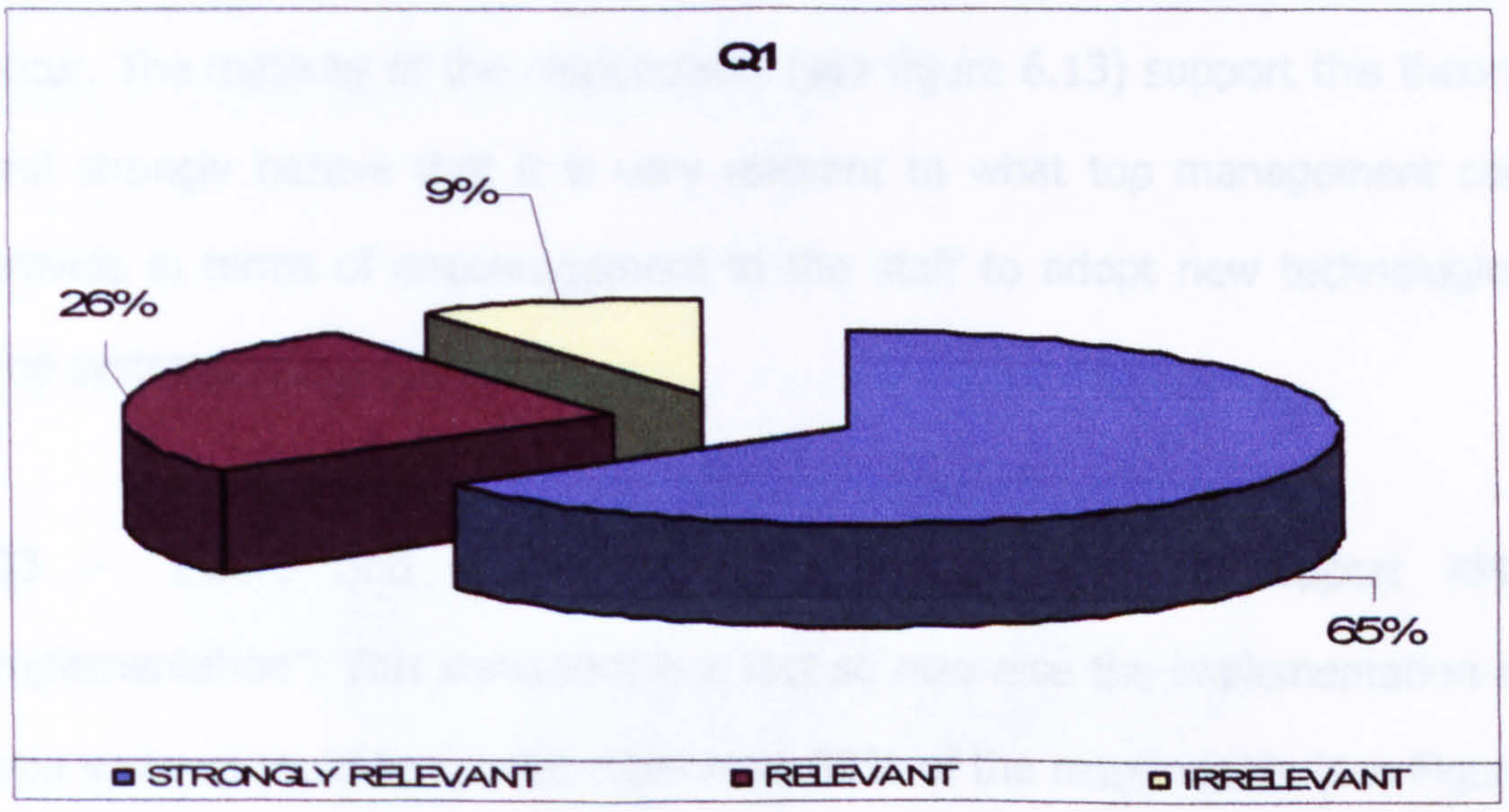

Figure 6-12: Top Management Commitment – Q1

Q2 – "Provide encouragement towards the utilisation of KMS":

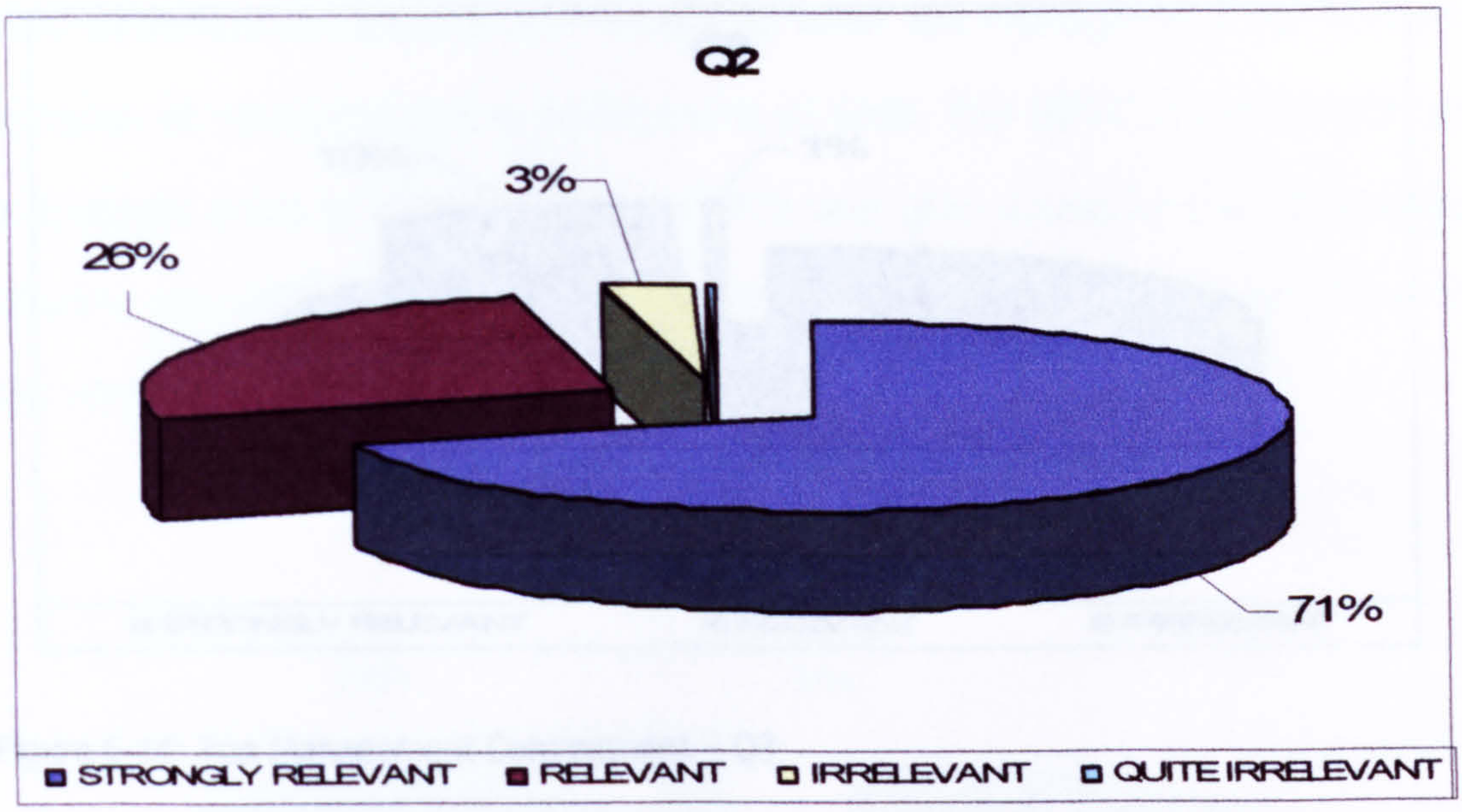

Figure 6-13: Top Management Commitment – Q2

Top management should also ease the way towards the use of KMS once they are implemented so that no loss of investments on such systems will occur. The majority of the respondents (see figure 6.13) support this theory and strongly believe that it is very relevant to what top management can provide in terms of encouragement to the staff to adopt new technologies and systems.

Q3 – "Insure and guarantee appropriate funding to support KMS implementation": This statement is a fact so how else the implementation of new systems could be funded otherwise. 89% of the respondents (see Figure 6.14) believe that this issue is related to the top management for funding the implementation of KMS within the GPTC.

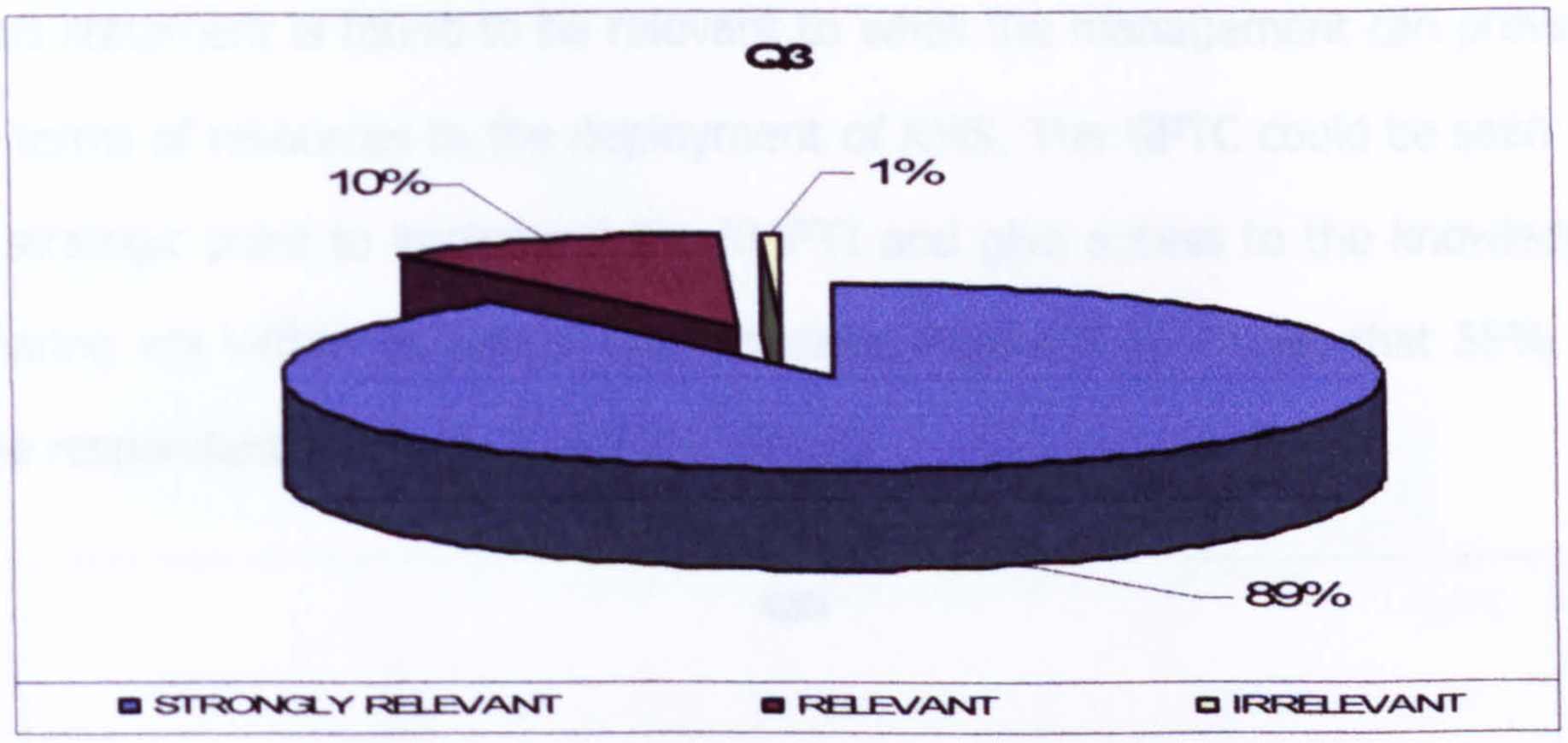

Figure 6-14: Top Management Commitment – Q3

Q4 – "Eliminate any existing and future rules that are likely to obstruct the implementation of KMS": This statement is intended to demonstrate how strong is the involvement of top management in facilitating the introduction of KMS within a given organisation. The personnel of the GPTC strongly believe in the commitment of the management as being the key to the adoption of KMS within their departments.

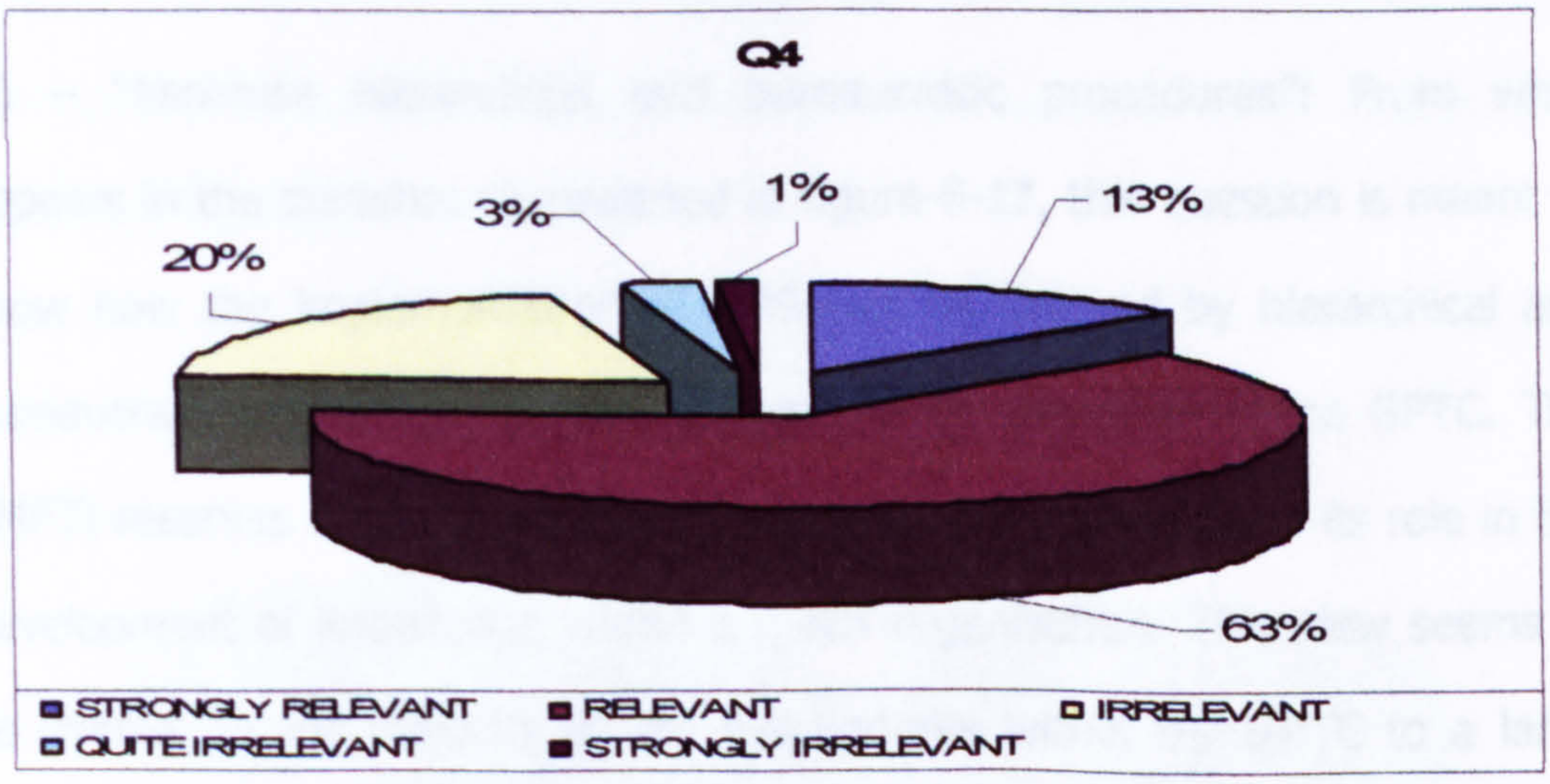

Figure 6-15: Top Management Commitment – Q4

Q5 – "Provide available resources necessary to the implementation of KMS":

This statement is found to be relevant to what the management can provide in terms of resources to the deployment of KMS. The GPTC could be seen as a strategic point to implement the KMFTI and give access to the knowledge sharing era within its overall departments. Figure 6-16 shows that 55% of the respondents strongly share this view.

