

Knowledge Management and Global Diversity: A Framework to Support Organisations in Developing Countries

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DEDICATION

*This dissertation is dedicated to the Glory of God
and to my mother, Adeogun Anike Okunoye, a typical woman of Africa, for her
love, sacrifice, support and prayer.*

Mum,

*Those who trust in the LORD
Are like Mount Zion,
Which cannot be moved, but abides forever.
As the mountains surround Jerusalem,
So the LORD surrounds His people
From this time forth and forever.
Psalm 125:1-2*

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Abstract

The existing frameworks to support organisations in their knowledge management operations do not adequately consider global diversity and the local context of the environment in which each organisation operates. The main goal of this study is to develop a context-aware framework to guide organisations in their efforts to manage knowledge, and thus contribute to the development of organisations in the global knowledge economy. To achieve the main goal, a multiple case study was conducted of six research organisations in two developing countries – Nigeria and The Gambia. The analysis of the data reveals some local contextual issues and assumptions that are of importance in a framework to support organisations in developing countries. The study shows that the availability and usage of information technology in an organisation depends on the broader context of national information infrastructure. Also, the organisational variables — which include people, leadership, structure, and culture — can all be influenced by the societal culture and orientation of the local people. The findings also confirm the difficulties associated with information technology in developing countries, and how these can affect organisations' efforts to manage knowledge. Thereby, the study aims to contribute to the understanding of the state of knowledge management in developing countries.

The framework constructed in the study embeds diversity in national culture, infrastructures, organisational variables and technology. It allows organisations to determine which knowledge processes need to be addressed to achieve their goals. Although the framework is intended primarily for organisations in developing countries, the level of its abstraction and the contextualisation of each of the components make it relevant globally.

Keywords: knowledge management, developing countries, context-aware framework, global diversity, sub-Saharan Africa, Nigeria, The Gambia, information technology knowledge economy

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LIST OF ORIGINAL PUBLICATIONS (AVAILABLE AT <http://www.cc.jyu.fi/~adeokun>)

- Paper I.** Okunoye A. and Karsten H. (2002). Where The Global Needs The Local: Variation in Enablers in the Knowledge Management Process, *Journal of Global Information Technology Management*, Vol. 5 No 3, pp. 12-31
- Paper II.** Okunoye A. and Karsten H. (2002). ITI as Enabler of Knowledge Management: Empirical Perspective from Research Organisations in sub-Saharan Africa. In Proceedings of the 35th *Hawaii International Conference on Systems Sciences* January 7-10, 2002, Big Island, Hawaii
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- Paper IV.** Okunoye A. and Karsten H. (2003). Global Access to Knowledge in Research: Findings from Organisations in sub-Saharan Africa, *Information Technology and People*, Vol. 16, No 3.
- Paper V.** Okunoye A. (2002). Towards a Framework for Sustainable Knowledge Management in Organisations in Developing Countries. pp. 225-237, In Brunnstein K. and Berleur J. (Eds.). *Human Choice and Computers: Issues of Choice and Quality of Life in the Information Society*. International Federation of Information Processing, World Computer Congress, August 25-30, 2002, USA: Kluwer Academic Publishers.
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PART I INTRODUCTION

1 Introduction

1.1 Introduction to the dissertation

This study examines knowledge management (KM), with specific emphasis on organisations in developing countries. The principal aim is to develop a context-aware framework to guide organisations in their efforts to manage knowledge, and thus contribute to the development of organisations in the global knowledge economy.

It is surprising that it was not until the early 1990s that knowledge became widely recognised as an organisational resource, and its management became essential for organisational competitiveness and survival. Even though Penrose (1959), in her theory of the growth of firms, had already identified knowledge as a resource for competitiveness, its formal management (unlike the other factors of production: land, labour and capital) was neglected for a very long time.

As far back as the early 1960s, Michael Polanyi had been writing about knowledge, knowing, being and meaning (Polanyi 1962, 1966, 1969). In the 1970s, Daniel Bell published an influential book on the post-industrial society (Bell 1974). Despite all these studies, many practitioners and researchers still placed more emphasis on organisational learning and remembering (e.g., Daft and Weick 1984, Huber 1991, Argyris and Schon 1978, Walsh and Ungson 1991). However, in recent times, research in strategic management (Drucker 1988, 1993; Stewart 1997; Nonaka 1994; Hedlund 1994, etc.), economics (Machlup 1980, OECD 1996, Nelson and Winter 1982, Nelson 1996, Howitt 1996, Chandler et al. 1998), and sociology (Bell 1974; Castells 1996) has taken more interest in the economics of knowledge. This has been combined with writings considering the sociology of knowledge and technology as issues of interest in information systems and management science (Alavi and Leidner 2001; Nonaka and Takeuchi 1995; Leonard-Barton 1995).

Subsequently, this has led to repeated revisions of both theories and frameworks: the resource-based view of a firm has become extended to the knowledge-based view (Grant 1996a, b; Spender 1996). New growth theories were developed to explain the forces which drive long term economic growth (Romer 1994; Grossman and Helpman 1994). According to these theories, to sustain this economic growth, it then becomes important that individuals, organisations, and nations develop an appropriate knowledge management practice to improve the efficiency and effectiveness of their knowledge systems.

This is needed in order to improve the way knowledge is acquired from outside sources, produced from internal sources, and how it is diffused, stored and used (Swanstrom 2002).

The recognition of knowledge as an organisational resource, the new growth theories and the advent of knowledge-based organisations all together helped to ensure the establishment of the new field of knowledge management in the information systems discipline. These developments show how knowledge, in its various forms, is the property of human beings and how it could be embodied in technology and other related artefacts. Investment is thus being directed to high-technology goods and services. Unlike the other factors of production, knowledge and capabilities are characterised by increasing returns (Abramowitz 1989). Information and Communication Technologies (ICTs) serve as tools for releasing the creative potential and knowledge embodied in people. They also have a multiplier effect on the overall economy, as does manufacturing in the industrial economy. The sustained productivity and improved performance of organisations have thus become closely linked with ICT (Brynjolfsson 1993; Brynjolfsson and Hitt 1998; Hitt and Brynjolfsson 1996; Dewan and Kraemer 1998).