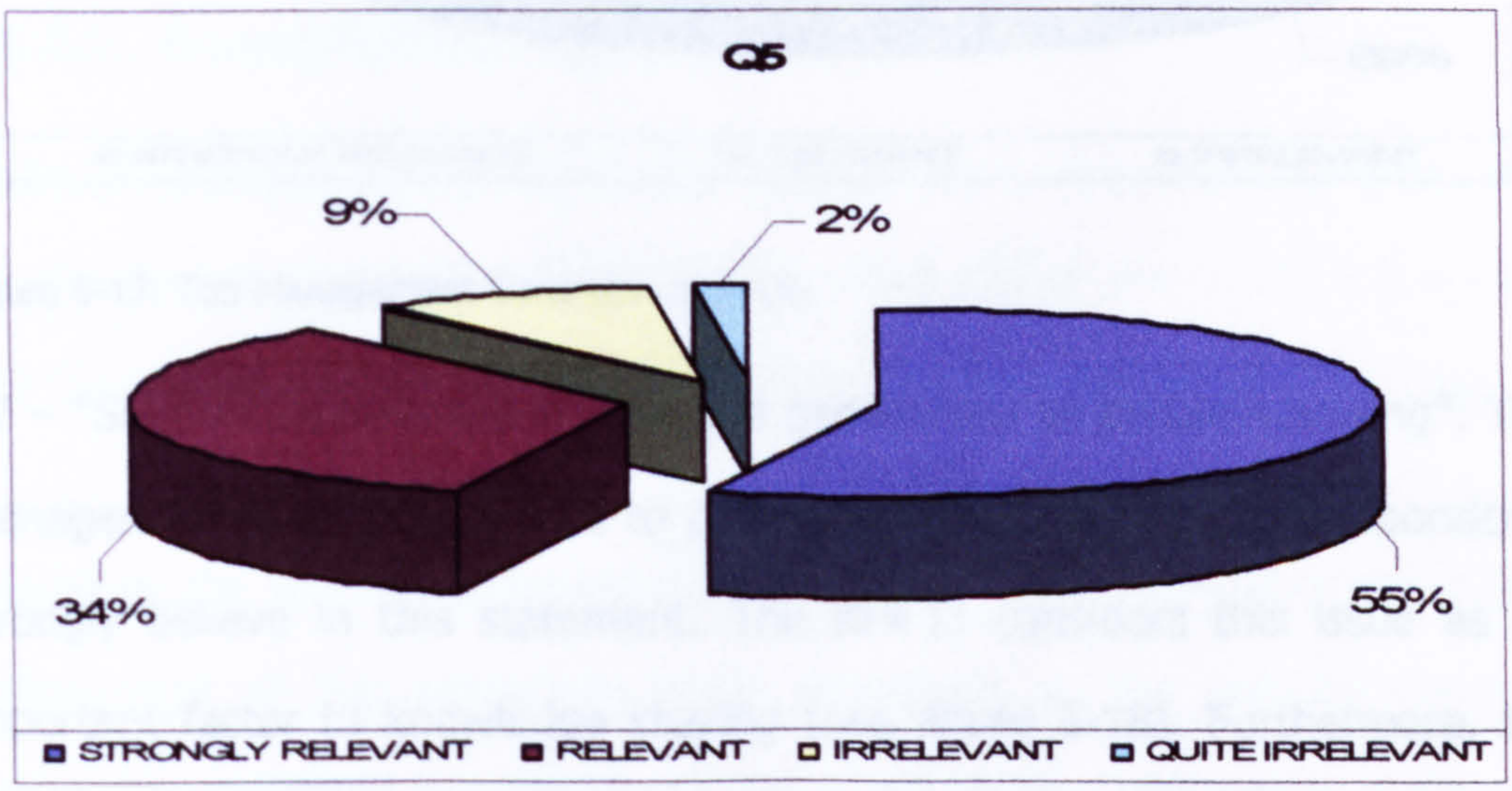

Figure 6-16: Top Management Commitment – Q5

Q6 – "Minimise hierarchical and bureaucratic procedures": From what appears in the statistics represented in figure 6-17, this question is meant to show how the implementation of KMS can be delayed by hierarchical and bureaucratic procedures as this appears to be the case in the GPTC. The KMFTI reserves a very important role to such a parameter and its role in the development of knowledge within a given organisation. This view seems to be shared by the majority of the respondents within the GPTC to a large extent. In fact, 68% think that top management can strongly minimise hierarchical and bureaucratic procedures for implementing KMS if a real commitment is established. However, only 2% do not yet share this view.

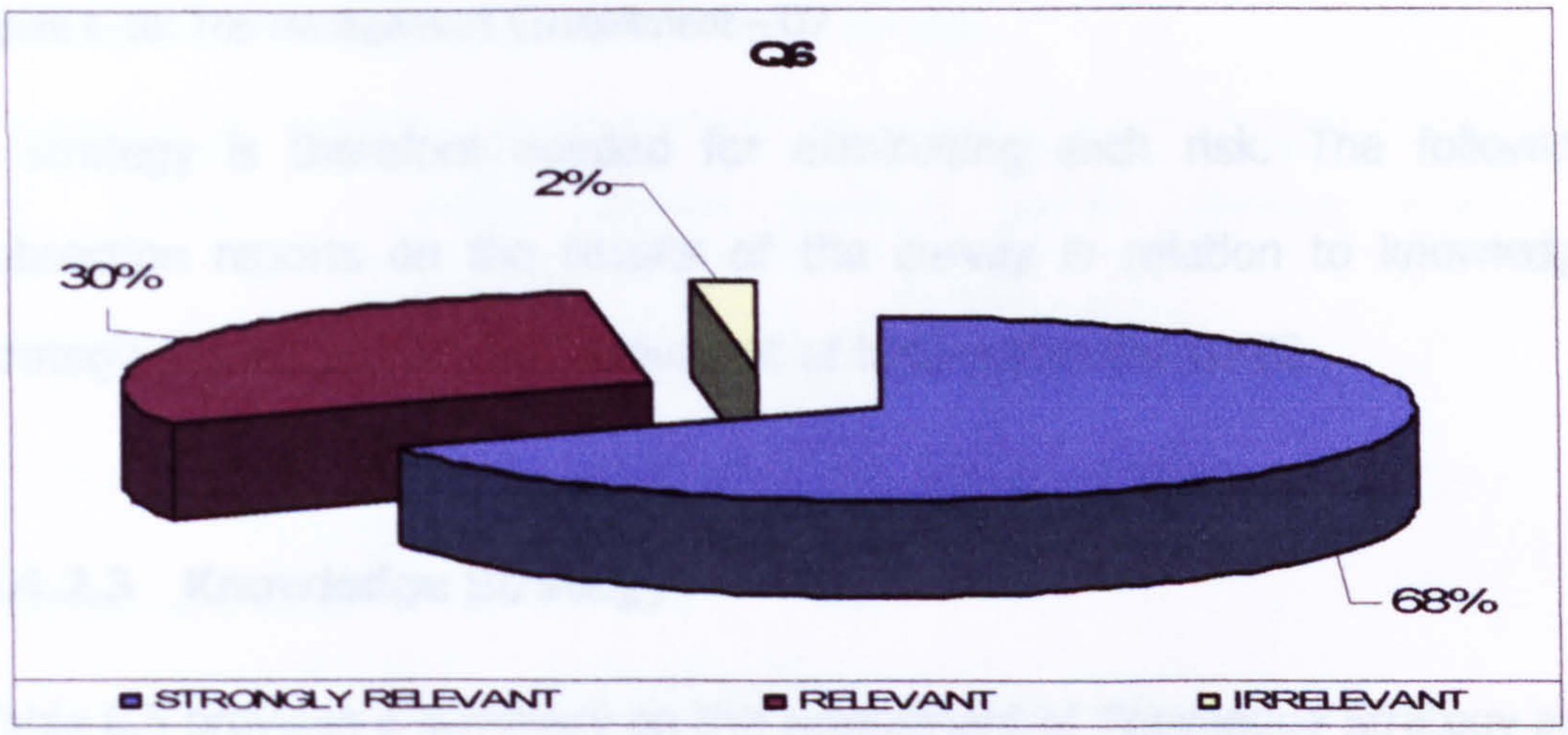

Figure 6-17: Top Management Commitment – Q6

Q7 – "Support team-based efforts and approaches to problem solving": Top management should contribute to problem solving. 72% of the respondents strongly believe in this statement. The KMFTI considers this issue as an important factor to knowledge sharing (see figure 6-18). Furthermore, the commitment of top management for deploying KMS within the GPTC is one of the main factors considered by the KMFTI. The results of the survey confirm that without a real commitment from the top managers, there will be no means to implement KMS even though there seems to be an urgent need for its deployment.

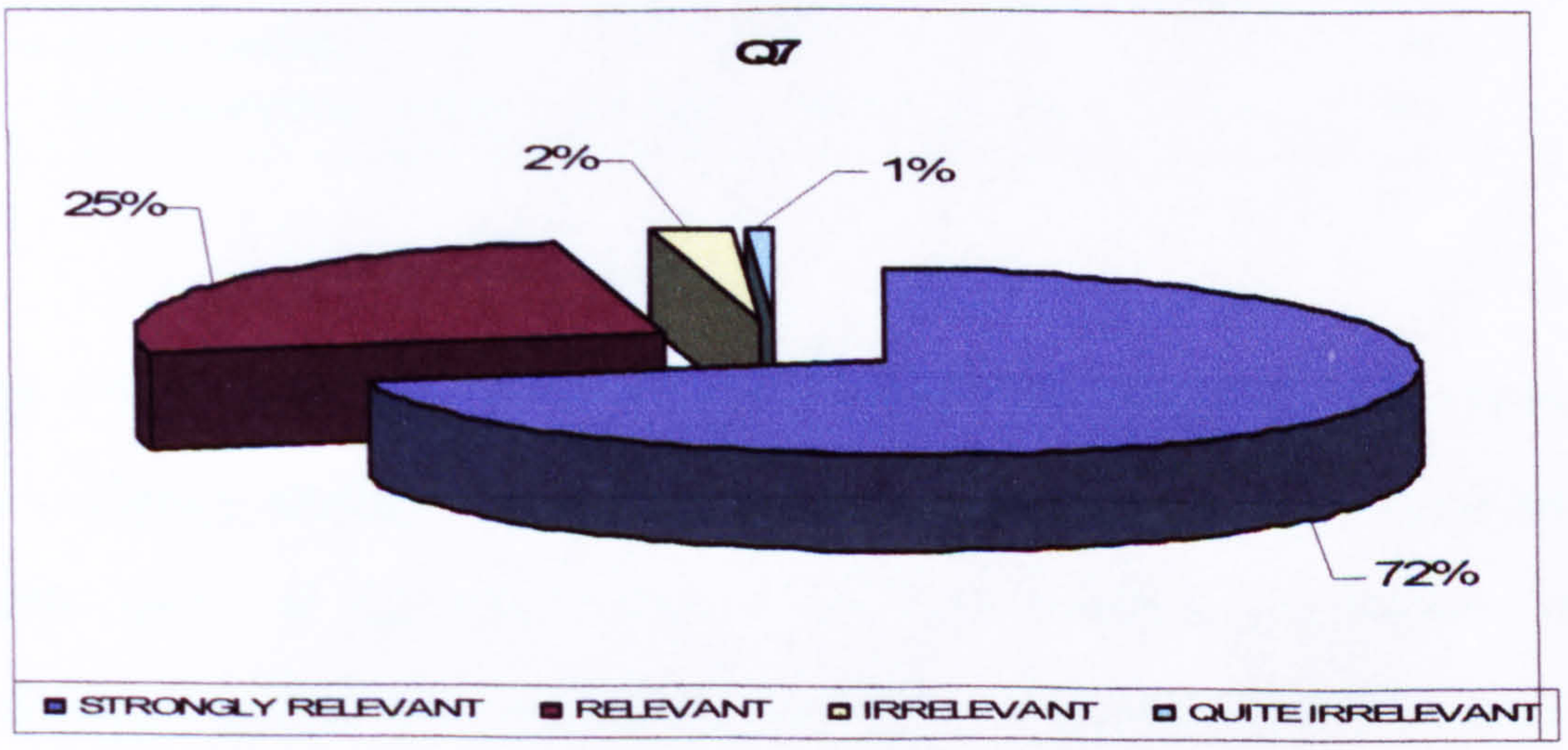

Figure 6-18: Top Management Commitment – Q7

A strategy is therefore needed for eliminating such risk. The following subsection reports on the results of the survey in relation to knowledge strategy and its role in the deployment of KMS within the GPTC.

6.4.2.3 Knowledge Strategy

Table 6.5 provides a summary on the assessment of Knowledge Strategy and the role it plays in the introduction of new KMS. Within the GPTC, it is agreed that there is no existence of any KMS at the time this survey is conducted.

Therefore, the opinions gathered from the respondents as to what extent the commitment of top managers could contribute to the establishment of knowledge strategies are expressed according to their perception of the role that their managers can play at this level. A total number of seven options were presented to the respondents in order to express their opinions stating what is meant by "having a knowledge strategy" in place and what is meant by this statement.

Table 6-5: Summary on the results of Knowledge Strategy

RESPONSES No. and %	STRONGLY RELEVANT	RELEVANT	IRRELEVANT	QUITE IRRELEVANT	STRONGLY IRRELEVANT	TOTAL
Q1: NUMBER OF RESPONSES	178	121	6	4	1	310
PERCENTAGE FROM 310	57.42%	39 03%	1.94%	1.29%	0.32%	100%
Q2: NUMBER OF RESPONSES	101	119	88	2	0	310
PERCENTAGE FROM 310	32.58%	38.39%	28.39%	0.65%	0.00%	100%
Q3 NUMBER OF RESPONSES	197	96	17	0	0	310
PERCENTAGE FROM 310	63.55%	30.97%	5.48%	0.00%	0.00%	100%
Q4: NUMBER OF RESPONSES	80	117	86	27	0	310
PERCENTAGE FROM 310	25.81%	37.74%	27.74%	8.71%	0.00%	100%
Q5: NUMBER OF RESPONSES	93	118	84	12	3	310
PERCENTAGE FROM 310	30.00%	38 06%	27.10%	3.87%	0.97%	100%
Q6: NUMBER OF RESPONSES	152	114	44			310
PERCENTAGE FROM 310	49.03%	36.77%	14.19%	0 00%	0.00%	100%
Q7: NUMBER OF RESPONSES	91	117	87	9	6	310
PERCENTAGE FROM 310	29.35%	37.74%	28.06%	2.90%	1.94%	100%

Q1 – "Involve the majority of employees in decision making efforts": Having a knowledge strategy in place is for the majority (58% strongly agree and 39% agree) of the respondents a means of involving the majority of employees at their different levels in decision making efforts (see table 6.19).

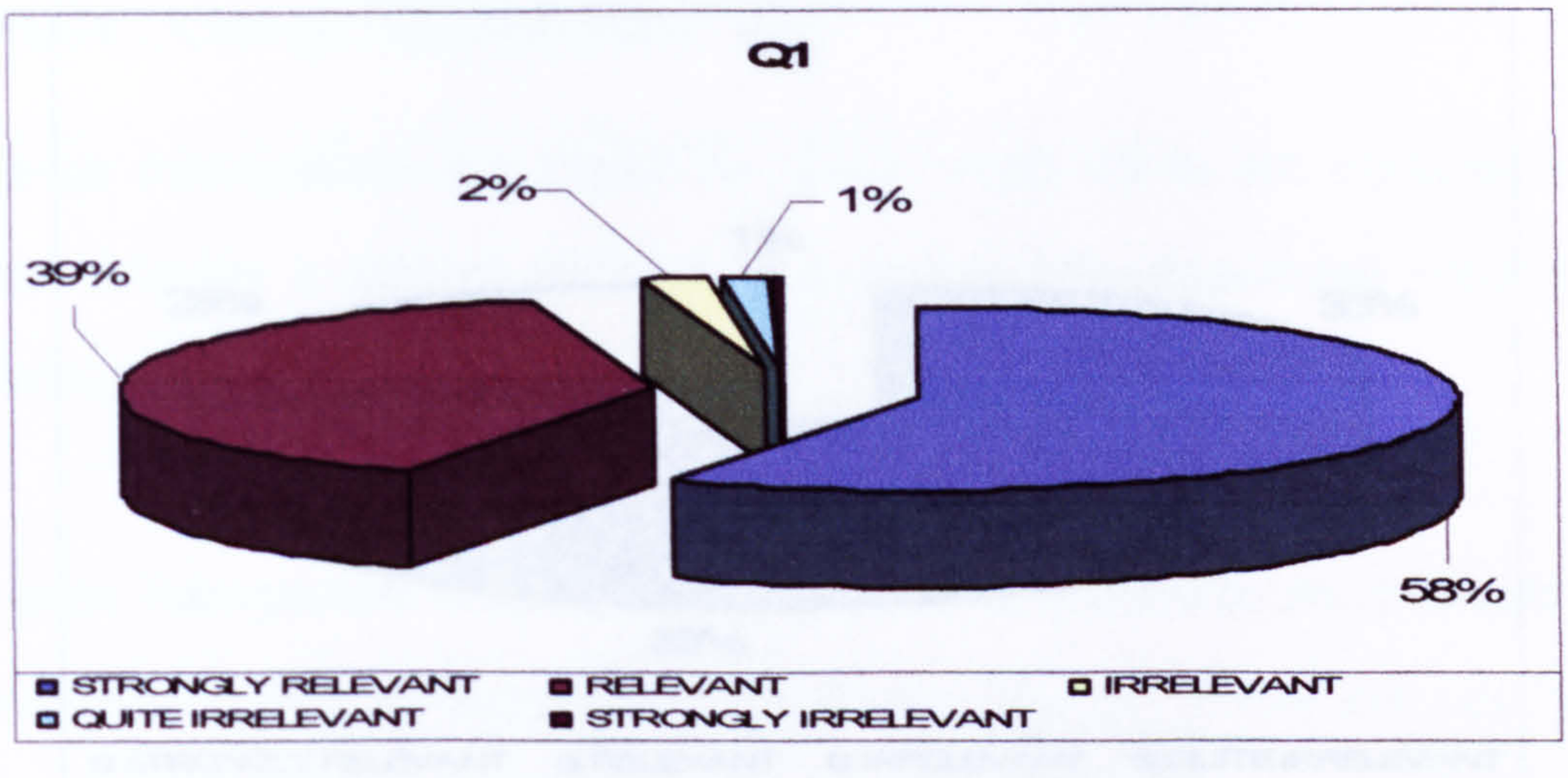

Figure 6-19: Knowledge Strategy – Q1

The KMFTI considers that the interaction between the employees of a given telecommunication organisation and their involvement in decision making is an important factor for introducing new technologies and systems. It is important to note that the results of this question will strengthen this statement to a large extent.

Q2 - "Provide employees with adequate state of the art operational information": The state of the art (SOA) in KMS is a means to identify what already exists as systems that apply to the telecommunication sector in terms of capturing and exploiting knowledge. A knowledge strategy can identify this SOA to some extent to avoid replication in the issues generated by existing KMS.

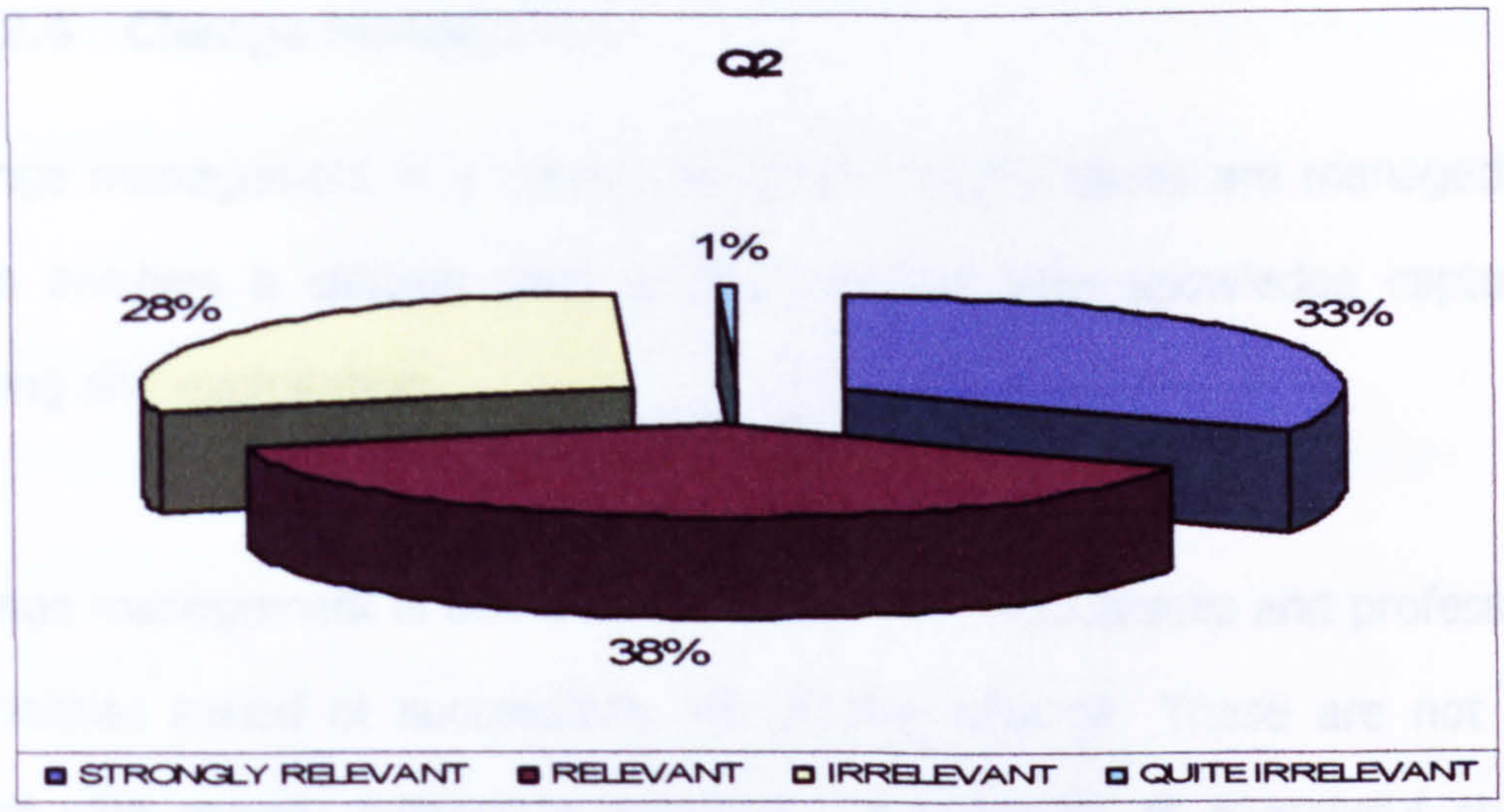

Figure 6-20: Knowledge Strategy – Q2

Respondents believe (see figure 6.20) that having a knowledge strategy in place could significantly contribute to the implementation of KMS within the GPTC. The level of belief is however shared by the respondents about this statement.

Other statements such as encouraging the appraisal and promotion of employees; creating more friendly business culture among the employees; promoting continuous learning and skills development; developing an information sharing culture and integrating KM in business activities are amongst the benefits that could be obtained through the implementation of a solid knowledge management strategy within the GPTC or any given telecommunication organisation.

The KMFTI endorses such statement in its parameters and will be considered as one of the most important pillars in its implementation.

6.4.2.4 Change Management

Change management is a means by which people issues are managed and often involves a cultural shift to endorse the new knowledge capturing, sharing and exploitation.

Change management is also a broad spectrum of processes and professional specialities aimed at successfully introducing change. These are not "soft skills" with merely subjective outcomes: the results of successful change management can be easily measured (see table 6.6), in the satisfaction of employees, speed of delivery of a particular action or service (i.e. training).

Moreover, change management is a proactive process, with success seen in hindsight: if an organisation designs a programme of change, executes it, and measures favourable outcomes, then it can be said that effective change management has occurred.

Table 6-6: Summary on the results of Change Management

RESPONSES No. and %	STRONGLY RELEVANT	RELEVANT	IRRELEVANT	QUITE IRRELEVANT	STRONGLY IRRELEVANT	TOTAL
S1: NUMBER OF RESPONSES	193	63	51	3	0	310
PERCENTAGE FROM 310	62.26%	20.32%	16.45%	0.97%	0.00%	100%
S2: NUMBER OF RESPONSES	83	173	41	12	1	310
PERCENTAGE FROM 310	26.77%	55.81%	13.23%	3.87%	0.32%	100%
S3: NUMBER OF RESPONSES	156	88	61	5	0	310
PERCENTAGE FROM 310	50.32%	28.39%	19.68%	1.61%	0.00%	100%
S4: NUMBER OF RESPONSES	141	86	64	19	0	310
PERCENTAGE FROM 310	45.48%	27.74%	20.65%	6.13%	0.00%	100%
S5: NUMBER OF RESPONSES	211	77	21	1	0	310
PERCENTAGE FROM 310	68.06%	24.84%	6.77%	0.32%	0.00%	100%

Respondents were introduced with a question asking them to what extent is it relevant to believe that change management is a means to:

S1 - Possess an accurate and affective knowledge;

S2 - Keep an established and well defined continuous learning strategy;

S3 - Create a friendly information sharing culture;

S4 - Establish user friendly information systems; and

S5 - Create culture that supports innovation, learning and knowledge sharing.

It is obvious (see table 6.6) that the majority of responses were centred on a strong level of relevancy for the totality of these statements. It is believed that what was assumed by the KMFTI during the first phase of development (see chapter 7) was in fact confirmed by the results of this survey to a large extent.

The KMFTI takes into consideration the factor "change management" as being a non dissociated parameter for bringing about a successful implementation of KMS within the GPTC in particular and the telecommunication sector in general.

Therefore, a well defined knowledge process is needed in order to make this change happens. The next subsection reports on the results of the survey centred on this question.

6.4.2.5 Knowledge Process

Knowledge process is a means to share knowledge between individuals whether they belong to the same organization, department or group. Table 6.7 below shows how important is to have a solid KM process in place.

Table 6-7: Summary on the results of Knowledge Process

RESPONSES	STRONGLY RELEVANT	RELEVANT	IRRELEVANT	QUITE IRRELEVANT	STRONGLY IRRELEVANT	TOTAL
No. and %						
Q1: NUMBER OF RESPONSES	229	71	8	2	0	310
PERCENTAGE FROM 310	73.87%	22.90%	2.58%	0.65%	0.00%	100%
Q2: NUMBER OF RESPONSES	189	91	27	3	0	310
PERCENTAGE FROM 310	60.97%	29.35%	8.71%	0.97%	0.00%	100%
Q3: NUMBER OF RESPONSES	194	86	23	7	0	310
PERCENTAGE FROM 310	62.58%	27.74%	7.42%	2.26%	0.00%	100%

The majority of the respondents believe that a KM process is an important condition for deploying KMS in their organisation and understand that without such a process in place it is likely that no KMS will be implemented at any given time. Individuals are in fact essential pillars in a given organisation, therefore, they must be involved in the decision making process from the start as implied by the KMFTI .

6.4.2.6 Benefits of Knowledge Management

The benefits from having a well established KMS in place should not be ignored. The employees within the GPTC in their majority support this statement to a large extent.

Table 6.8 below summarises the different opinions of the respondents related to this issue.

Table 6-8: Summary on the results of Knowledge Management Benefits

RESPONSES No. and %	STRONGLY RELEVANT	RELEVANT	IRRELEVANT	QUITE IRRELEVANT	STRONGLY IRRELEVANT	TOTAL
S1: NUMBER OF RESPONSES	120	176	14	0	0	310
PERCENTAGE FROM 310	38.71%	56 77%	4 52%	0 00%	0.00%	100%
S2: NUMBER OF RESPONSES	163	145	2	0	0	310
PERCENTAGE FROM 310	52.58%	46.77%	0 65%	0.00%	0.00%	100%
S3. NUMBER OF RESPONSES	186	98	23	3	0	310
PERCENTAGE FROM 310	60.00%	31.61%	7.42%	0 97%	0.00%	100%
S4: NUMBER OF RESPONSES	171	93	41	5	0	310
PERCENTAGE FROM 310	55.16%	30.00%	13.23%	1.61%	0 00%	100%
S5: NUMBER OF RESPONSES	233	71	5	1	0	310
PERCENTAGE FROM 310	75.16%	22.90%	1.61%	0.32%	0.00%	100%
S6: NUMBER OF RESPONSES	79	134	54	32	11	310
PERCENTAGE FROM 310	25 48%	43.23%	17.42%	10.32%	3.55%	100%
S7: NUMBER OF RESPONSES	178	116	13	3	0	310
PERCENTAGE FROM 310	57.42%	37.42%	4.19%	0.97%	0 00%	100%
S8: NUMBER OF RESPONSES	76	99	110	21	4	310
PERCENTAGE FROM 310	24 52%	31 94%	35.48%	6.77%	1.29%	100%
S9: NUMBER OF RESPONSES	181	94	34	0	1	310
PERCENTAGE FROM 310	58 39%	30.32%	10.97%	0 00%	0.32%	100%
S10: NUMBER OF RESPONSES	67	165	71	7	0	310
PERCENTAGE FROM 310	21.61%	53 23%	22 90%	2.26%	0.00%	100%
S11: NUMBER OF RESPONSES	201	74	35	0	0	310
PERCENTAGE FROM 310	64 84%	23 87%	11.29%	0.00%	0.00%	100%
S12: NUMBER OF RESPONSES	99	117	93	1	0	310
PERCENTAGE FROM 310	31.94%	37.74%	30.00%	0.32%	0.00%	100%

They share their view on the fact that the benefits of KMS can be translated by the following statements:

- S1: Innovating and delivering high quality services to the organisation;
- S2: Improving innovation and developing new services;
- S3: Increasing workers productivity;
- S4: Identifying new business opportunities through better KM;

- S5: Providing early warning of potential organisational or business changes;
- S6: Eliminating redundant or unnecessary processes;
- S7: Ensuring employees commitment to their organisation;
- S8: Capturing information and creating knowledge;
- S9: Sharing and learning;
- S10: Improving communications within the organisation;
- S11: Enhancing employees' retention rate by recognising their values; and
- S12: Improving the GPTC business strategy and enhancing the infrastructure of knowledge sharing operation.

6.4.2.7 Summary of the Questionnaire Survey

The questionnaire survey revealed how important is to maintain a good level of relevance between the different parameters set out in the KMFTI . It is clear that the GPTC must associate itself to the new era of knowledge sharing and without a solid; this change will never take place. A large majority of the respondents from the GPTC believe that their organisation is not exploiting knowledge as it should. They also believe that having knowledge management framework in its structure could significantly improve its market share and contribute to its long-lasting growth in terms of skills, business development and effectiveness which is also identified from

the interviews presented in the following subsection.

6.5 Data Analysis: Interviews

The interviews are the second part of the field's empirical investigations that have led to the adjustment of the final shape of the KMFTI presented in chapter 7. A total number of thirty five Interviews were conducted with the decision makers of the General Post and Telecommunications Company in Libya (GPTC) which are represented in the cognitive map hereinafter (see figure 6.21).

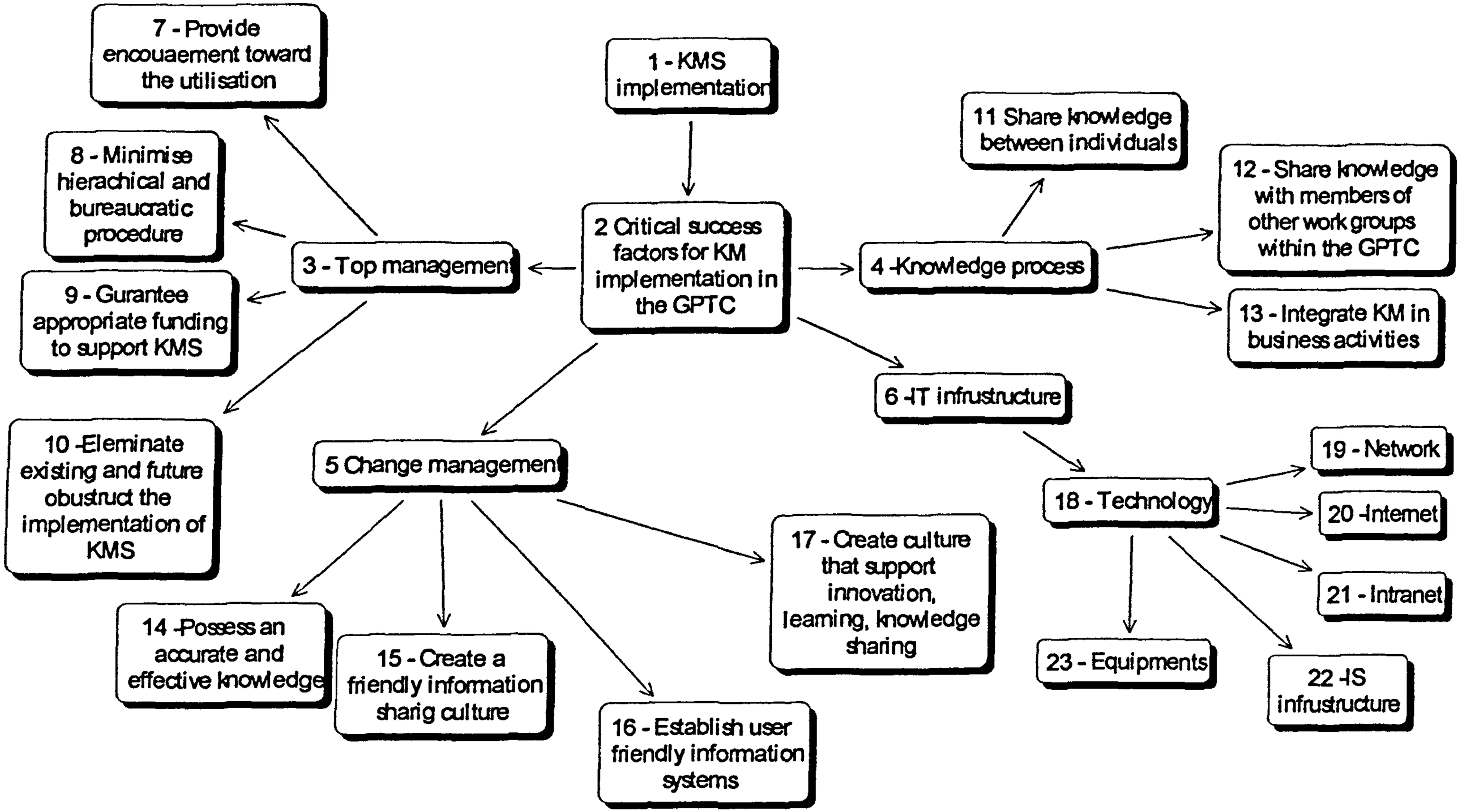

Figure 6-21: Cognitive map of the interviews analysis

These interviews took place in Tripoli during May 2004 with the executives of the following Departments:

- General management;
- Research & Development ;
- Information Systems;
- Training;
- Business Development,
- Finance;
- Human Resources;
- International Relations;
- Planning; and
- Technical departments: Switching; Satellite; Microwave; Networking.

The interviews consisted of four discussion subjects as per the main research question (see section 1.3.3: research question):

- Top management commitment;
- KM process;
- Change management; and
- IT infrastructure.