The linking of ICT to knowledge, and the accompanying competitive advantage, have introduced new challenges into the discipline of information systems. Many organisations began to be more involved either in delivering knowledge-based products, or in actually selling knowledge directly. Thus it became imperative that approaches should be developed for managing this knowledge. It was not, however, until this had been well recognised in practice that it started to gain the formal interest of academics. Being a discipline that connects people with organisations and information and communications technology, information systems was naturally positioned to develop a range of methodologies, frameworks and approaches to successfully manage knowledge at every level – individual, group, organisational and inter-organisational. The complexity of the issues concerned in the emerging knowledge management field extends to other disciplines such as organisational behaviour, human resources management, computer science, anthropology and numerous others. This has brought about a proliferation of literature with various standpoints from each discipline.

There are claims that we are now in a knowledge economy, in other words, in the predicted post-industrial era. It is easy to focus on Western industrialised countries (e.g. the USA and EU) and Japan, as they provide an advanced model of economic development. Organisations in industrialised countries pioneered knowledge management and the sale of knowledge-based products. Of the few

theories developed (Nonaka and Takeuchi 1995; Leonard-Barton 1995), most have been based on the experience gained from these organisations, and were meant to be relevant for organisations in a similar environment. This phase lasted for a decade, until it was realised that KM is a global issue that concerns all organisations (Davenport and Grover 2001). Prior to this, knowledge management had been viewed from the narrow perspective of people and organisations that were predominantly involved in Western industrialised countries (Earl 2001, Alavi and Leidner 2001; KPMG 2000). These approaches do not take global diversity into consideration, especially in the context of developing countries.

The first goal of this study is therefore to provide an empirical and theoretical report of the state of knowledge management in a number of organisations in developing countries (Paper I: Okunoye and Karsten 2002a). In order to do this, existing models and frameworks were reviewed. The aim of this was to establish the necessary components of the frameworks, and their assumptions and fundamental relevancy in the context of developing countries. The second goal of the study is to provide a framework that could be used by organisations everywhere, irrespective of the inherent diversity of the complicated environment and infrastructure of the world economy. Even though this work has been conceived with organisations in developing countries in mind, the end result is expected to be applicable everywhere.

The empirical data for this study was collected in research organisations in Nigeria and The Gambia (Okunoye and Karsten 2001). We noticed variations in KM enablers, and the assumptions about them in these organisations, as compared to earlier studies (Okunoye and Karsten 2002a, Paper I). The availability of information technology infrastructure could have a significant influence on KM (Okunoye and Karsten 2002b, paper II; Okunoye 2003b, paper III). The Internet is used to illustrate the relevance of technology in KM within the context of developing countries (Okunoye and Karsten 2003, paper IV). A knowledge management framework was built on these findings (Okunoye 2002a, paper V). The ideas were refined and presented as a context aware framework of KM (Okunoye 2003a, paper VI).

The first part of this dissertation serves as an introduction to the publications of this study, of which the six mentioned above are included as Part II. The introduction also includes a review of the background literature, where I establish the need for a new framework using the relevant theories. It also contains a summary of the contributions and implications of the study.

1.2 Motivation

As the head of the data centre at the Farafenni Field Station of the Medical Research Council Laboratories, an international research organisation in The Gambia, I was a pivotal member of the medical research team. It comprised senior investigators (Epidemiologist, Statistician, Clinical Physicist, Sociologist, Microbiologist, Entomologist etc), laboratory technicians and data staff. Upon joining this organisation, I immediately realised that there was a lack of institutional knowledge. There had been several heads of station, often each with different research agendas. Apart from the local junior scientific support and administrative staff with long-term employment, the majority of the staff members were hired solely for the duration of each project. Most of the regional and international scientific staff stay for an average of five years, and then depart, taking with them their expertise, newly acquired experience and knowledge. They often also take their data with them, leaving no access to valuable information. This does not necessarily happen physically, but few people, if any, would know the location of the data or its context. Completed research questionnaires are scattered around the data centre, in spite of the effort of the new head of station to put things in order. The station is of strategic importance to the unit, as it has demographic surveillance data spanning 20 years for 40 villages around Farafenni. This is maintained and updated regularly. In addition, there have been several ad-hoc censuses of villages outside the main study area, of which records were not kept. Thus, any scientist requiring this information would have to conduct another census. This had never previously proved to be an insuperable problem, as incoming scientists always used allotted funds from donors.

The station is situated approximately 200 km from the headquarters at Fajara across the River Gambia. Postal services within The Gambia are almost non-existent, and the only means of communication is a weekly dispatch vehicle to the headquarters. This served as a message delivery service and a means of transporting people to meetings. For urgent correspondence with collaborators abroad, we relied on the telephone and a fax machine. However, in 1998 the Internet came to The Gambia, and the station was promptly connected. We were extremely pleased, but unfortunately, no sooner were we connected than we were completely cut off, due to technical problems at the local telephone exchange. It took nine months and considerable effort to resolve these problems. As a computer scientist and data manager, I was convinced that technology could help in solving some of the problems affecting work practice in our field station. I endeavoured, based on my training and experience, to design software to improve some manual processes, to train the users in basic IT skills in order to facilitate increased computer use for data storage and

retrieval, and to press for an improved Internet connection. I also planned a scheme to introduce a LAN and subsequently an Intranet.

Even though I realised that the people who have worked in the organisation for several years possessed knowledge essential for the functioning of the unit, I did not know what could be done to ensure that this knowledge was made available within the organisation. For example, Mendy Sarr¹ had exclusive knowledge of villages that would comply with different kinds of research. Katim Ndow¹ knew the Alkalos (the village heads) and the best way to present a new research agenda to them. Mendy and Katim both understood the culture and local beliefs of the people and the best ways to explore these for the success of the project. They understood the malaria season and knew the villages with the highest annual incidence of malaria and other diseases. They also knew the best strategies to recruit field workers that would be acceptable in villages. There was a vast amount of knowledge locked in the heads of various individuals, which it would take an outsider many years to acquire.

The knowledge of the scientific staff was also immeasurable. Indeed, some of them had worked in other parts of Africa and possessed comparative knowledge useful to research. Unfortunately, even with the will to transfer knowledge to the local staff, the educational level and learning capability of the locals often created great barriers. This brought repetition, duplication of effort, and lack of continuity to many projects and the work of the station and the unit in general.