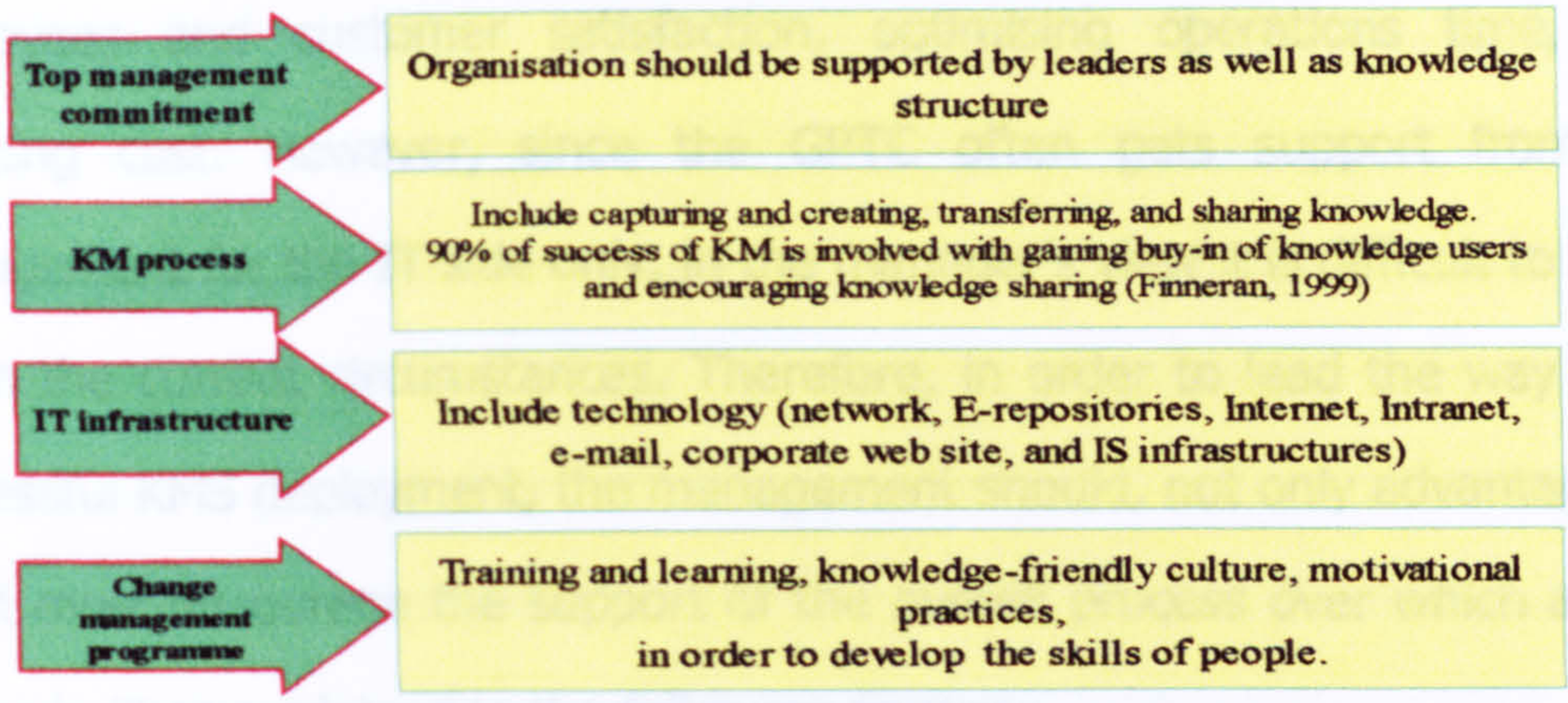

Figure 6-22: Interviews analysis

6.5.1 The application of KM systems in the GPTC

All the interviewees recognise the significant role that KM could play on the development and improvement of the overall market of the GPTC. A statement made by a group of interviewees shows that:

> *'The implementation of Knowledge Management System is a very important step for the GPTC since it contributes to improving the overall performance of its employees at all levels. However, the deployment of a KM concept is not only technology related it is rather a set of integrated and inter-related factors which must perform together as a solid framework. This could be in relation to decision-making, top management commitment, change management, etc. it is then only how a KM system can be implemented where the GPTC could take advantage of its benefits".*

By exploiting KM, the organisation will be at an increased level of competitiveness and could gain a limitless number of benefits such as

employees and customer satisfaction, optimising operations time, and reducing cost. However, since the GPTC often gets support from top management for the IT side only, in the manager's view it is difficult to apply KM in the current circumstances. Therefore, in order to lead the way for a successful KMS deployment, the management should, not only advantage IT, but it must encourage the support of the overall process over which a KMS will be built as explained in the following sections.

6.5.2 Top Management

The majority of the departments within the GPTC are unable to provide structured support to their employees due to the lack of an effective and appropriate KM system. This also increases the need for external support such as hiring consultancy services to fill in the gap in knowledge management skills. Therefore, "by managing and exploiting knowledge internally, the organisation will bring itself to the highest level of performance in the knowledge management area". This statement was recognised by the majority of the interviewees.

The interviewees have further stated that the top management leaders should identify their needs, objectives, and future vision in order to contribute to the development of knowledge within the GPTC. Also, they must offer more support and motivation to their subordinates and colleagues which will help building a common and solid policy to lead the way for adequate KM infrastructure.

Moreover, the interviewees strongly agree that top management

support and commitment play a very critical role in successful KM implementation. In essence, top management must know the right way to support the organisation and how to be positively involved. Sometimes however, the intervention of top managers in dealing with information in general can be perceived by the employees as a barrier to the development of process management due to an old-fashioned bureaucratic behaviour. This is to mean that many of the escalated information will remain on their desks without being treated and exploited as per say.

> *"The majority of departments have very skilled workers but need a continuing support from their management; however, such support is often difficult to take place despite the continuing attempts from top managers to creating new ideas for supporting their employees to bring about development throughout their respective departments.*

Based on the above analysis, top management should play an integrated role in the development and exploitation of knowledge within the GPTC. The commitment of top managers for supporting this initiative is a condition for a successful concept and proved to be a very important factor for successful implementation of knowledge management systems in any organisation.

6.5.3 KM process

It has been indicated by the majority of the interviewees that the GPTC does not either possess an adequate system to manage the process for creating and managing knowledge, or a clear strategy to apply and exploit such

knowledge. On the other hand, it has a large potential to transfer skills in particular for troubleshooting IT problems. Although KM process is one of the parameters of successful KM practice, the interviewees recognise that if a process approach is established, it may only take place at the top management level, the rest of the employees are not involved in such process. This issue illustrates why the GPTC did not implement an appropriate KM process for developing and applying KM.

According to the interviewees:

> *"Top management does not have a clear procedure on how to create, transfer, and share information or knowledge. The organisation has plenty of resources, but it has not built a system or clear rules to construct a strong process."*

Moreover, IT has the capability to assist the GPTC in the creation of a process that, according to the interviewees, will improve the organisation's overall performance and could provide a sustainable KM system. They also indicate that it is a vital tool for the success of its business and operations. Furthermore, there is no system to manage KM process directly, but when someone seeks assistance, the support takes place on a coincidental basis due to the absence of an appropriate process. IT tools could drive the GPTC to obtain many benefits, for example saving time getting useful information, and exchanging experience between the employees, thus helping them performing their job more efficiently. IT therefore, should be considered as a tool within the KM process rather than being considered as the main factor for its establishment.

6.5.4 IT infrastructure

Prior to conducting the interviews, IT was considered as a major factor to KM process as explained in the theoretical KMFTI (See Ch. 7: Framework, section: pre-field investigation), However, the interviewees indicate that IT is perceived as a tool that could play a significant role in the empowerment of KM rather than being a factor on its own that establishes the critical path to KM process. The interviewees, further state that the GPTC has an excellent information system relying on the most advanced technologies. It has a large database of operations, personnel, customers, suppliers, development, etc. but it does not exploit these data to develop knowledge. The IT infrastructure is globally deployed; however, none of the departments is aware of the existence of an effective KMS that could exploit knowledge within the GPTC.

> *"If the GPTC wants to place itself on a high level of competitiveness in the international market, it must convert its data into information, than transfer the information into knowledge; it is only through this kind of processes that knowledge can then be exploited".*

> *"IT is a recognised tool and must contribute to the implementation of KM process and its exploitation"*

Noteworthy, according to the interviewees, there is no such process to help the GPTC creating, transferring and sharing information or knowledge. They believe that their organisation has a great potential of resources and

expertise to develop KM systems, but it needs a common infrastructure and a model to clear the path for implementation and exploitation and management of such knowledge.

6.5.5 Change management programme

The training department creates and organises training courses for the sixteen thousand employees at the GPTC, but very often these training programs are found to be inadequate for some of the trainees who find themselves in courses which are not related to their missions, although, their background may have been recorded at the early stages of their careers within the GPTC in a completely different discipline. This issue is emanating from the fact that there is no appropriate procedure to take care of the management of training and development of skills.

The need for a change management program has been expressed by the interviewees as being an important step forward to be urgently treated by the GPTC in order to maintain a sustainable development of the skills of its personnel.

> *"There are some training courses with changing culture but they are not effective, because some of them do not fit with our trainees' requirements or with the GPTC's objectives and this issue creates a large gap of qualifications amongst departments".*

"KM implementation should depend on sharing, transferring,

and using knowledge in order to sufficiently deal with the cultural change of the employees where an adaptation to their new working environment can be critical to their success.

Based on the information gathered through these interviews, it can be understood that the GPTC provides a very low level of priority to knowledge sharing. This issue is partly related to the affectation of an adequate budget to this kind of development which could benefit the aggregate of employees at their diverse levels. These benefits could be translated into a continuous learning cycle to further creating a culture that supports innovation, and knowledge sharing in order to change the culture among its employees and help adopting change. It is also observed that the majority of employees tend to keep secret their knowledge and do not share it with one another in order to eliminate any source of competition towards their position and to further protect their own interests within the GPTC.

6.6 Conclusion

This chapter has outlined the findings of the empirical investigations and discussed the results obtained from the surveys and interviews conducted with a number of departments through the General Post and Telecommunication Company (GPTC) in Libya. It has to some extent answered the majority of the main questions required by the KMFTI related to the investigations of the capturing, sharing and exploitation of knowledge within a given telecommunication organisation.

The results from the questionnaire survey (310 valid questionnaires) revealed

how important is to maintain a good level of relevance between the different parameters set out in the KMFTI such as change management, knowledge Management Process, Top Management Commitment, in order to maintain a proper implementation of KMS within a given organisation.

Also the thirty five interviews conducted with the majority of top managers in the GPTC reveal that the benefits of implementing the KMFTI or any other KMS could be translated into a continuous learning cycle to further creating a culture that supports innovation, knowledge sharing which could further contribute to a complete shift of cultural change within the organisation as endorsed by the this framework.

The following chapter "The KMFTI" discusses the development of the Knowledge Management Framework for the Telecommunication Industry (KMFT) and investigates the different parameters that represent its building blocks.

Chapter 7: Knowledge Management Framework for the Telecommunication Industry (KMFTI)

7.1 Introduction

It can be argued that the development of successful KM frameworks clearly requires well defined objectives and strategies. Moreover, such frameworks should be able to provide accurate and established guidelines to business organisations, investigators or individuals involved in similar development through these objectives or strategies. It is also to note that KM frameworks in general could provide a unified view of phenomena that help investigators study the field of KM in an organised and more constructive way. Furthermore, a clear strategy can be described as a detailed plan at the high level of an organisation including a set of clear goals, and describing in detail how these goals are to be achieved within a specified timeframe with the identification of the short term and long term actions (Carrillo et al, 2000).

This chapter describes the strategies and steps through which the Knowledge Management Framework for the Telecommunication Industry (KMFTI) was developed. The KMFTI is a framework that is meant to identify, create, capture, organise, and exploit knowledge within any telecommunications organisation. Two versions of this framework were therefore investigated: The first version was based on a number of theories and assumptions, which is referred to as the "Pre-field investigations framework" while the second version is based on the results of the empirical investigations and is referred to as the "Post-field investigations framework". The two frameworks are described in detail in this chapter.

This chapter is organised in the following order: sections one and four present the introduction and conclusion respectively. Section two provides a

definition of the KMFT . Section three explains how the KMFTI was developed.

7.2 Definition of KMFTI

The Knowledge Management Framework for the Telecommunication industry (KMFTI) is a set of commonly integrated variables established with the aim to contribute to the development and enhancement of the overall services in the Libyan's General Post and Telecommunications Company (GPTC), and to further provide a working framework for the implementation of the existing Knowledge Management Systems (KMS) within such environment. KMFTI takes into consideration the different social, cultural, financial, political, and technical factors to determine their influence on the exploitation of the information flows within the GPTC or similar telecommunications environments.

Prior to proceeding with the development of the KMFTI, it is important to illustrate the different meanings of the term framework as could be described within the scientific world. Hence, the term framework is used in a variety of situations that are often different enough to necessitate a clear understanding of what is meant by this term in this chapter (Beyh, 2004).

Sekaran (2000) defines the term "framework" as a "conceptual model of how one theorises or makes logical sense of the relationships among the several factors that have been identified as important to the problem". In the software development world, Gamma et al. (1995) define the framework as a

"set of cooperating classes that make up a reusable design for a specific class of software. It provides architectural guidance by partitioning the design into abstract classes and defining their responsibilities and collaborations". However, in this chapter a framework of reference, aimed at capturing, organising, exploiting and managing knowledge within the various telecommunication organisations was developed based on a high level of understanding of the related literature and the field's empirical investigations.

7.3 The Development of the KMFTI

Due to the lack of similar frameworks or models that could be identified from the literature (see chapters 3, 4: literature review) which might apply to the management of knowledge within the telecommunication industry, it was necessary to draw a picture of what a final KM would be alike. Therefore, a landmark to guide the authors in this development was necessary to establish, which was based on the following parameters:

- Literature Review; and
- Theories and Assumptions.

The abovementioned assumptions and theories used, are the results of a thorough analysis of the literature in the KM field along with the surveys conducted within the General Post and Telecommunications Company (GPTC) in Libya that served as one of the main source of information for the development of the KMFTI . The following subsections illustrate in detail the steps involved in the elaboration of the different parameters that formed the building blocks of the KMFTI .

7.3.1 Phase one: Pre–field Investigation

This section describes how the KMFTI was conceptualised prior to engaging in any of the field's investigations. The authors have therefore followed a number of logical steps in order to maintain an appropriate approach. In chapter 3, and 4, four variables have been identified following the assessment of several criteria such as the lack of exploitation of knowledge within the GPTC preventing the development of skills within the industry on the one hand, and on the other hand, the difficulties of managing knowledge on the ground amongst the technical and mobile workforces such as Engineering and Technicians who have no, or little access to the appropriate KM means. These criteria have therefore formed the basis of the initial theoretical KMFTI that consists of the followings parameters:

- Top management commitment;
- Strategy;
- Change management programme; and
- IT infrastructure.

The following subsections further describe these parameters and their respective contributions to the development of the KMFTI:

7.3.1.1 Top Management Commitment

Davenport et al. (1998) identified top management and support as one of the most important critical factors for the successful implementations of knowledge. Goh (1998) also indicates that effective KM is possible only when the Top Management empowers employees and shows a strong commitment

to the organisation. Storey and Barnet (2000) further indicate that Top management commitment is one of the key issues that are required for implementing KM initiatives and since new initiatives often face resistance during implementation, top management support is crucial at the different stages of implementation. Top management commitment must therefore be an integral part of KM and, should further examine and focus on issues beyond the technical aspects of the organisation's KM change requirements. The top management commitment and support do not end with KM initiation and facilitation. Rather, they should be continuously acting as an ongoing and never ending process. Top management should further identify competent and committed individuals (teams) within the organisation, and encourage them to become KM champions.

It is also worthy to note that top management has the main role, not only in initiating KM implementation, but also during the whole project lifecycle. The literature shows that there must be a number of appropriate commitments in the implementation of KM within the top managers and they must:

- Possess sufficient knowledge;
- Have realistic expectation of KM results;
- Communicate with employees; and
- Have the ability to coordinate the different interests of functional units in the KM implementation process.

Based on the above discussion, it was observed that Top Management Commitment should be provided as an important factor in the implementation of Knowledge Management and yet it is established as a first parameter in the theoretical KMFTI.

7.3.1.2 Strategy

Strategies and Top Management Commitment are interchangeably linked to one another. It can be argued that in most cases, a decision making process is the responsibility of the top management. This level however can be envisaged as the process of establishing overall KM goals and planning how to achieve these goals through well established plans to ensure that the organisational KM strategy is aligned with other factors. Therefore, a clear KM strategy is important to be defined since it provides significant benefits to a given organisation and prevents critical losses in its operations. Al Ghassani et al (2002) indicate that a clear KM strategy should help to:

- Ensure that KM plans are in line with organisational goals. Any organisation, whether profit-making or non-profit-making, has goals that it aims to achieve and a KM strategy should support achieving these goals. Profit-making organisations, for example, aim to increase profits through improving business performance while non-profit-making organisations aim to deliver certain services within minimum cost and acceptable quality. As unclear goals from implementing KM can lead to the failure of a KM system (Davenport, 1998; Storey and Barnet, 2000; Al-Ghassani et al, 2001a), clear goals and a good strategy will allow viewing how KM will help in reaching their targets;

- Gain continuous commitment from top management. A clear KM strategy provides top management with a detailed description of the proposed KM plan, its implementation barriers, and how to overcome them. This should strengthen their commitment and also prepare them to make corrective actions to support their decisions whenever it comes to a dead end;

- Allocate the appropriate resources. KM systems are expensive (Davenport et al, 1997; CIRIA, 2000) and sophisticated requiring various resources. These resources include monetary figures, staff, tools and technologies with skills for using them, and time for contributing to the Knowledge Management Systems (KMS) and for using such systems. In construction organisations for example, the resources that are considered crucial for a KM strategy are the availability of budget, time, staff, and IT infrastructure (Robinson et al, 2001) and unless all these resources are clearly stated in the KM strategy and approved by the top management it will be almost impossible to get them during implementation.

- Allow for compatibility between existing and required structures of culture and technology. Culture and technology are two important elements of KMS. A clear strategy identifies characteristics of existing culture and technology in an organisation and builds on them. Culture is identified as the most significant barrier in the implementation of KM strategies in construction organisations (Robinson et al, 2001). A construction organisation took more than four years to convince its staff to share their knowledge while some staff in another construction organisation did not accept the idea and left the company (CIRIA, 2000). Understanding technology requirements is also critical because it is expensive to acquire and to modify. A KM system failed because its new technology did not go with the existing one (Storey and Barnet, 2000). In the telecommunication environment, these issues are also assumed to be similar to those found within construction organisations since human

nature to deal with change is believed to be universal regardless of the working environments of the individuals.

The above analysis has led to the conclusion that a strategy to implement KM systems within organisations is a crucial factor in order to make such implementation successful. "Strategy" is further set out as the second parameter on which the KMFTI is to be based.

7.3.1.3 Change Management

Change Management is essential to prepare a given organisation to embrace successful KM and its implementation. An effective change management programme will ensure a smooth implementation of KM with minimum resistance from the employees. Further, organisations need to select an appropriate change management team ideally from within the organisation. The purpose of this team is to prepare the actual plan for successfully introducing knowledge management and its benefits on the organisation and its employees. Therefore, the team must identify how they are going to initiate the change from their current business practices to the ones that are based on knowledge management (Macdonald, 1999). The team members selected will be acting as change agents to help introducing the new system, ideally the team members should represent all the key functional areas of the business "administration, design, IT, production, delivery, service, and finance". By identifying and involving the right problem owners and people that will be directly affected by the change will ensure that the introduction of change is more accepted upon implementation (Vakola, 2000).

Furthermore, the change management strategy should cover many aspects, like communication, user involvement, formal training and education of all users at all levels, organisational and cultural readiness for change (Beyh and Kagioglou, 2004), KMS user feedback, and many other factors. Organisation must remember that each knowledge management project is unique to their particular organisation, therefore they must be clear on the purpose of introducing knowledge management and on what they hope to achieve from it. Nevertheless, there are many analytical tools that can be applied to help identifying the nature of change (Vakola, 2000). Change Management is therefore expected to become an important pillar in the KMFTI based on what is discussed earlier in this chapter.

7.3.1.4 IT Systems

The strategy concerning organisational IT infrastructure for KM should be planned carefully, taking into account elements of scenario planning. According to Mahdjoubi and Yang (2001) there is a good opportunity for applying advances in information technology to help less experienced personnel in planning and decision making-process. By aligning IT with the organisational business strategy (Aouad, 1999), savings would be achieved by avoiding issues resulting from the migration from legacy systems and the integration of new ones. Top management must know that IT itself cannot create knowledge, only people can do that but IT enables knowledge to spread faster and in an easier way. Furthermore, it is assumed that managers rely on a variety of IT tools that enable them to convert data into information and then into knowledge, as well as to capture, collect, communicate, organise, and distribute information that support such

knowledge. It was observed that most research maintain that there exists a strong relationship between KM and IT (Sierhuies, 1996; Bassi, 1997; Malhotra, 1998; Manasco, 1999; Duffy, 2000; Snyder, 2000; APQC, 2001b; Heisig, 2001, Mertins, 2001). However, some authors maintain that IT provides little assistance towards KM, and that it is possible to mange knowledge without IT (Poynder, 1998; Chait, 1999; O'Dell and Grayson, 2000). Besides, Radding (1998) states that top management must view the organisation as a human community, capable of providing diverse meanings to the information outputs generated by technological systems, and by technology, the organisation can set up a bulletin board for example on the corporate intranet, where people working on a particular project or within department can share ideas, post questions, and receive responses in real time or at any later stage. Therefore, the view of whether IT supports building KM or not is shared between researchers to some extent.

Based on these diverted views, we believe that KM and IT are complementary, and IT plays a major role in KM process such as communications, and capturing, transferring and storing knowledge. It can be a difficult way to implement KM effectively and efficiently without IT particularly when processes are often found to be difficult to manage without strong IT tools, and this is a fact that managers need effective and powerful information systems that help them tracking and building the organisation's collective knowledge as can be described by Davenport, (1998) who identified two of the most critical factors for successful KM implementation as follows:

- Establishment of a broad IS infrastructure based on desktop computing and communications; and
- Utilisation of the networks technology infrastructure such as the Internet, Lotus Notes, and global communication systems for effective transfer of knowledge.

Further, King (1999) indicates that successful development of KM requires an organisation to think in terms of applications and how people use applications, not systems and software. In this regard, there must be a strong relationship between top management commitment and change management and this could not be established without proper IT systems and tools. Therefore, it is believed that such IT factor will play an important enabling role within the KMFTI.

7.3.1.5 Summary on the Pre-field investigation

The implications of the pre-field investigations stage have established a first shape of the theoretical KMFTI where its variables have been defined based on the literature performed in the field of KM within the telecommunication sector. As shown in figure 1 hereinafter.

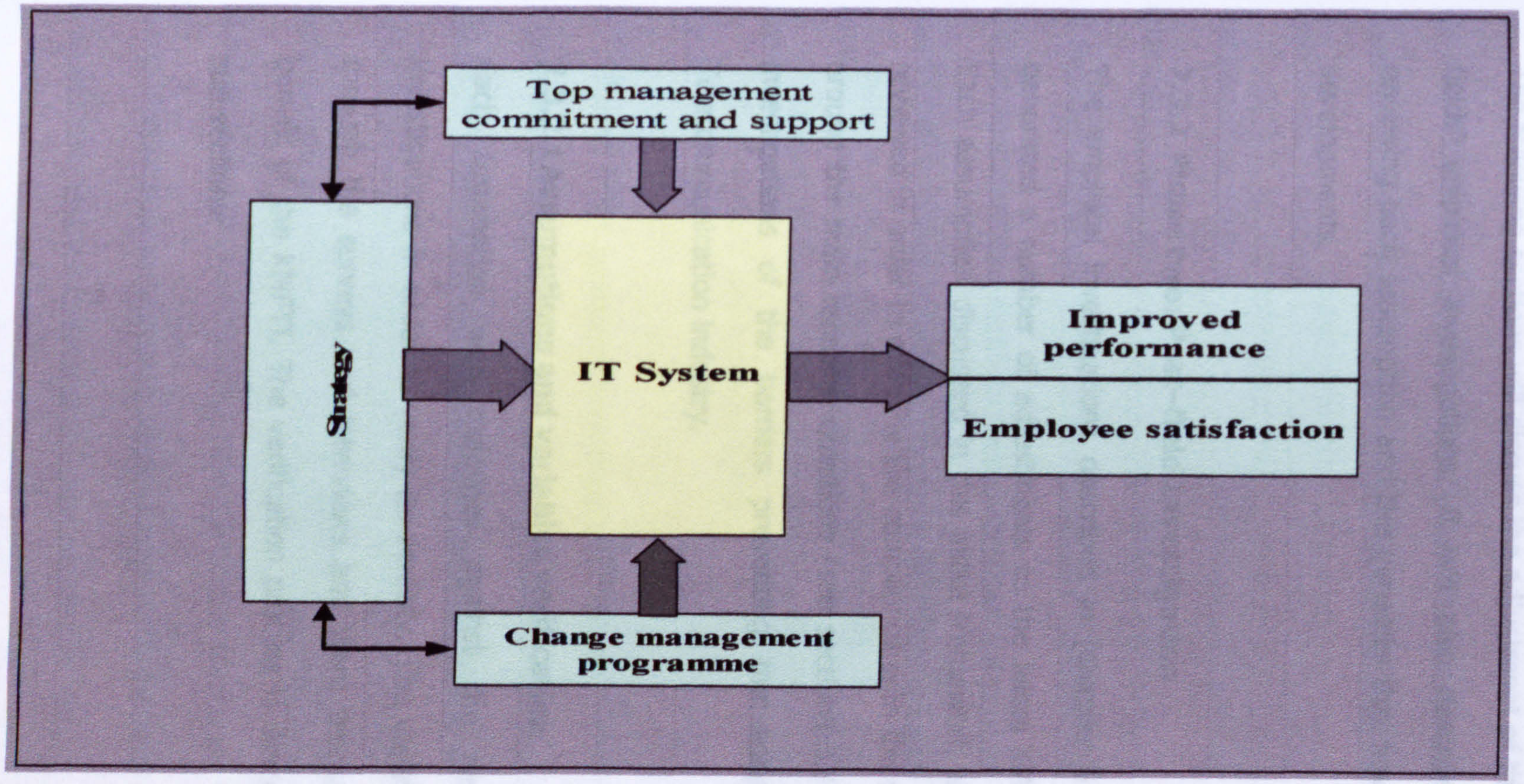

Figure 7-1: KMFTI - Pre-field Investigations

The theoretical part of the framework has described a number of entities where assumptions have been made to test its veracity. A number of enabling processes (i.e. strategy, top management commitment, IT and change management) where further defined to enhance such development. The following sections will discuss the adjustment of the KMFTI based on the fields' empirical investigations. It will also describe its final shape by reviewing each assumption and the variables that have contributed to their developments.

7.3.2 Phase two: Post–field Investigation

The empirical investigations described in (chapter 6 Data Analysis) have generated a number of adjustments to the initial KMFTI described earlier. Each assumption discussed in this initial framework was therefore carefully reviewed in order to examine the compliance with the rationale that is based around the main research questions (see section1.3.3) which discusses the investigations of the barriers preventing the adoption of KM by the Telecommunication industry.

7.3.2.1 Assumptions and variables verification

Each assumption was examined against the results of the field's investigations in order to verify its veracity. The variables were also tested through the surveys and interviews and were thereafter adjusted to the benefit of the KMFTI. The verification process is described in the following sub-sections:

7.3.2.2 Assumptions testing

- **Verification of assumption one**

The findings in this research confirm that the factor of top management commitment and support is the most important critical factor in KM implementation (see section 6.4.2.2). The results from the empirical investigations suggest that top management commitment is directly linked to the success of implementation of KM implementation. In fact, 87 % of the respondents identified that this factor was very critical to the success of the implementation of KM (see table 6-4) while the very similar results were obtained from the interviews (see table 6.5.2).

In essence, the decision-making process looks into the KM system as a business solution rather than an IT solution. Top management should fulfil their controlling function to avoid pitfalls or failure in implementation, otherwise in the contrary; the absence of such variable could result of a major failure of KM implementation.

Clearly, the empirical investigations emphasise that top management commitment and support are instrumental in the successful implementation of KM. Moreover top management commitment is not only needed for the initiation of KM implementation, it is rather an essential pillar to sustain the same level of commitment during and subsequently beyond such implementation.

- **Verification of assumption two**

The findings from the empirical investigations confirm that Strategies in general are an important factor in KM implementation (see chapter six, section 6.4.2.3). In fact, these results suggest that the factor "Strategy" as referred to in the KMFTI, plays an important role for successful KMS implementations. This was further suggested by 71% of the respondents who believe that such success is certainly conditioned by a strong strategy without which, a failure is more than likely to take place at any stage of the implementation process. This analysis has led to establish such assumption as being one of the parameters to be integrated into the building blocks of the final KMFTI as shown earlier in Fig. 6-1.

- **Verification of assumption three**

The pre-field investigations framework initially showed that IT systems could be considered as a separate entity that integrates to the different parameters forming the theoretical KMFTI. However, the empirical investigations revealed that this assumption is not entirely true since it was observed that IT systems are one step of the entire knowledge process which is containing these IT systems (see section 6.5.4 from the interview). Furthermore, successful KM implementation requires a full and deliberate KM process. The authors consider this process as the core of KM implementation as per the results gathered from the literature review, surveys and interviews. Based on these findings, this assumption is partially disqualified contributing to the modification of the initial framework which reflects such change in the structure of its parameters.

- **Verification of assumption four**

This study reveals that change management and the success of KM implementation are positively linked. The majority of respondents (about 80%) from the questionnaires and interviews (see section 6.4.2.4 from the questionnaires and section 6.5.5 from the interviews) consider the change management in the KM systems as an essential factor to achieving KM success. Indeed, the field investigations show that the change management factor has a strong influence on the implementation of KM systems. Further, the investigations report that learning, training, and culture change are the most effective strategies in the change management process (see Discussion chapter) which leads to the validation of this assumption as being an important part in the implementation process of KMS.

7.4 Summary and conclusion

This chapter described the process and analyses under which the development of the Knowledge Management framework for the Telecommunication Industry (KMFTI) model has been undertaken. The methodologies used during its development were thoroughly illustrated through a number of steps and stages that have been successfully organised including the conduct of the related literature and the field's empirical investigations.

The final framework as shown in figure 7-2 below consists of the integration of four inter-related variables to investigate the issues preventing the implementation of KM in the telecommunication sector.

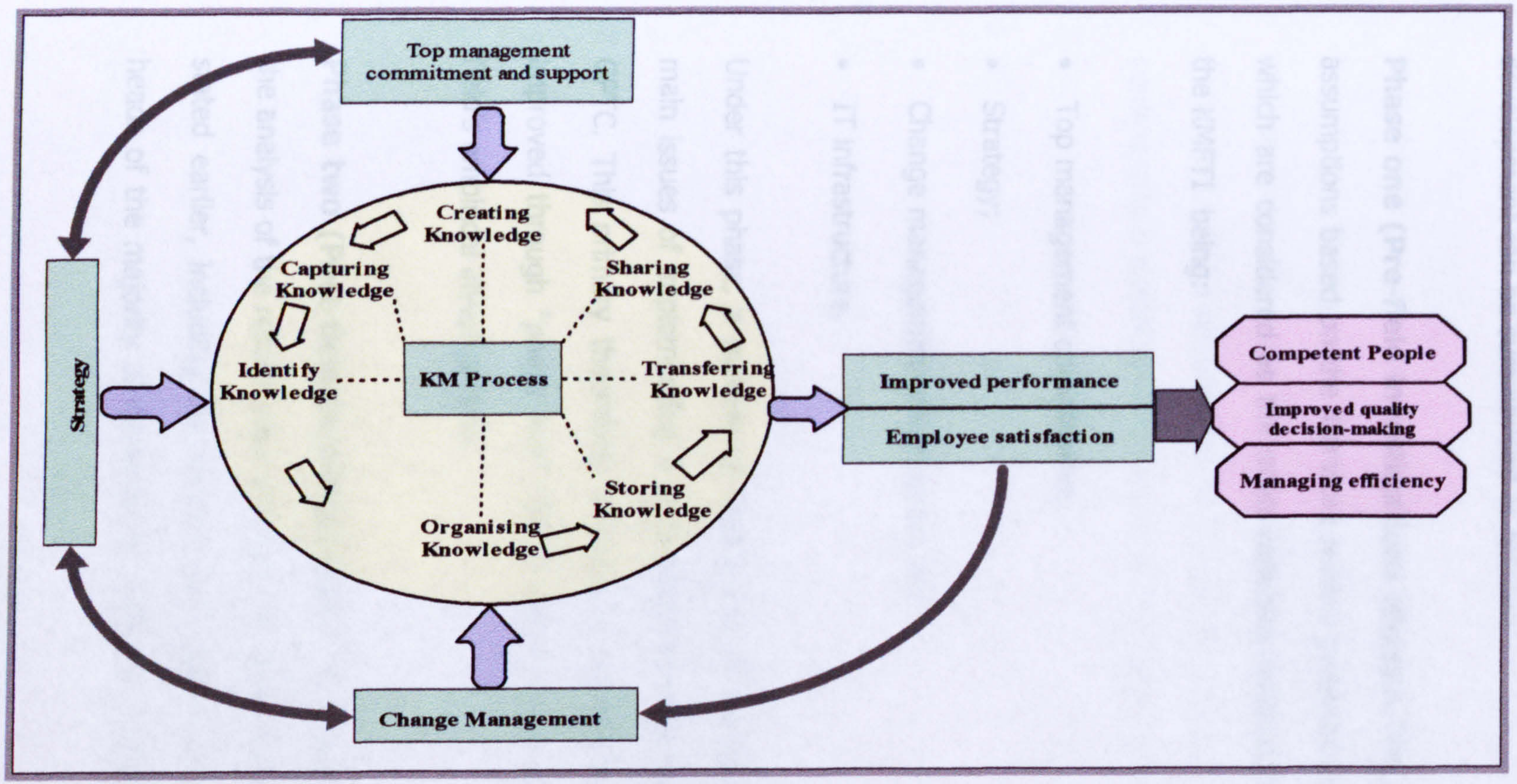

Figure 7-2: The KMFTI

The methodology used for building such a framework is based on two main phases: the Pre-field-investigations and the Post-field-investigations phases. Each of these two phases was composed of different steps in order to formulate the final shape of the KMFTI, and the illustration of its development can be summarised as follows:

Phase one (Pre-field investigations phase): This phase described four assumptions based on the literature review gathered from chapters 3, and 4 which are considered as the main variables building the initial structure of the KMFTI being:

- Top management commitment;
- Strategy;
- Change management programme; and
- IT infrastructure.

Under this phase, a number of theories were believed to demonstrate the main issues of implementing a Knowledge Management System within the GPTC. This primary theoretical framework has further been analysed and improved through "phase two" that is solely based on the findings of the field's empirical investigations.

Phase two (Post-field-investigations): This phase was concerned with the analysis of the results obtained from the fields' empirical investigations as stated earlier, including the surveys and interviews conducted within the heads of the majority of departments within the Libyan's General Post and

Telecommunication Company (GPTC). The aim of this phase was to validate/invalidate the previously established assumptions of the KMFTI. The improvement of the initial framework was observed through the integration of IT systems as being an integral part of the Knowledge Process rather than being a separate variable as determined in the initial framework.

The KMFTI can be viewed as a decision making tool to implementing Knowledge Management Systems within the GPTC and other similar environments. There are, however some uncertainties as to what extent such framework will be contributing to the implementation of KMS in a real life context, this is described in detail in the following chapter.

Chapter 8: Discussion

8.1 Introduction

This chapter discusses the most significant limitations of this research and emphasises on the issues that have prevented the use of a case study strategy to implement the KM Framework in a telecommunication organisation. It further explains how the presentation of the Framework to a number of professionals in the telecommunications sector and with academic People in Libya at three events held in Europe; the Far-East and Libya have to some extent filled-in the validation gap resulted from the non-use of a case study strategy as it was initially intended in this research. The chapter also presents the different implications of this research on the Telecommunications industry and the academia alike.

8.2 Limitation of the Study

As it is the case with other research studies, this has a number of limitations that need to be addressed. These limitations are mainly related to the broadness of the topic under investigation, representativeness and generaisability issues, lack of homogeneous organisational experiences, time constraints, and the limited access of information.

KM is an area of research where theory is still inadequate. This is a particularly the case as the research seeks to develop a holistic and integrative understanding of KM, a feature which demands broadening the scope of the

study in reviewing a large body of relevant literature and collecting a huge set of appropriate data. However, while the researcher has endeavoured to meet such a requirement by reviewing various bodies of literature and seeking different types of data from both questioners and interviews sources. It is not possible to claim that the empirical investigation of this study has come across all issues related to this perspective, at least those issues presented in the literature. Time frame for a complete investigation of the phenomenon under consideration, especially with case study, could not be undertaken. Though all possible effort were made to interview as many people in each department in the GPTC, With more time given for investigation, richer data could have been obtained. Furthermore, the nature of KM practices suggests that measuring impact of KM implementation and exploitation might be difficult to quantify over a short period of time. However, time constraints have inhibited this study from venturing into such deeper investigations. Following this approach is also bound by the often limited access to information provided by the departments, another limitation that this study has suffered from.