It was the realisation of this that first drew my interest to multimedia distributed information systems and then to computer supported co-operative work (CSCW). In January 2000, I left the position at the Farafenni Field Station, to begin studies for a Master's degree in Computer Science and Information Systems at the University of Jyväskylä, Finland. I tried to impart as much of my expertise to my immediate junior colleague as I could, and wrote a comprehensive hand-over report, as bureaucracy meant that I would not meet my replacement. Within months of my departure, and prior to the arrival of the new data manager, I received e-mails from my colleagues on how to carry out some data extraction procedures. During this period, I attended a course in organisational learning, memory and co-ordination. Within a few weeks, I read all the assigned articles and searched for more. I saw the relevance of what I read to my last organisation, and I wished that I had had this knowledge whilst working there, for it would have helped me enormously in my work and the organisation in general. While the application of my new knowledge remained in my mind, I did not see any studies that talked about organisations in developing countries. Most of the discussion assumed homogeneity of

¹ Real names disguised.

organisational and environmental factors in every part of the world. At the end of the course I made a presentation on how organisational memory could be relevant to research organisations in developing countries.

At the completion of this course, I started to study knowledge management further, and consequently my frustration grew. Most of the literature specifically talked about the West and Japan, whereas I could see similarities in many of the case organisations from which KM methodologies and frameworks drew. I could for example, see a resemblance between the activities of the Buckman laboratories (Buckman, 1998; Willett 2002) and the activities of the MRC in The Gambia. I began to ask questions as to whether KM only relates to Western industrialised countries and why no one talks about developing countries. By the time the course finished, I had come to disagree with several of the assumptions on knowledge management enablers and the general views expressed in the literature. While the issues sounded familiar, the recommended solutions and approaches seemed not appropriate in developing countries. Coming from a place where the whole region, let alone our organisation, was cut off from the Internet for nine months, where buying a diskette required a day's journey and where technical expertise was very scarce, I could see that technology should be given equal focus with the other factors in organisational change issues, and especially in KM. There were also several differences in organisational issues, which I will discuss in later chapters.

I then proposed a project to investigate these issues, since my personal experiences and feelings did not constitute scientific knowledge. I conducted a case study of six research organisations in Nigeria and The Gambia. The preliminary analysis of the data resulted in a Master's thesis and the results were also presented at a conference (Paper II). However, already during the data collection, I realised that the issue went far beyond the way I had first perceived it. I could not study KM from a purely technological point of view without considering other enablers. The interviewees voluntarily offered information that went beyond technology, and I decided to investigate further. I made an extra effort to understand the messages embedded in the data and make sense of it in view of the object of study, knowledge management.

Further analysis of the data clearly revealed that the assumptions about the components of earlier frameworks may not be totally applicable to organisations in different environments, and that the environmental factors are often completely neglected (Okunoye and Karsten 2002a; Okunoye 2003a). I also had the opportunity to revisit the whole KM issue in research organisations in another developing country, India (Okunoye et al. 2002; Okunoye 2003d).

This opportunity to reflect led me to work on the context-aware framework of knowledge management, reported in paper VI.

1.3 Significance of the study

They are called *Babalawo* by the Yoruba in Nigeria, *Griot (Jalibba)* by the Madinka in The Gambia and *Guru* by the Hindu in India. In addition to their religious function, what they all have in common is knowledge, as believed by their people. They are treated with honour and respect, obeyed and believed, even by the elite. They are celebrated, and on most issues not questioned. They have equivalents in every part of the world, but in many Western countries the custom has become antiquated.

For example, the Hausa tribe in Northern Nigeria believes that leadership is a gift from God and that leaders are not expected to be questioned about their views. There and in many other parts of Nigeria, it is not uncommon that the majority of the people that work in an organisation are all relatives, socially or by blood ties. Loyalty, trust, and allegiance at work are strongly affected by these relationships. Moreover, losing a job has implications for several members of the family. This is the way that the society is built, even though it has been greatly influenced by colonialism and more recently by globalisation.

The best ethnographer could perhaps spend a long time without really understanding some of the important issues embedded in the social structure. These issues may appear illogical to an outsider, and therefore their study could be neglected. They can only be understood by the people with a shared mental model. For example, a policy that would negatively affect the business of an influential person would never be promulgated, and there is no continuity in governance. Many political appointments are based on the past record of parents and the family name. Objectivity only applies for positions that are considered less important or too sensitive to tamper with, and this too still requires the agreement of some “powerful” members of society. The people have come to understand it in that way and accept it religiously.

While the above description of the Hausa social structure resembles that of other social systems, its purpose here is to point to essential differences in the concept of knowledge, in the culture and the social-political and economic environments of developing countries when compared to Western industrialised countries. Local factors (e.g. governmental, economic, political, social, cultural, educational and infrastructural) differ widely between developing countries, and even within some larger countries.

Over the last ten years, these issues have attracted the interest of international researchers and practitioners in relation to ICTs, as is evidenced by the conferences of the IFIP WG 9.4 (Bhatnagar and Bjorn-Andersen 1990; Bhatnagar and Odedra 1992; Roche and Blaine 1996; Odedra-Straub 1996; Avgerou and Walsham 2000). The Working Group 9.4 of IFIP studies the social and cultural implications of information technology and systems in developing countries. There are also several publications highlighting these differences (Odedra et al 1993; Moyo 1996; Korpela 1994; Bada 2000), and the impact of global diversity in relation to information technology is becoming more recognised (Walsham 2001; Avgerou 2002, Information Society 2002).

With the rise of the knowledge economy (OECD 1996), the idea of globalisation (Robertson and Lechner 1985; Robertson 1992) and the worldwide recognition of the importance of knowledge for national development (The World Bank 1999), the creation, integration and distribution of knowledge using ICTs has become a major area of interest for organisations. Also organisations in developing nations have begun to consider KM. However, the only available frameworks and examples were based on organisations in Western industrialised countries (Holsapple and Joshi 1999; Lai and Chu 2000, Rubestein-Montano et al 2001; Hedlund and Nonaka 1993). These frameworks are not generally acceptable, and therefore a universal generalised framework has been called for (Holsapple and Joshi 1999; Earl 2001). The problems associated with applying KM frameworks in developing countries resemble the problems of IT transfer to developing countries. According to Straub et al.:

The transfer of information technology (frameworks) from industrialised to developing countries generally involves a process of injecting the technology (framework) of the industrialised world and its associated methodologies into a developing nation host. The technology (framework), designed and produced in developed countries, is likely to be culturally-biased in favour of industrialised socio-cultural systems; technology (framework) transferred to developing countries meets cultural resistance. (Straub et al., 2001, p.8)

In the case of KM, the crucial issue might not relate only to cultural resistance, but also include other factors in the framework, such as infrastructure and education, which also vary in local settings. When this happens, the implementation of a framework may be initially very difficult, if indeed ever usable (Morales-Gomez and Melesse 1998; Moyo 1996; Odedra et al. 1993). The adoption and usage of such a technology framework will vary according both to local socio-cultural and organisational contexts, and to the national

context, including government, economic and political systems, educational systems and history, culture and infrastructure (Schneider and Barsoux 1997).