The practice of KM has inherited the confusion that surrounds it concepts. Also respondents have different perspectives of KM. and the lack of a common language regarding KM may cause bias in the data collection process, as data of various quality levels are given.

Though this diversity enriches the data collected, it inhibits generalisation and further comparisons, especially with the small size of the sample being collected. Also the access to appropriate number of telecommunications organisations themselves was a constraint, which made the researcher use convenient sampling to conduct the investigations.

8.3 Validation of the KMFTI

The most appropriate approach that could have been used to test and validate the Knowledge Management Framework for the Telecommunications Industry (KMFTI) would have been provided through its implementation in a telecommunication organisation in order to gather further tangible evidence to support its variables.

In this regard, a case study strategy aiming at such implementation was initially explored during the field investigations. However, due to the fact that there is no previous KM systems used within the GPTC to base the case study upon its findings, such strategy was not implemented.

Although, this situation did not permit the implementation of the Framework in a real life context as mentioned earlier, however we looked at other initiatives which could be relevant and necessary to its validation. This approach to validation consisted of introducing the Framework at specific KMS related

telecommunications industry events in order to establish richer and more effective critiques necessary to its assessment and adjustment.

Based on this approach, assessment the KMFTI was achieved through a number of presentations made at international academic and industrial events such as the organisation of specific workshops held at the GPTC with the heads of departments who have participated in the survey and interviews.

8.3.1 The assessments of the KMFTI

Questions noted were classified into four categories in order to analyse their relevance to the KMFTI at a later stage. However, the four categories of questions are presented as follows:

- Top management commitment;
- KM process;
- Change management; and
- IT infrastructure.

In the top management category, there appeared to be a focused on the fact that top management plays the very critical role in successful KM implementation, and should contribute to the development of KM within the General Post and Telecommunication Company (GPTC). Clearly, the results of the study emphasise on this particular aspect and confirm that their supports

are instrumental in the successful implementation of KM. Through this discussion it is believed that top management commitment is one of the most important factors for contributing to the implementation of KMFTI.

IT systems could be considered as a separate entity that integrates to the different parameters forming the theoretical KMFTI. However, the empirical investigations revealed that this assumption is not entirely true since it was observed that IT systems represent one step of the entire knowledge process which is containing these IT systems. Furthermore, the successful KM implementation requires a full and deliberate KM process. It is considered that this process as the core of KM implementation as per the results gathered from the literature review, surveys and interviews. Based on these findings, this assumption is partially disqualified contributing to the modification of the initial framework which reflects such change in the structure of its parameters.

As for the change management category, it was observed that a change management programme is essential to prepare the GPTC to embrace a successful implementation of KM. An effective change management programme will ensure a smooth implementation of KM systems in the telecommunications sector as a whole.

A review of the relevant organisational experience shows that the change management programme is one of the main primary concerns of KM implementation. The change management should cover many aspects, like communication, formal training and education of all the employees at all levels, organisational and culture readiness for change, etc.

In relations to the structure of the KMFTI, the questions raised during the abovementioned events could effectively establish a realistic picture of what would be the main focus of the telecommunications industry who will attempt the integration of KM systems in their environments. In this regard, the top management factor would certainly be the main focus, amongst others, which could play an important role on the decision of the organisation whether to attempt such integration. This cross analysis obtained from the results of the literature in chapters three and four, along with those obtained from the field investigations in chapter six, is a clear confirmation of the theoretical validity of the KMFTI .

8.4 Research implications

8.4.1 Roles of the KMFTI

The real value of the KMFTI was developed in this research could be highlighted by distinguishing its different roles as: descriptive and empirical. These roles are briefly discussed in the following sub-sections.

8.4.1.1 The KMFTI as a Descriptive framework

At first sight, the KMFTI can be used as a conceptual model which could permit researchers to organise the different and complex panoply of factors and variables that could potentially determine data flows within a telecommunication organisation which can be managed and exploited as real knowledge. Hence, the framework helps to identify the set of variables that are likely to influence such implementation by providing the researchers with a tool that contributes to further investigate potential problems related to the implementation of KMS in a telecommunication context.

8.4.1.2 The KMFTI as an Empirical framework

The KMFTI Framework has the potential to guide empirical research in the development of KMS in both the GPTC and other telecommunication organisations. It provides an integrated and holistic view of how raw data flows could be turned into real knowledge assets. This requires that further studies should be made in order to validate this statement.

8.4.2 Implications for knowledge

The contribution of this work to several research areas is reviewed under this section after having described the potential uses of the KMFTI Framework.

8.4.2.1 The telecommunication industry

The most straightforward contribution of this research as stated earlier should be reserved to the benefits of the telecommunication industry in general and the GPTC in particular. On the other hand, the theoretical contribution concerns the body of knowledge management systems as a whole and their implementation in a telecommunication context. This research is believed to be the first of its kind dedicated to the development of KMS within the telecommunication industry. Prior to undertake this research, it did not appear that there were any explanations being they are theoretical or empirical concerning the understanding of the deployment of such systems by the telecom practitioners in Libya or elsewhere. Therefore, this research provides a significant step forward by giving a comprehensive and detailed framework grounded and supported by theoretical and empirical investigations to the development of KMS within such industry.

8.5 conclusions

This chapter emphasised the issues of this research particularly those concerned with the development of Knowledge Management Systems within the telecommunication industry. One limitation of this framework could be observed as there is no evidence that the parameters over which it was built could be otherwise applied to organisations from different sectors.

The chapter further described the approach through which it was believed that the KMFTI was validated without the use of a case study strategy. This validation was based on the fact that exposing the framework to a large number of professionals through internationally organised events could determine whether its concept would require further investigations at this stage.

The following and final chapter "Conclusion" provides a summarised description of the research. It focuses on showing how the results of the study relate to the original research questions and the objectives set out in this thesis. In this regard, the chapter discusses two main points including 1) the contribution of the research in terms of the development of KMS within the GPTC and other telecommunication organisations, and 2) the recommendations for future work in this area.

Chapter 9: Conclusion & Recommendations

9.1 Introduction

This chapter presents an overall summary of the research undertaken. It focuses on showing how the results of the study relate to the original research questions and objectives set out in this thesis, the chapter outlines several directions which have emerged from this study and will further provide a number of concluding remarks.

9.2 Contribution of the study

This study has been effective in identifying and describing components that make up a holistic approach to implementing KM within a given telecommunication organisation. This study provides, not only an empirical assessment of the essential elements in KM implementation, but it also assesses the importance of deploying KM systems as it could be found in the varied literature. The study also attempts to clarify the confusions surrounding the concepts and practice of using, sharing and exploiting Knowledge within the telecommunication sector. It has shown that successful KM implementation is a crucial part in the organisation's sustainable competitiveness, which calls for the participation of every individual, and most significantly the top managers.

The study has also provided a dynamic framework for implementing and exploiting knowledge in an innovative way identified in this research as being the KMFTI which takes into consideration the integrative aspects supported by an underlying IT infrastructure and presents the possibility to handle change in a nearly perpetual manner, in order to deliver sustainable performance to the organisation.

Moreover, the proposed KMFTI is expected to provide an excellent foundation upon which can be laid the future framework for complementary research. This study has also provided contextual and situational insights into understanding how the majority of departments within the GPTC have implemented and dealt with KM. The evidence and factors emerging from these experiences have provided useful insights into the importance of different factors and variables that form the building blocks of the KMFTI. Again, these variables can be further 'tuned' in future research to provide more analytical frameworks that could better serve the telecommunication sector as a whole rather than being focused on one single organisation.

This study can serve as a basis to other research. Practitioners could therefore derive a better understanding of the activities that are under-taken by the GPTC, and the way these activities are being dealt with can result in different forms of outputs in terms of benefits to exploiting KM. The KMFTI proposed in this research should enable the KM practitioners to audit and mange knowledge much more effectively particularly in the telecommunication sector.

The results from this research are expected to be of a great benefit to top managers, information system executives, strategic planner, business managers, and other practitioners who are implementing or planning to implement KM within their own organisations or for their customers with the following objectives in mind:

Objective one: To explore the need and benefits of knowledge management and how it can improve the efficiency of the telecommunications sector in general and in the GPTC in particular.

There are several benefits that the telecommunications organisations can derive from the successful implementation of knowledge management systems. The present research systematically attempted to measure the benefits that could be derived as a consequence of KM. the benefits of KMS can be translated by the following:

- Innovating and delivering high quality services to the organisation;
- Improving innovation and developing new services;
- Increasing workers productivity;
- Identifying new business opportunities through better KM;
- Providing early warning of potential organisational or business changes;
- Eliminating redundant or unnecessary processes;
- Ensuring employees commitment to their organisation;
- Capturing information and creating knowledge;
- Sharing and learning;
- Improving communications within the organisation;
- Enhancing employees' retention rate by recognising their values; and
- Improving the GPTC business strategy and enhancing the infrastructure of knowledge sharing operation.

Objective two: To explore existing KMF and identify critical success factors to implement KM in the GPTC:

The study has examined a number of the existing KM frameworks as seen in chapter 4. The thorough analysis of these frameworks indicated a number of issues and barriers for implementing KMS within a given telecommunication organisation. Therefore the development of the KMFTI was very important as to take into consideration the factors and parameters that have been solely ignored by the traditional frameworks.

Objective three: Develop KMS and frameworks that help top management to improve the decision making process.

Chapter 6 has shown that a KM process is an important condition for deploying KMS in the organisation and that without such a process in place it is likely that no KMS will be implemented at any given time. Individuals are in fact essential pillars in a given organisation, therefore, they must be involved in the decision making process from the start as implied by the KMFTI.

Objective Four: Develop KMS to help organisation in empowering its operation by sharing and exchanging knowledge within the GPTC.

The results from the questionnaire survey and interviews revealed how important is to maintain a good level of relevance between the different parameters set out in the KMFTI, in order to maintain a proper implementation of KMS within a given organisation.

the interviews conducted with the majority of top managers in the GPTC reveal that the benefits of implementing the KMFTI or any other KMS could be translated into a continuous learning cycle to further creating a culture that supports innovation, sharing and exchange knowledge which could further contribute to a complete shift of cultural change within the organisation as endorsed by this framework.

9.3 Conclusion and main findings

The GPTC has not yet been able to fully achieve the benefits of KM at an acceptable level. The findings have also shown that the realisation of KM benefits tends to increase as KM implementation become more successful.

Previous change management programmes have failed in the GPTC. This is due to the lack of 'true" commitment from the top managers, and also due to a large reluctance to change from the majority of employees. True change is perceived as a threat, and in the absence of a well defined strategy, top management embarks upon change initiatives that effectively results in zero net gain for the company and its employees (i.e. change for the sake of change). Furthermore, difficulties in managing effectively and creating a culture for change are considered to be critical for successful KM implementation.

As implied by the KMFTI, top management commitment is absolutely crucial for successful implementation of KM, and thereafter to exploit KM to its full potential as depicted from the empirical investigations.

Based on the overall findings of this study, an integrated framework for capturing, creating, storing, organising and exploiting knowledge was developed. Detailed description of this framework or the KMFTI was given and an illustration of how this framework should be used is provided. The fundamental driving constituents of the framework are 1) strategy, 2) top management commitment, 3) change management, and 4) knowledge process. These four parameters must converge into KMS implementation.

The study has examined a number of the existing KM frameworks. The thorough analysis of these frameworks indicated a number of issues and barriers for implementing KMS within a given telecommunication organisation. Therefore the development of the KMFTI was very important as to take into consideration the factors and parameters that have been solely ignored by the traditional frameworks.

9.4 Recommendations for the industry

The most straightforward contribution of this research as stated earlier should be reserved to the benefits of the telecommunications industry. On the other hand, the theoretical contribution concerns the knowledge management systems in general and its implementation in a telecommunications organisations context in particular. This research is believed to be the first of its kind dedicated to the use of knowledge management within Libyan Telecommunication environments. Prior to undertake this research, it did not appear that there were any explanations being they are theoretical or empirical concerning the understanding of the adoption or rejection of knowledge management by the telecommunications practitioners in the GPTC or in the telecommunication industry. Therefore,

this research provides a significant step forward by giving a comprehensive and detailed framework grounded and supported by theoretical and empirical investigations to the development of knowledge management systems within the telecommunication industry.

Despite the rapid development of knowledge management in other business sectors worldwide, there was still a clear gap in the existence of theory-based frameworkss that could explain the causes and effects in the adoption process of the telecommunications sector, particularly in Libya The KMFTI has therefore provided clear and consisted variables to this issue and is believed to have covered this gap in the body of knowledge.

9.5 Recommendations for Future Research

As the number of various organisations implementing KM continues to grow, further research is needed to expand the finding from this study and to provide more conclusive answers. Despite the attempts of the KMFTI to be exhaustive and cover a broad area of the implementation of KM systems within the GPTC, further research should therefore focus on developing a broad system or framework that could support any given organisation whether it be a telecommunication organisation or not. Therefore we would suggest that a number of recommendations should be considered in future research as follows:

- Through the review of the literature, and from the data collection process, it has been found that there is a lack of common and standardised terms and definitions for KM. This has been reflected in organisational perceptions of KM concepts and practices. Even the concept of KM is not fully developed, embedded and comprehended by

organisations. Therefore, there is great need for more research which solicits opinions and perceptions of both academic and practitioners of KM definitions and terms, and develops clearer and common use of the KM terms. This study can be considered as a good starting point in this area of research, since it embraces a holistic perspective that unifies different focuses and definitions.

- The integrated KMFTI proposed by this study provides ample opportunities for further refinement and testing of the traditional KM systems. As for the researchers involved in similar research, it would be worth for them to explore how the concepts and practices of KM are being integrated with other emerging knowledge management approaches, like Customer Relationship Management (CRM) and E-commerce in the telecommunications sector because it is expected that organisations will begin to face the challenge of embracing different management tools in a complementary manner.

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APPENDICES

Appendix 1
Questionnnaire Survey

QUESTIONNAIRE

PLEASE ANSWER THE FOLLOWING QUESTIONS BASED ON YOUR EXPERENCE DURING THE TASK YOU HAVE JUST COPLETED. FOR THE SCALED QUESTIONS, SELECT THE ANSWER ON THE SCALE WHICH MOST CLOSLY COINCIDES WITH YOUR OPINION.

All data will be maintained strict confidence. A copy of the overall survey results will be available once the research has been finished

SECTION ONE: GENERAL INFORMATION

Respondent name	
Division or Department	

Please tick as appropriate:

Position

Head of Department	
Head of Division	
Head of Unit	
Other Executives	

Education Level

PhD, MSc, BSc, BA	
High School and below	

Other, please specify: .....

SECTION TWO: KNOWLEDGE MANAGEMENT

PART I: ASSESSMENT OF THE USE OF KM WITHIN THE GPTC

QUESTION: TO WHAT EXTENT DO YOU AGREE WITH THE FOLLOWING STATEMENTS

Q1: KM IS A MEAN TO CREATE, IDENTIFY, CAPTURE AND DISTRIBUTE ORGANISATIONAL KNOWLEDGE TO PEOPLE WHO NEED IT

STRONGLY AGREE		AGREE		NEUTRAL		DISAGREE		STRONGLY DISAGREE	
1	☐	2	☐	3	☐	4	☐	5	☐

Q2: KM IS AN IMPORTANT ASSET FOR THE GPTC

STRONGLY AGREE		AGREE		NEUTRAL		DISAGREE		STRONGLY DISAGREE	
1	☐	2	☐	3	☐	4	☐	5	☐

Q3: KM IS A VITAL FACTOR FOR THE SUCCESS OF THE GPTC

STRONGLY AGREE		AGREE		NEUTRAL		DISAGREE		STRONGLY DISAGREE	
1	☐	2	☐	3	☐	4	☐	5	☐

Q4: KM WILL BECOME MORE AND MORE UNMANAGEABLE WITHOUT AN ADEQUATE SYSTEM AND INFRASTRUCTURE

STRONGLY AGREE		AGREE		NEUTRAL		DISAGREE		STRONGLY DISAGREE	
1	☐	2	☐	3	☐	4	☐	5	☐

Q5: KM PROGRAM SHOULD FIT WITH THE GPTC DEVELOPMENT PLANS

STRONGLY AGREE		AGREE		NEUTRAL		DISAGREE		STRONGLY DISAGREE	
1	☐	2	☐	3	☐	4	☐	5	☐

Q6: KM SHOULD CONTRIBUTE TO THE IMPROVEMENT OF THE GPTC'S PRODUCTS & SERVICES

STRONGLY AGREE		AGREE		NEUTRAL		DISAGREE		STRONGLY DISAGREE	
1	☐	2	☐	3	☐	4	☐	5	☐

Q7: KM SHOULD IMPROVE THE GPTC'S OVERALL PERFORMANCE & SUSTAINABLE COMPETITIVENESS

STRONGLY AGREE		AGREE		NEUTRAL		DISAGREE		STRONGLY DISAGREE	
1	☐	2	☐	3	☐	4	☐	5	☐

Q8: TOP MANAGEMENT COMMITMENT IS ONE OF THE MOST IMPORTANT FACTORS FOR SUCCESSFUL KMS IMPLEMENTATION

STRONGLY AGREE		AGREE		NEUTRAL		DISAGREE		STRONGLY DISAGREE	
1	☐	2	☐	3	☐	4	☐	5	☐

Q9: KMS MUST IMPROVE THE GPTC BUSINESS STRATEGY AND ENHANCE THE INFRASTRUCTURE OF KNOWLEDGE SHARING OPERATIONS

STRONGLY AGREE		AGREE		NEUTRAL		DISAGREE		STRONGLY DISAGREE	
1	☐	2	☐	3	☐	4	☐	5	☐

PART II: TOP MANAGEMENT COMMITMENT

QUESTION: TOP MANAGEMENT COMMITMENT IS TO: (ANSWER THE FOLLOWING STATEMENTS)