Avgerou (2001, 2002) provides a detailed discussion on the significance of context in information systems and organisational change. Several studies have been reported on IT in the context of developing countries (Avgerou and Walsham 2000). Avgerou (2001) argues that the significance of considering the context of IS innovation (a KM framework in our case) in developing countries cannot be over-emphasised. The innovation involves the transfer of technologies and organisational practices which were originally designed and proved useful in quite different socio-organisational contexts. She therefore cautions that their adoption and feasibility of use in a different local socio-organisational condition cannot be taken for granted.

Similarly, Walsham (2001) discusses the issue of context in information technology in general. Using various examples from developing countries, he shows how the world is highly diverse in terms of human characteristics such as gender, race, religion and culture, and that this diversity is something to be celebrated and to learn from. Guchran Das (1993) has earlier advised that globalisation does not mean imposing homogenous solutions in a pluralistic world. It means giving a global vision and strategy, but it also means cultivating roots and individual identities. It means nourishing local insights, but it also means re-employing communicable ideas in new geographies around the world. There are several other people working on related issues of the context and information technology. Straub and his colleagues, for example, have been looking at issues of national culture and IT in several countries. They have conducted studies on Japan and some European countries, and more recently on Arab countries (Straub et al. 2001; Straub et al. 2002; Hill et al. 1998).

The concept of de-scription proposed by Akrich (2000) appears very useful in justifying the significance of this thesis. Akrich argues that when technologists define the characteristics of their object, they necessarily make hypotheses about the entities that make up the world into which the object is to be inserted. They also assume that the designers define actors with specific tastes, competences, motives, aspirations, political prejudices and the rest. They assume that morality, technology, society and the economy will evolve in particular ways. In a nutshell, they inscribe their vision, or prediction about the world, into the technical content of the new object.

Thus, if we are interested in technical objects and not in chimeras, we cannot be methodologically satisfied with the designer's or user's point of view alone. Instead, we have to continually go back and forth between the designer and the

user, between the designer's projected user and the real user, between the real world inscribed in the object and the world described by its displacement. Description then becomes the inventory and analysis of the mechanisms that allows the relation between a form and a meaning constituted by and constitutive of the technical object to come into being.

Akrich uses the case of a photoelectric lighting kit designed in France for use in developing countries for further detailed illustration. In a situation where the context of inscription is very similar to the context of implementation and usage, the displacement is negligible and often unnoticeable. This has been the case of KM frameworks, which are designed from the experience and the interpretation of cases from Western industrialised countries, implemented and used also by organisations there. However, in developing countries, the context can be different, and thus the implementation and usage of such framework will also be different.

Karsten (2000, p 21) also suggests that “the functions of these (technical) systems² are not predetermined, but only evolve within specific, socio-political contexts”. Focusing on specific contexts will help to move away from unfruitful general claims and all-encompassing pictures, enabling us to see a technical change as embedded in a larger system of activity, as having consequences which depend on peoples' actual behaviour, and as taking place in a social world in which the history of related changes may influence the new change.

We can take the KM frameworks presented by various authors and consider them as IS innovations (Avgerou 2001), technologies (Walsham 2001), or technical objects (Akrich 2000). If we then also take into consideration the context in which they are designed, and their designers, we could then argue that certain basic assumptions (e.g. cultural and infrastructural) about KM activities and impact will have been inscribed in them. Significant displacement could therefore follow an attempt to describe the KM framework by a user in another context without first considering the local contextual issues, and the use of such frameworks may not be effective. The present work is aimed at producing a framework where the projected user will be the actual user, and where the gap between the world inscribed in it, and the world that will be described by its displacement, will be narrowed, if not totally eliminated. KM is particularly complex, due to its multidisciplinary nature, and it has the potential to go badly wrong when context and assumptions are essential.

² Framework in the context of this thesis.

2 Knowledge management in organisations

In this section, I present the basic concepts of knowledge and culture, in order to establish the meaning I henceforth attach to them. Each of these concepts is controversial and there are diverse opinions as to their meaning. I will also discuss the basics of knowledge management and its relationship with productivity and organisational performance.

2.1 Knowledge

2.1.1 Concepts of Knowledge

The complexity of understanding the meaning of knowledge can be traced back to the early philosophers. The nature of knowledge varies from philosophy to sociology and economics, and recent information science. Each of these disciplines has distinct theories about knowledge. It is not my intention to join the debate regarding the possible distinctions between data, information, and knowledge, or to enter into the philosophical arguments about theories and natures of knowledge. I will however, attempt to present my understanding of knowledge in order to enable the reader to comprehend my use of the term in this study and to convey my intention in the applied sense. I will mainly draw on economics and the sociology of knowledge, as these are more relevant to the focus of my thesis.

In information systems, there are two main views of the relationship between data, information and knowledge. There is the dominant conventional view (Alavi and Leidner 2001) that data is simple facts that become information, and information is the combination of data into meaningful structures. When these meaningful structures are put into context, it then becomes knowledge. This view assumes that data precedes information and information precedes knowledge in a linear order. The iconoclastic view, as presented by Tuomi (1999a), is directly opposite to this conventional view. Its main assertion is that data emerges last, only after there is knowledge and information. Tuomi argues that there are no isolated pieces of simple facts, unless someone has created them, using his or her knowledge. Data can emerge if a meaningful structure or semantics is first fixed and then used to represent information.

Aside from the argument about the hierarchy of these concepts, these different views do not question the fundamentality of each concept, and they assume a linearity of transition. An alternative to these linear views is to see the

relationship between these three concepts as cyclical, hence relative to each other and context-dependent. For example, what does it mean to say the temperature is 75 degrees Fahrenheit to someone without any pre-knowledge of the Fahrenheit scale of temperature? 75 degrees Fahrenheit is undoubtedly data, and adding “temperature” qualifies it in this sentence, but still does not convey any meaning without a knowledge of Fahrenheit.

Apart from Tuomi (1999a), most analyses do not consider the direct conversion of data into knowledge and vice versa. Again, I argue here that each of these concepts could recreate itself, i.e. we can generate data directly from data, information can be extracted from information, and similarly, knowledge could produce knowledge (Figure 1).

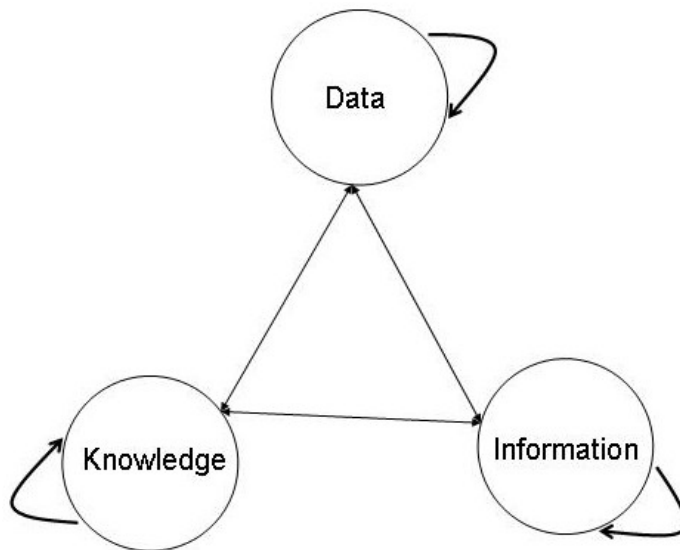


Figure 1: Cyclical representation of data, information and knowledge

Knowledge is not an easy or direct concept to define, and there have been several attempts to define it across various disciplines. Bell (1974) defines knowledge as a set of organised statements of facts or ideas, presenting a reasoned judgement or an experimental result, which is transmitted to others through some communication medium in some systematic form. Knowledge consists of new judgements (research and scholarship) or new presentations of older judgements (textbook and teaching). He compares the scope of his definition with Max Scheler, who distinguishes three classes of knowledge: knowledge for the sake of action or control, knowledge for the sake of non-material culture, and knowledge for the sake of salvation. He uses Machlup’s argument that an objective interpretation, according to what is known, will be

less satisfactory than a subjective interpretation, according to the meaning which the knower attaches to the known (i.e. who knows, why and what for).

In his conclusion, Bell takes a utilitarian view which ignores the sociology of knowledge. He proposes a restricted definition in which knowledge is that which is objectively known, an intellectual property, attached to a name or a group of names, certified by copyright or some other form of social recognition. He asserts that this knowledge is paid for in time spent in writing and research, or in monetary compensation by the communication and educational media. It is subject to a judgement by the market, by administrative or political decisions of superiors, or by peers as to the worth of the result, and as to its claim on social resources, where such claims are made. Knowledge is considered as part of the social overhead, an investment in society: a coherent statement, presented in a book, article, or even a computer program, written down or recorded at some point for transmission, and subject to some rough count.

In contemporary organisational studies, management, strategy, and information science literature, knowledge is broadly viewed from its various dimensions and its competitive capacities and how it could be managed. There is less focus on the theories of knowledge. Nonaka and Takeuchi (1995) define knowledge as a true justified belief. Tuomi (1999a) questions this definition, claiming that we know the world in the same way as its facts, through socially constructed and historically developed distinctions. The criterion for truth and knowledge is pragmatic and defined only within a specific community of thought. Leonard and Sensipar (1998) define knowledge as information that is relevant, actionable and based partially on experience. O'Dell and Grayson (1998) define knowledge as what people in organisations know about their products, customers, processes, mistakes, and success. Davenport and Prusak (1998) define knowledge as a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information.

These definitions reveal the position of modern organisations regarding knowledge and show how knowledge is being conceptualised in information systems and organisational and management disciplines. According to Tsoukas (1996), it shows how knowledge is now understood in a much broader sense than the propositional knowledge implied by the traditional perspective. Practitioners do not simply use, in an instrumental fashion, already existing knowledge; they also draw upon their own factual knowledge, and further, on collective knowledge.

Alavi and Leidner (2001) summarise these modern views under five different perspectives: state of mind, object, process, access to information, and capability. The state of mind perspective considers knowledge as a state of knowing and understanding. The object perspective defines knowledge as an object which can be explicated, stored and manipulated (Carlsson et al. 1996; McQueen 1998). The process perspective views knowledge as a process of applying expertise, whilst the access to information perspective focuses on the condition of access to information (McQueen 1998). The capability perspective views knowledge as a potential to influence action. Each of these different views has implications for knowledge management.

Blackler (1995) also provides a summarised definition of knowledge. He defines knowledge as multifaceted and complex, being both situated and abstract, implicit and explicit, distributed and individual, physical and mental, developing and static, verbal and encoded. This definition encompasses both the economist and sociologist views. The economist view is that knowledge flows freely, and the challenge is to impede knowledge flows while the sociologist views knowledge as inert and the challenge is therefore to facilitate knowledge flow (Knott 2001).

Bell (1974) acknowledges the narrowness of his own definition and his neglect of the sociology of knowledge, the social settings of ideas, their interconnection and their relation to some structural foundation. Nevertheless, his view of knowledge is fundamental to the development of the knowledge-intensive industries. The sociology of knowledge is the basis of knowledge processes and management, thus both views seem to be essential for understanding the concept of knowledge and its subsequent management. With the realities of a knowledge economy and society, there is renewed interest in the definition and conceptualisation of knowledge, especially when we begin to extend it to organisations.

In this respect, there have been claims that concepts of knowing holistically and complementarily define and provide a unified view of knowledge. Drawing on the work of Ryle (1949) and Polanyi (1966), in order to better understand organisational knowledge, Blackler (1995), Tsoukas (1996), Cook and Brown (1999), and Orlikowski (2002) extensively discuss knowing (action, doing, practice) and knowledge (things, elements facts, processes, dispositions), their interrelationship and differences. Even though each author has slightly different views, what is important is their acknowledgement of the essence of knowledge and knowing and its implication on broader exposition of organisational knowledge.

In summary, the discussions centre on “how individual and groups draw on tacit and explicit knowledge simultaneously; how can what individuals know tacitly be made useful to groups; and how can explicit instructions be made more useful aids for development of tacit skills” (Cook and Brown 1999, p 383). This is exactly what all knowledge management issues are about, either directly or indirectly. To further help our understanding of the concept of knowledge, I will now discuss various dimensions and types of knowledge.

2.1.2 Dimensions of knowledge

Since knowledge itself is too abstract to define, there have been attempts to use dimensions and types of knowledge to elaborate its meaning. Machlup (1962) uses the subjective meaning of the known to the knower to distinguish five types of knowledge.