Q1: PROVIDE LEADERSHIP AND COMMITMENT TOWARDS KM IMPLEMENTATION

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q2: PROVIDE ENCOURAGMENT TOWARDS THE UTILSATION OF KMS RESOURCES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q3: INSURE AND GUARANTEE APPROPRIATE FUNDING TO SUPPORT KMS IMPLEMENTATION

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q4: ELIMINATE ANY EXISTING AND FUTURE RULES THAT IS LIKELT TO OBSTRUCT THE IMPLEMENTATION OF KMS

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q5: PROVIDE AVAILABLE RESOURCES NECESSARY TO THE IMPLEMENTATION OF KMS

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q6: MINIMIZE HIERARCHICAL AND BUREAUCRATIC PROCEDURES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q7: SUPPORT TEAM-BASED EFFORTS AND APPROACHES TO PROBLEM SOLVING

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

PART III: KNOWLEDGE STRATEGY

QUESTION: HAVING A KNOWLEDGE STRATEGY WILL (ANSWER THE FOLLOWING STATEMENTS)

Q1: INVOLVE THE MAJORITY OF EMPLOYEES IN DECISION MAKING EFFORTS

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q2: PROVIDE EMPLOYEES WITH ADEQUATE STATE OF THE ART OPERATIONAL INFORMATION

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q3: ENCOURAGE THE UPRAISAL AND PROMOTION OF EMPLOYEES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q4: CREATE MORE FRIENDLY BUSINESS CULTURE AMONG THE EMPLOYEES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q5: PROMOTE CONTINUOUS LEARNING AND SKILLS DEVELOPMENT

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q6: DEVELOP AN INFORMATION SHARING CULTURE

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q7: INTEGRATE KM IN BUSINESS ACTIVITIES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

PART IV: CHANGE MANAGEMENT

QUESTION: CHANGE MANAGEMENT IS A MEAN TO (ANSWER THE FOLLOWINGS)

Q1: POSSESS AN ACCURATE AND EFFECTIVE KNOWLEDGE BASE

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q2: KEEP AN ESTABLISHED AND WELL DEFINED CONTINUOUS LEARNING STRATEGY

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q3: CREATE A FRIENDLY INFORMATION SHARING CULTURE

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q4: ESTABLISH USER FRIENDLY INFORMATION SYSTEMS

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q5: CREATE CULTURE THAT SUPPORTS INNOVATION, LEARNING AND KNOWLEDGE SHARING

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

PART V: KNOWLEDGE PROCESS

QUESTION: KNOWLEDGE PROCESS IS A MEAN TO (ANSWER THE FOLLOWINGS)

Q1: SHARE KNOWLEDGE BETWEEN INDIVIDUALS

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q2: SHARE KNOWLEDGE WITH MEMBERS OF OTHER WORK GROUPS WITHIN THE ORGANISATION

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q3: INTEGRATE KNOWLEDGE MANAGEMENT IN BUSINESS ACTIVITIES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

PART VI: BENEFITS OF KM

QUESTION: THE BENEFITS OF KM CAN BE TRANSLATED BY

Q1: INNOVATING AND DELIVERING HIGH QUALITY SERVICES TO THE ORGANISATION

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q2: IMPROVING INNOVATION AND DEVELOPING NEW SERVICES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q3: INCREASING WORKERS PRODUCTIVITY

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q4: IDENTIFYING NEW BUSINESS OPPORTUNITIES THROUGH BETTER KM

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q5: PROVIDING EARLY WARNINGS OF POTENTIAL ORGANISATIONAL OR BUSINESS CHANGES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q6: GIVING MORE POWER TO EMPLOYEES IN DECISION MAKING

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q7: ELIMINATING REDUNDANT OR UNECESSARY PROCESSES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q8: ENSURING EMPLOYEES COMMITMENT TO THEIR ORGANISATION

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q9: CAPTURING INFORMATION AND CREATING KNOWLEDGE

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q10: SGARING AND LEARNING

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q11: IMPROVING COMMUNICATIONS WITHIN THE ORGANISATION

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q12: ENHANCING EMPLOYEES RETENTION RATE BY RECONGNISING THEIR VALUES

STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

Q13: IMPROVING THE GPTC BUSINESS STRATEGY AND ENHANCEINGTHE INFRASTRUCTURE OF KNOWLEDGE SHARING OPERATIONS

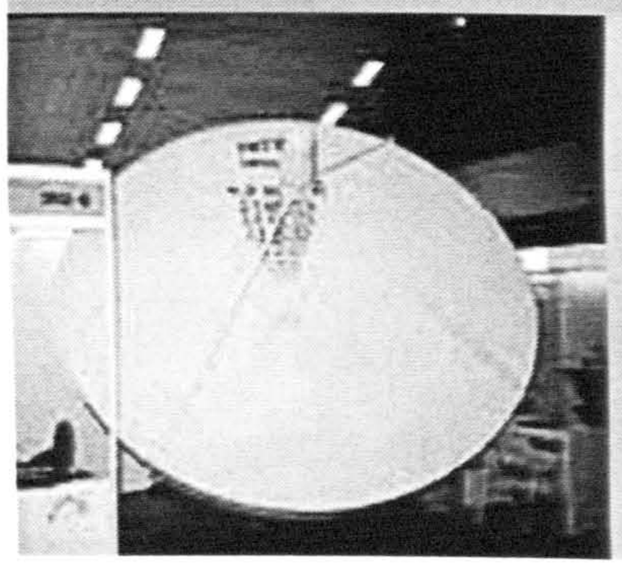
STRONGLY RELEVANT		RELEVANT		IRRELEVANT		QUITE IRRELEVANT		STRONGLY IRRELEVANT	
1	☐	2	☐	3	☐	4	☐	5	☐

PART VII: ABOUT YOUR SUGGESTIONS AND CONMMENTS ON KM

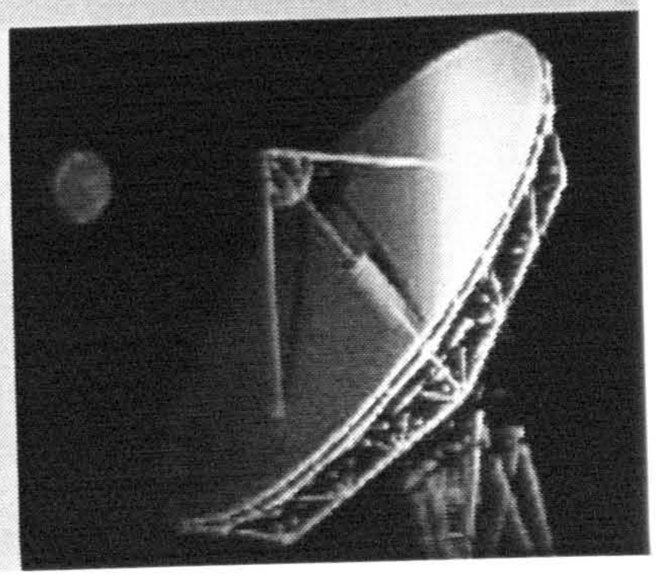
THANK YOU FOR YOUR TIME AND TRUBLE IN COMPLETING THIS QUESTIONNAIRE.

Appendix 2
Telecommunication Development in Libya
(GPTC)

Telecommunication Development In Jamahirya



General Post and Telecommunication Company



Telecommunications Development Plan

- The development of services and the adoption of modern digital technology to replace old technology.
- The reduction of the waiting period of applicant subscribers for telephone services.
- Securing fully automatic telecommunications services to allow efficient services for subscribers.
- To make telecom services available to all and provide services to remote zones.
- To achieve a telephone density of 20% by year 2010 and 37% by the year 2020.
- The provision of data transmissions and networks.
- The provision of GSM services.
- Make necessary provisions to execute projects in accordance with medium and long term programs and laying out financial plans.

Jamahiriya Objectives for the Medium Term

- **To reach a Telephone Density of 20% by year 2010, 1.7 Million Lines in service.**
- **Special emphasis to extend Telecommunications Services, over the country covering Rural Areas.**
- **Improve National and International Telecommunications services.**
- **Obtain optimum Socio-Economic tariffs.**
- **Improve traffic flow.**
- **Participation in the establishment of a Regional Satellite Communications.**
- **Participation in Regional African telecommunications Networks.**
- **Subscriber equipment manufacturing capabilities.**

Jamahiriya Objectives for the Long Term

- **Improve further traffic flow.**
- **Reach an average Telecommunications Density of 37 % (4 300 000 MLs), by year 2020.**
- **Emphasis on the high capacity transmission systems between centers.**
- **Emphasis on high speed data networks.**
- **Expanding regional African Telecom. networks.**
- **Expanding manufacturing capabilities.**

PRESENT SITUATION 2000

- **Satisfied Demand (number of connected MLs about 570 000 MLs).**
- **Potential Demand (number of potential subscribers, i.e. number of persons, who on the base of the existing tariffs would have or would have applied for a ML-connection, if readily available, at present about 1 250 000 MLs.**
- **Number of telephone switches, international ,zone and group centres : 265, 2, 17**
- **Number of international and national satellite stations : India, Atlantic Ocean, 14 Local Domsat withIntelsat.**
- **Existing submarine Fiber Optical cables (Tripoli-Mazzara) 2.5 GHz, SDH (30,000 circuits)**

PRESENT SITUATION 2000

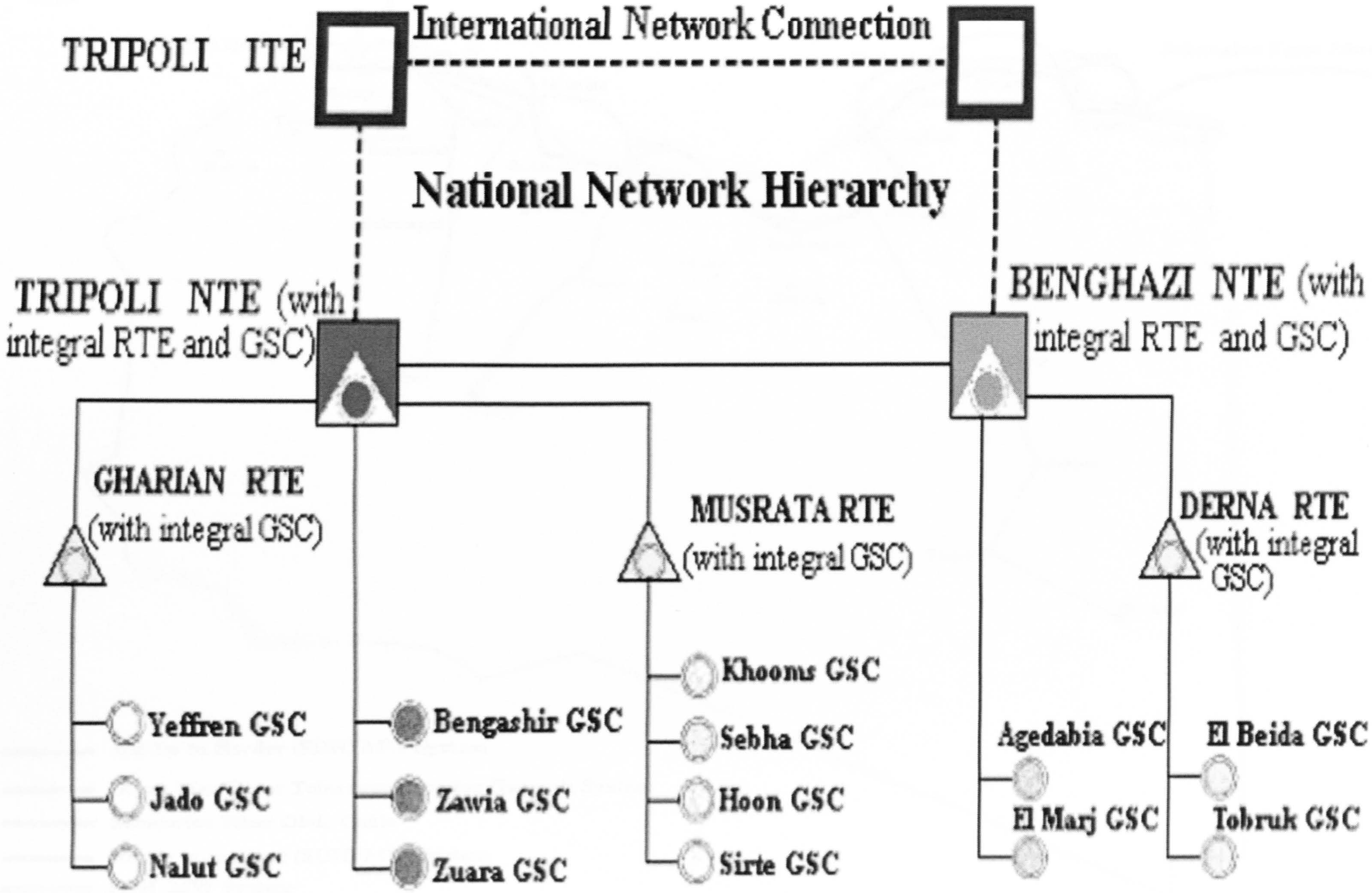
- **Submarine coastal Fiber Optical cable, under implementation 2.5 GHz, WDM. (1610.5 km.)**

- **Digital MW, links under implementation, backbone Tripoli-Sirte-Banghazi (18,920 Channel)**

- **Several VSAT stations working in the Region.**

- **GPTC contribution in international and national Regional networks.**

LIBYAN TELECOMMUNICATION HIERARCHY



MEDITERRANEAN SEA

Submarine Fiber Obtic
Cable to Mazara in Italy

Submarine Egypt Fibre

Ra's Ejdher
Zwara
Ezawa
Tripoli
Khoms
Elazizya
Musrata
Tholmeta
Damah
Elbiada
Elmarj
Benghazi
Tobruk
Emsaad
Teeji
Gharian
Binywalid
Tarhona
Siert
Nahuot
Bu Grayn
Bu Njeam
Ra's Lanouf
Ejdaoya
Eshwoyrif
Elbraygah
Eljofra
Huon
Marada
Zalah
Oajalah
Jalow
Brak
Sabha
Essner
Tazirbo
Elkofran

Border to Border (SDH) MW System
Great Man River Telecommunication Network System
Submarine Fiber Obtic Cable
Ready to contract (SDH) MW System
PDH MW System

Tartos in Syria

MEDITERRANEAN SEA

Tunisia

Ra's Ejdher

Zwara

Ezawa

Tripoli

Khumis

Musrata

Elazizya

Tarhona

Teeji

Ghanian

Binywalid

Nahuot

Bu Grayn

Siert

Bu Njeam

Ra's Lanouf

Eshwoynif

Ejdabya

Elbraygah

Eljofra

Huon

Marada

Zalah

Brak

Sabha

Tholneta

Elmarj

Elbiada

Darnah

Benghazi

Tobruk

Emsaad

Alexandria

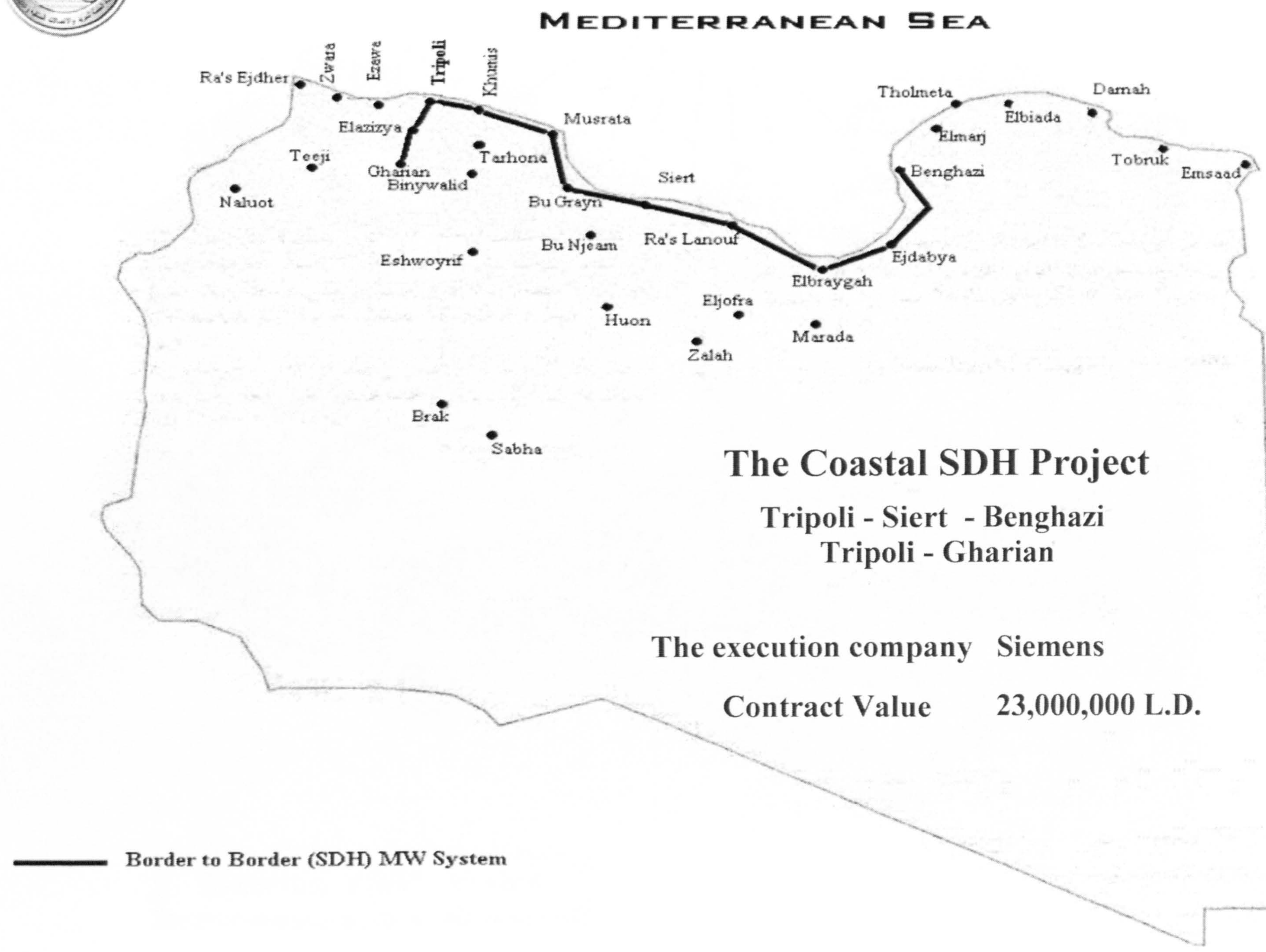
The Submarine Fiber Optic Cable Project

Zwara - Tobruk

The execution company Alcatel

Project Capacity 2.5 G Bit

Submarine Fiber Obtic Cable



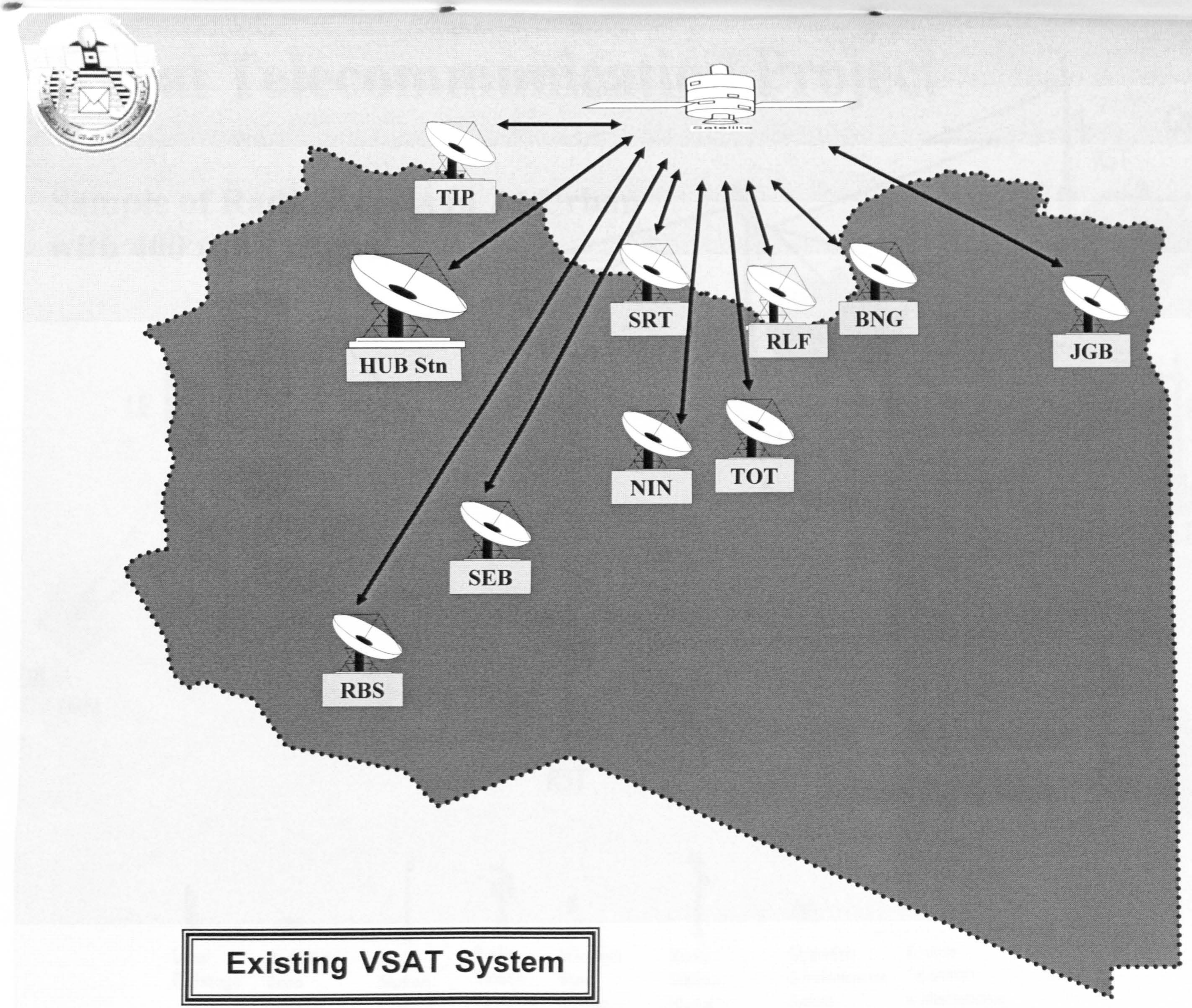
The Coastal SDH Project

Tripoli - Siert - Benghazi
Tripoli - Gharian

The execution company Siemens

Contract Value 23,000,000 L.D.

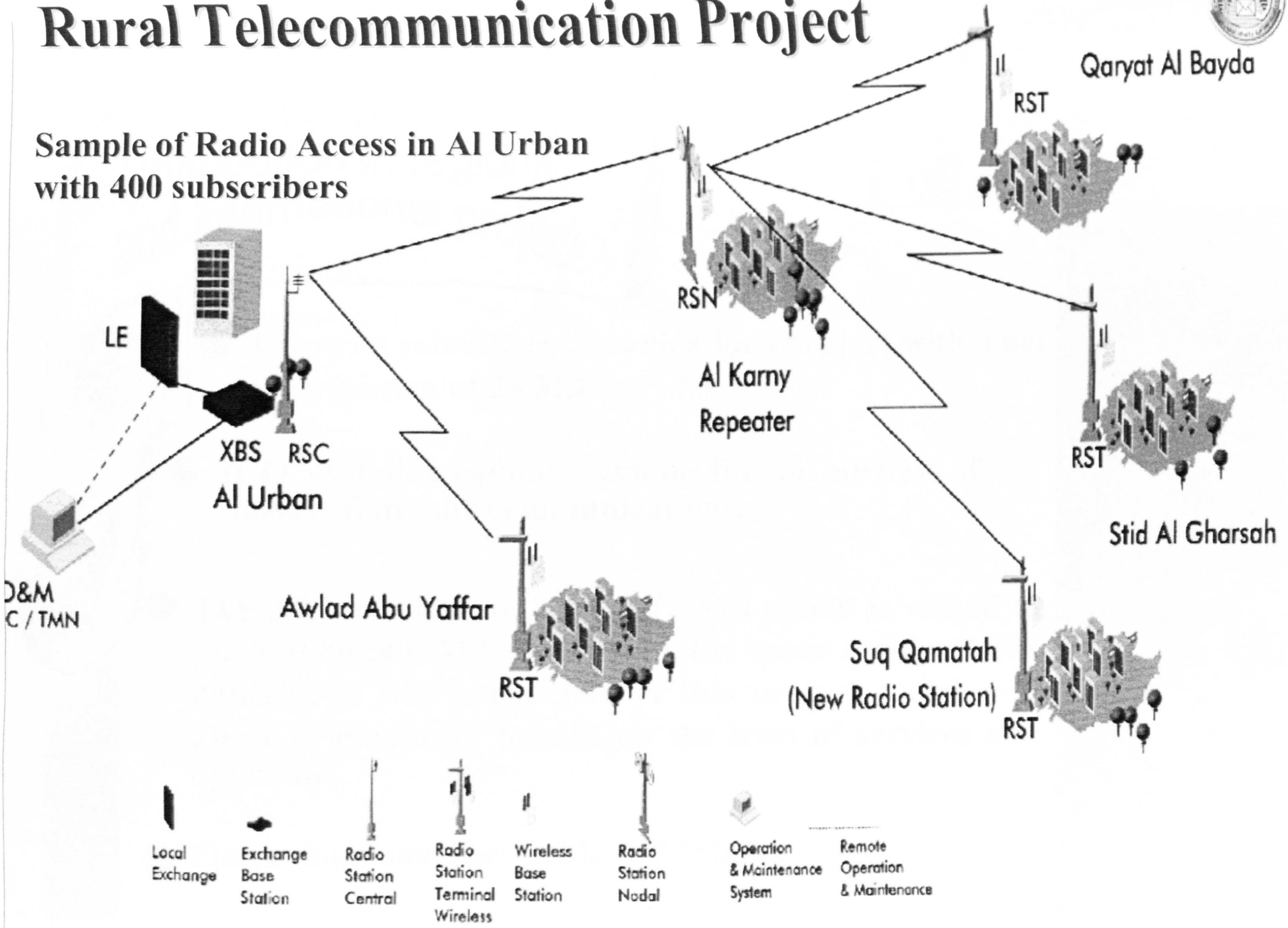
Border to Border (SDH) MW System



Existing VSAT System

Rural Telecommunication Project

Sample of Radio Access in Al Urban with 400 subscribers



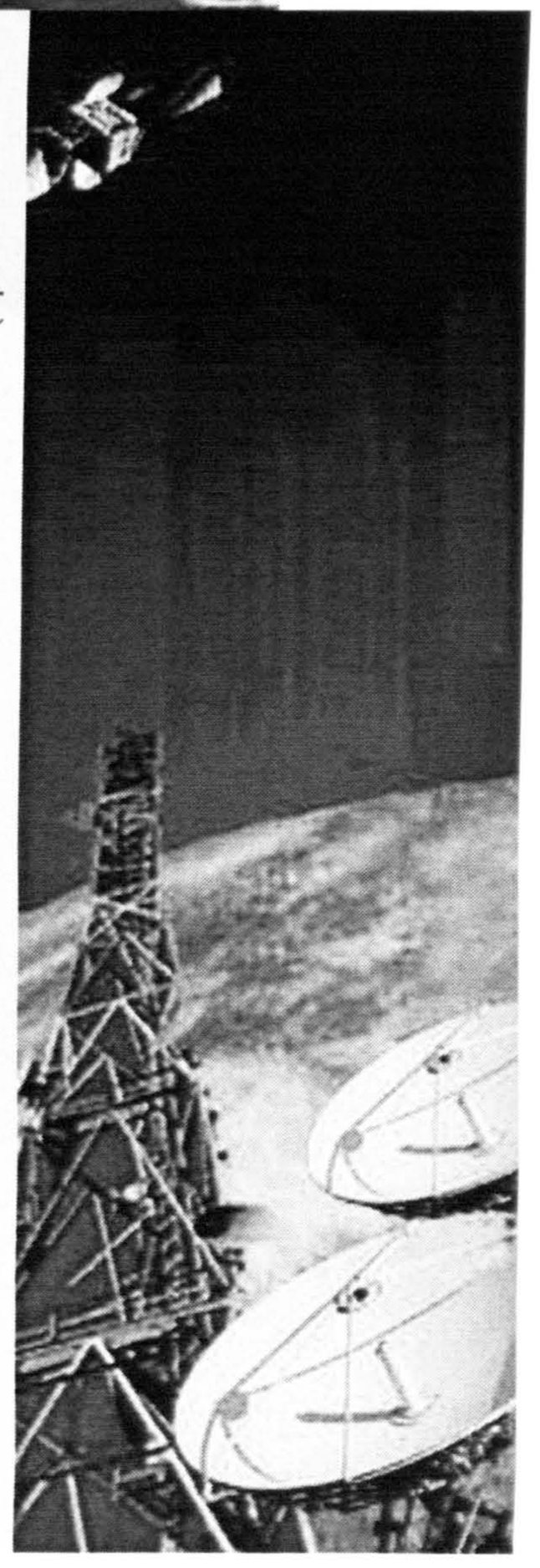
GPTC
contribution in regional and international project

- **Thurya's satellite communications project with a net contribution of 25 Million US$.**

- **ICO's satellite communications for the purpose of universal mobile communications.**

- **The African satellite Project (QAF) which is valued at more than 500 Million US$ for the space segment. The Jamahirya will participate in this project, which will allow to maximize benefit on the level of services and operation.**

- **Flag submarine fiber cable, (45 Mb/Sec.)**



The Development Plan

Demand Compliance:

Years	2000	2005	2010	2015	2020
Potential Demand	1.250	1.700	2.400	3.350	4.920
Expressed Demand	1.100	1.550	2.220	3.260	4.890
Satisfied Demand	0.700	1.135	1.780	2.800	4.300
Satisfied / Potential	55%	65%	75%	85%	90%

Evolution of Service Density:

Years	2000	2005	2010	2015	2020
Density	10%	15%	20%	27%	37%

New Technologies in The Network

- **SDH & WDM in the Transmission field.**
- **IN, ISDN & ATM in the Networks field.**
- **New Satellite Communication Systems. VSAT, GMPCS**
- **Data Services**
- **Wireless Systems connection. WLL**

The Investment Plan

A. Network

B. Construction & Other Services

The Investment Plan

A. Network

Subscriber Equipment

Includes the equipment and installations for the subscribers such as Telephone Sets, Telex, Public Phones, PABX, Faxes and Modems.

Switching

Involves all kind of digital exchanges, the power devices and interface sorted according to the CPU speed and the type of the exchange with the installation service.

Transmission

Digital microwave, fiber optic cables, data transmission networks, expanding local satellite station, Regional and International space communication.

The Investment Plan

B. Construction & Other Services

Building

All the building necessary to develop the system which includes air-condition and office equipment.

The service center

All the maintenance , operation and service requirements which is needed by the service centers.

Consultancy and Technical support

Technical support includes plans, design, project engineering and implementation, and training.

The Investment Plan (in Million Dollar)

Item	2000-2010	2011-2020	Total
A- Network			
1- Subscribers Equipment	1,276.71	2,207.79	3,484.50
2- Switching	703.25	1,320.43	2,023.68
3 -Transmission & carrier networks	1,197.57	1,085.07	2,282.64
B- **Construction & other services**	1,235.04	1,359.25	2,594.29
Total	4,412.57	5,972.54	10,385.11

Forseen Shared Investment Projects

Internet Networks

The General Post and Telecommunication Company (GPTC) objectives during the next decade is to increase the capacity of its Data Communication Network, in order to meet the great demand for the multimedia services.
The plan includes:

- **Establishing a National ATM Backbone Network.**

- **Increase the Number of Points of Presence (POP) to cover all the country.**

- **Increase the Number of Leased Lines.**

- **Increase the Number of dial up users that using GPTC internet service to reach 150,000 users.**

- **Provide Internet service to the public through private ISPs to accommodate up to 500,000 internet users.**

Mobile GSM Networks

-To reach 400,000 Line in Medium term plan

Solar Energy provision

Manufacturing joint venture

-Telephone sets, prepaid cards, ...etc..

Appendix 3
GPTC ORGANISATION STRUCTURE

اللجنة الشعبية

- مكتب الإعلام
- مكتب شئون اللجنة
- مكتب العلاقات والتعاون الدولى
- مكتب المستشارين
- المكتب القانونى
- الإدارة العامة للشؤن المالية
  - الإدارة المالية
  - إدارة الحسابات والميزانيات
- الإدارة العامة للمواد والمشتريات
  - إدارة المشتريات
  - إدارة المواد والمخازن
- الإدارة العامة للمراجعة والتفتيش والمتابعة
  - إدارة المراجعة
  - إدارة التفتيش
  - إدارة المتابعة
- الإدارة العامة لتنفيذ المشروعات
  - إدارة الشبكات
  - إدارة التركيبات
  - إدارة الأعمال المدنية والمبانى
- الإدارة العامة للفضاء
  - إدارة المحطات الدولية
  - إدارة المحطات المحلية
  - إدارة المحطات المتنقلة
- الإدارة العامة للشئون البريدية
  - إدارة الخدمات البريدية
  - إدارة الخدمات المالية البريدية
  - مراكز البريد
  - مكتب الشئون الإدارية والمالية
- الإدارة العامة للدراسات والتطوير
  - إدارة الحاسوب والمعلومات
  - إدارة التدريب
  - إدارة الدراسات والمشروعات
- الإدارة العامة للشئون الادارية والخدمات
  - ادارة الموارد البشرية
  - إدارة الخدمات والعلاقات
  - إدارة الحركة والنقل
- الإدارة العامة للخدمات التجارية
  - إدارة الخدمات الدولية
  - إدارة خدمات المشتركين
  - إدارة الاستثمار والمساهمات
- الإدارة العامة للإتصالات
  - إدارة المقسمات العامة
  - إدارة الموجات السنتيمترية
  - إدارة الكوابل الارضية والبحرية
  - إدارة القوى والتكييف
  - الورشة المركزية
- الإدارة العامة للإتصالات المعلوماتية
  - الإدارة التجارية
  - إدارة الشئون الفنية
- مناطق الاتصال
  - مراكز الخدمات
  - مكاتب الخدمات

Appendix 4
Publications

PUBLICATIONS

Elashaheb M. and Aouad G. (2003) The *Development of Knowledge Management Approach for a Telecommunication Company in Libya.* 3rd International Postgraduate Research Conference in the Built & Human Environment, pp: 299-310, Published by the University of Salford, Lisbon.

Elashaheb M. and Aouad G. (2003) *The Impact of Knowledge Management Within a Telecommunication Company in Libya,* PRoBE The first Scottish conference for built and environment, pp: 247-257, Glasgow, UK

Elashaheb M., and Aouad G. (2004) *Description and analysis knowledge management frameworks.* 4th International Postgraduate Research Conference in the Built & Human Environment, pp: 497-507 , Published by the University of Salford, Salford, UK.

Elashaheb M. and Aouad G. (2004) *THE IMPACT OF KNOWLEDGE MANAGEMENT SYSTEM WITHIN A TELECOMMUNICATION INDUSTRY in LIBYA* 4th International Conference on Construction Information Technology, pp: 619-628, Published by the CIDB, Langkawi, Malaysia.

Elashaheb M., Beyh S. and Aouad G. (2005).*The Implementation of Knowledge Management Framework within the Telecommunication Industry: The KMFTI Model,* 2nd International SCRI Research Conference in the Built & Human Environment, Published by the University of Salford, Salford, UK.

Journal Paper

Elashaheb M., Beyh S. and Aouad G. (2005).*The benefits of KMFTI Model within the Telecommunication Industry:* Undergoing paper to be submitted to Knowledge Management Journal in 2005.