- Practical knowledge, which is useful in a man’s work, his decisions, and actions. This knowledge covers professional knowledge, business knowledge, workman’s knowledge, political knowledge, household knowledge and all other practical knowledge.
- Intellectual knowledge, which satisfies a man’s intellectual curiosity. This knowledge is considered as part of liberal education, humanistic and scientific learning, general culture. It is a kind of knowledge that is acquired as a rule in active concentration with an appreciation of the existence of open problems and cultural values.
- Small-talk and pastime knowledge is opposite to intellectual knowledge. It satisfies non-intellectual curiosity and the desire of humans for light entertainment and emotional stimulation, including local gossip, news of crimes and accidents, light novels, stories, jokes, games and so forth. This knowledge is acquired, as a rule, in passive relaxation from serious pursuits and it is apt to dull human sensitiveness.
- Spiritual knowledge is related to human’s religious knowledge of God and of the ways to the salvation of the soul;
- And lastly there is unwanted knowledge which is the knowledge outside one’s interests, usually accidental, and often acquired and retained aimlessly.

There has also been a distinction between types of knowledge based on differences between practical, experience-based and theoretical knowledge derived from reflection and abstraction from that experience (Nahapiet and Ghoshal 1998). These could simply be viewed as procedural knowledge and declarative knowledge, based on the earlier work of Ryle (1949). Procedural

knowledge or know-how concerns well-practiced skills and routines while declarative knowledge or know-what concerns the development of facts and propositions. These have been extended to include know-why (Hamel 1991; Kogut and Zander 1992).

In contemporary organisational studies, Blackler (1995) presents a summary of the five images of knowledge: embrained knowledge, embodied knowledge, encultured knowledge, embedded knowledge, and encoded knowledge.

- Embrained knowledge depends on conceptual skills and cognitive abilities, abstract knowledge and this knowledge encourages explicit recognition and reworking of taken-for-granted objectives.
- Embodied knowledge is action-oriented and it is likely to be partly explicit. It depends on a person's physical presence, on sentient and sensory information, physical cues and face-to-face discussions. This type of knowledge is acquired by doing and is rooted in specific contexts.
- Encultured knowledge refers to the process of achieving shared understandings since cultural meaning systems – socialisation and acculturation – depend heavily on language, and hence are socially constructed and open for negotiation. This requires explicit formulation of ideas and metaphors, discussions and stories.
- Embedded knowledge is knowledge that resides in systemic routines. It explores the significance of relationships and material resources. This knowledge can be analysed systematically in systems terms, in the relationship between, for example, technologies, roles, formal procedures, and emergent routines. It is also the knowledge concerned how elements of organisation interact.
- Encoded knowledge is the information conveyed by signals and symbols. Traditional forms include books, manuals and code of practice. New forms include encoded and electronically transmitted information

In strategic management, Spender (1998b) suggests a pluralistic view of the various different types of knowledge used by organisations. He categorises four types of organisational knowledge: conscious knowledge, which is the explicit knowledge held by the individual; objectified knowledge, which is the explicit knowledge held by organisation; automatic knowledge, which is pre-conscious individual knowledge; and collective knowledge, which is the context-dependent knowledge manifested in the practice of an organisation.

Recently, in information systems, Alavi and Leidner (2001) have listed ten different types of knowledge. Tacit knowledge is the knowledge rooted in

actions, experience, and involvement in a specific context. It could be cognitive through the mental models or technical by know-how applicable to specific work. Explicit knowledge is articulated, generalised knowledge. Individual knowledge is created by and inherent in the individual. Social knowledge is created by and inherent in the collective actions of a group. Declarative knowledge is the know-about, and procedural is the know-how. Causal is know-why. Conditional is know-when, relational is the know-with, and lastly pragmatic is the useful knowledge for an organisation.

In another and more popular dimension, Polanyi (1966) classified human knowledge into two categories. Explicit or codified knowledge refers to knowledge that is transmittable in a formal, systematic language. Tacit knowledge, on the other hand, has a personal quality, which makes it hard to formalise and communicate. Tacit knowledge is deeply rooted in action, commitment, and involvement in a specific context. Although this classification was made in a philosophical context, the distinction of knowledge into tacit and explicit dimension was popularised by Ikujiro Nonaka (Nonaka 1994; Nonaka and Takeuchi 1995) in explaining the theory of organisational knowledge creation. They argue that knowledge is created through conversion between tacit and explicit knowledge through the process of socialisation, externalisation, internalisation and combination. This view appears to be dominant in modern management and information systems literature, providing a better understanding of organisational knowledge through its multifaceted nature. It has however also attracted some criticism. While Cook and Brown (1999) agree that explicit and tacit are distinct forms of knowledge, they contend that one form cannot be made out of or changed into the other, and challenge the whole process of Nonaka's mode of knowledge creation. Likewise, Tsoukas (1996, 2002) claims that Nonaka's idea of focusing on a set of tacitly known particulars and its possible conversion into explicit knowledge is unsustainable, since it ignores the essential ineffability of tacit knowledge.

In his attempt to develop a theory of organisational knowing and learning and show how these theories can be applied in organisational practice, Tuomi (1999b) also presented another dimension of knowledge. He distinguishes between two different types of developmental knowledge: firstly, ontogenic knowledge, which has its source in the development of the knowing entity and something that the knowing entity learns based on its experience; and secondly, phylogenetic knowledge, which has its source in inherited structures. Its generation cannot be attributed to a specific individual entity; it is transgenerational or collective. He uses culture as a special case of phylogenetic knowledge, where the unit of culture inherits meaning structures through

language and social practice. Individuals do not invent culture, but their development in society encultures them.

2.1.3 Synthesis

Since it is not realistic to discuss all the types of knowledge that have been written about, I have concentrated on some influential ones that are significant to this study. More detailed, comprehensive discussion about knowledge, knowing and types of knowledge can be found in Cook and Brown (1999), Tsoukas (1996, 2002), Schultze (1999) and Walsham (2001 pp. 36-42). The purpose of the review was to express how this study understands and views the concept of knowledge at an individual and organisational level, without which any attempt to build a framework to manage the activities involved in knowledge creation, sharing, storing and application is bound to fail. Most of the authors referenced here also refer to the works of Plato, Aristotle, and Descartes, and the contemporary discourse on knowledge constantly draws on the works of Hayek (1945), Ryle (1949), Polanyi (1966), Machlup (1962), and Giddens (1984). Apart from a few expressions of different meanings, interpretations and opinions, there are no substantial differences in the authors' conceptualisation of knowledge and its types. Each discipline merely tends to adopt the convenient definition and put more emphasis on the types of knowledge that best suit their purpose. The above review shows that most of the discussions revolve around tacit and explicit knowledge, using different labels, and that there is a definite need to pay attention to the issues of knowledge and knowing.

My aim is to design a framework that could assist organisations in their efforts to manage knowledge, and I adopt the view of Cook and Brown (1999) and Spender (1998b). Knowledge can thus be tacit, explicit, individual, and collective, and there is also a distinction between knowledge and knowing. I also support the view that once knowledge is explicit, it becomes information. The process through which this explicit knowledge becomes tacit knowledge is in the human mind, the learning process and cognitive detail of which is beyond the scope of this thesis. However, I agree with the processes of knowledge conversion presented by Nonaka and Takeuchi (1995) with particular attention to the strengths in Cook and Brown's (1999) observation. With the complexity of defining knowledge, it is also difficult to define its associated terms and the reason for ambiguity in knowledge management becomes apparent.

2.2 Knowledge work and knowledge worker

Closely related to knowledge and the dimensions of knowledge is knowledge work, which also seems to lack a precise definition (Collins 1998). Here the concept of knowledge work is discussed in the light of knowledge workers and the knowledge society, as they seem to be inseparable. Unlike knowledge, which has a long philosophical tradition, the idea of categorisation of some kind of work as knowledge work only originates in the early 1900s. Bell (1974) in his dimensions of post-industrial society argues that society can be divided into three parts: the social structure, the polity, and the culture. Post-industrial society deals primarily with changes in the social structure, the way in which the economy is being transformed and the occupational system reworked, and with the new relations between theory and empiricism, particularly science and technology.

He highlights three ways in which social changes pose questions to the society. First, the social structure is a structure of roles, designed to co-ordinate the actions of individuals to achieve specific ends; e.g. the bureaucratisation of science, and the increasing specialisation of intellectual work into minute parts. Second, changes in social structure pose management problems for political systems, since post-industrial society increases the importance of the technical components of knowledge and thus forces scientists, engineers and technocrats to either compete or co-operate with politicians. Last, new modes of life, which depend strongly on the primacy of cognitive and theoretical knowledge, inevitably challenge the tendencies of culture, which strives for the enhancement of the self and disregards institutions. Although written 30 years ago, these are no longer speculations, but the reality of our time, and the confirmation of a new era. There is more recognition of individual and organisational knowledge, and that businesses and government are becoming mutually dependent³.

Bell (1974) then presents the five dimensions of post-industrial society:

- Economic terms: the change from a goods-producing to a service economy.
- Occupational distribution: the pre-eminence of the professional and technical class.
- Axial principle: the centrality of theoretical knowledge as the source of innovation and of policy formulation for the society.

³ The recent World Earth Summit in Johannesburg brought together world business leaders on issues that are of primary concern to governments. In countries like Singapore, government is now playing a major role in business.

- Future orientation: the control of technology and technological assessment.
- Decision-making: the creation of a new intellectual technology.

He goes on further to describe some major characteristics of a post-industrial society, which include the creation of a service economy where a majority of the labour force is no longer engaged in agriculture or manufacturing, but in services, with, special focus on health, education, research and government. He also talks about the pre-eminence of the professional and technical class, with an emphasis not only on where people work, but also on the kind of work they do. This, he argues, will be an important determinant of class and stratification in society. Lastly, he talks about the primacy of theoretical knowledge, which could lead to codification of knowledge into abstract systems of symbols that, as in any axiomatic system, can be used to illuminate many different and varied areas of experience.

Bell's view of knowledge work is presented here due to the importance I attach to it in relation to my understanding of this knowledge economy. Although Bell expressed reservations and uncertainty in his predictions, they have turned out to be right. We are witnessing a knowledge economy with post-industrial characteristics. Interestingly, he has talked about codification of knowledge, which was one of the main reasons for the popularity of knowledge management. Bell was careful to separate the post-industrial society from a knowledgeable society, even though on the basis of his writings and the real evidences of the knowledge society (Mansell and Wehn 1998), I could conclude that they are very similar, if not the same. Instead, he uses the idea of Robert Lane (1966) to define knowledgeable society as one in which more than in other societies, its members

- (a) inquire into the basis of their beliefs about man, nature and society,
- (b) are guided (perhaps unconsciously) by objective standards of veridical truth, and at upper levels of education, follow scientific rules of evidence and inference in inquiry,
- (c) devote considerable resources to this inquiry and thus have a large store of knowledge,
- (d) collect, organise, and interpret their knowledge in a constant effort to extract meaning from it for the purposes at hand; and
- (e) employ this knowledge to illuminate and perhaps modify their values and goals as well as to advance them.

I have compared Lane's description with recent attempts to explain knowledge work, and found many similarities; indeed many are just additional ideas based

on what we are witnessing in today's knowledge economy. For example, Davenport et al. (1996) define knowledge work from the primary activities involved. They identify activities like acquisition, creation, packaging, or application of knowledge, characterised by variety and exception rather than routines. These activities are performed by professional or technical workers with a high level of skill and expertise. They include activities like research and product development, advertising, education and professional services like law, accounting and consulting as knowledge work processes.

According to Richard McDermott (1995), the common core of these professional and technical workers involves using specialised knowledge and expertise to analyse information, solve problems, generate ideas, teach, and create new products. They require formal education, the ability to acquire and apply theoretical and analytical knowledge, and the habit of continuous learning. Alvesson (1993), and Knights et al. (1993) associate knowledge work with activities performed by managers and professionals who occupy a privileged position because of the prestige and symbolic value attributed to the formal abstract knowledge they claim to possess.

Schultze (2000) characterises knowledge work as the production and reproduction of information and knowledge, manipulation of abstractions and symbols that both represent the world and are objects in the world. They are activities that defy routinisation and depend on the use of creativity in order to produce idiosyncratic, esoteric knowledge, and require a formal education – i.e., abstract, technical and theoretical knowledge. Knowledge work involves the creation of new understandings of nature, organisations or markets, and their application by a firm in valued technologies, products or processes (Boland and Tenkasi 1995). Iivari and Linger (1999) go deeper, to interpret the concept of knowledge work as a useful characterisation, rather than a categorisation, of work. They distinguish between data work and knowledge work, and characterise knowledge work as based on a body of knowledge which entails working on representations of the objects of work. It typically stipulates a deep understanding of the objects of work, the outputs of which entail knowledge as their essential ingredient.

UNESCO (1993) defines knowledge work as any creative systematic activity undertaken in order to increase the stock of knowledge of man, culture and society, and use of this knowledge to devise new applications. It includes basic research, applied research, and experimental development work leading to new devices, products or processes. With this definition of UNESCO, understanding the meaning of research could also help in further conveying the detailed description of knowledge work.

The concept of research itself is as old as science (Encyclopaedia Britannica 2001). It is part of the beginning of most systems of industrial production and the heart of the current knowledge era. Most of the innovations that result in new products and new processes have their roots in research, and have followed a path from laboratory idea, through pilot or prototype production and manufacturing start-up, to full-scale production and market introduction. Research is defined as the work of scientists and others who pursue their investigations with or without conscious goals other than to unravel the secrets of nature. This entails variety and exceptions and could be called knowledge work. This is one of the reasons why I chose to carry out my inquiry in research organisations.

Despres and Hiltop (1995) define knowledge work as a systemic activity that traffics in data, manipulates information and develops knowledge. This work may be theoretical and directed at no immediate practical purpose, or pragmatic and aimed at devising new applications, devices, products or processes. They then went further to claim that knowledge workers manipulate and orchestrate symbols and concepts. That they identify more strongly with their peers and professions than their organisations, have more rapid skill obsolescence and are more crucial to the long-term success of the organisation.

Again, in all these definitions, there could be an assumption of differences without careful analysis, whereas the core of knowledge work remains that of non-routine work that requires some kind of formal education, constant re-training and continuous learning. It requires a multidisciplinary expertise and mutual learning in order to achieve a complex synthesis in highly specialised state-of-the art technologies and knowledge domains. Knowledge workers are definitely a new kind of workers, who need to be managed in different ways; they possess new wealth beneficial to the organisation and the nations. Any unexpected loss of such workers, without means of institutionalising their knowledge, is liable to have an adverse effect on an organisation. Studying the current global economy, and all the explanations of knowledge work and knowledge workers, there is no doubt that today's organisations now thrive better on knowledge (OECD 1996), and the wealth of societies is closely linked to how well they can harness their available knowledge (The World Bank 1999).

2.3 Culture

2.3.1 Concept of Culture

The concept of culture is complicated, and its study is full of complexity which is due to the multidimensional nature of the construct itself. This is further compounded by possible different levels of analysis, such as functional, professional, organisational, industrial, regional and national⁴ (Schneider and Barsoux 1997). Although there are similarities about basic concept, each carries some salient meaning. In its simplest manifestation, culture could be exhibited in arts, such as literature, paintings or cinema, languages, clothing and even food. It can also be seen in symbols, heroes, rituals, values and practices.

There are several alternative definitions of culture, which refer to values, knowledge, attitudes, norms and habits which the members of a given society or a community share and which are common to its members. For example, in an applied way, Schein (1985) defines culture as a set of basic assumptions – shared solutions to universal problems of external adaptation (how to survive) and internal integration (how to stay together) – which have evolved over time and are handed down from one generation to the next. Schein (1985) integrates different definitions of culture and tools for discovering culture. Culture could be entrenched in behaviour, artefacts, values and beliefs, systems of meaning, and ways of knowing. As discussed earlier, this now establishes a connection between cultures and knowing, people orientation, beliefs and values that affect their view of knowledge and processes of knowing.

While behaviours and artefacts can be observed, meaning has to be derived from questioning and interaction, and knowing is not a simple process. Hofstede (1997) defined culture as the collective programming of the mind, which is derived from one's social environment and which distinguishes the members of one group or category of people from another. He presents six different levels of culture: national, regional (ethnic, religious or linguistic), gender, generation, social class and organisational, although this list is not exhaustive, and the levels can conflict.

Schnieder and Barsoux (1997) discuss these levels of culture, and present reasons for differences. Regional culture refers to differences within countries and similarities between countries which have evolved due to geography,

⁴ Hofstede (1997) cautioned about applying the concept of 'nation' to societies which are organically developed social organisations and can have a common culture.

history, political and economic forces, language and religion. Industry also varies culturally, advertising is culturally different to banking, and these differences are influenced by different task environments such as the nature of decision making, nature of products or services, rates of technology change, degree of state intervention and market characteristics, and sources of competitive advantage. Like industry, professions also have cultural peculiarities which they acquire through intensive training, supervision, and socialisation. Even with large organisations, functional organisation becomes apparent as finance, production, and marketing all have different cultures. These differences can be found in external environments and the nature of tasks that each function performs.

Organisation or corporate culture is the most frequently discussed and most popular type of culture, due to its influence on business and on the functioning of organisations. However, it does not mean that it is the most important one. Understanding the effect of interaction between all the different types of culture is essential, as organisational culture can represent the intersection of others (Schneider and Barsoux 1997).

Schein (1985) has defined organisational culture as a set of core values, behavioural norms, artefacts and behavioural patterns, which govern the way people in an organisation interact with each other and invest energy in their jobs and in the organisation at large. Organisational culture is related to the ownership of the enterprise, leadership and management practices, and contextual factors in the business environment.

Organisational culture is different from societal culture. According to Hofstede (1997, p.18), “organisational culture is a phenomenon per se, different in many respects from national culture; an organisation is a social system of a different nature than a nation“. People enter an organisation and leave at will, whereas people have little influence or choice of their societal culture. It is formed through a process over which they do not necessarily have much influence. Many of the cultural issues in KM are entrenched in what people have learned prior to joining an organisation. Depending on the approach of the organisation, people may also imbibe the organisational culture during the working period. However, where the conflict is enormous, they look elsewhere, where there is less conflict between the societal and organisational culture. In a similar manner, this culture was neglected in management and business practices and research for a long time (Schneider and Barsoux 1997). KM research and practice have also focused on the organisational culture, neglecting other more influential cultures.

I adopt a synthesis of these definitions. I define culture as a set of basic assumptions formed from a collective programming of mind, resulting from social interaction of people in groups and society. These assumptions evolve over time and are handed down from one generation to the next. This presents a complete view of culture both from an anthropological point of view and from a contemporary standpoint. Hofstede's definition enables an understanding of culture in its entire sphere. Schein's definition directly addresses key challenges facing managers: finding solutions to problems of external adaptation – developing strategies; and of internal integration – designing organisations and determining human resources practices, all of which are embedded in culture (Schneider and Barsoux 1997).

This definition also emphasises some of the main issues in KM: finding solutions to problems of external adaptation, which require leadership and strategy, and internal integration, which deals with organisational variables and the application of technology. All these have already been established as having a great influence on KM (Holsapple and Joshi 2000). This is again where culture has a great impact on KM, and where an assumption about people's behaviour in the formulation of a framework could pose some difficulties.

At the individual level, the effect of culture on individual attitudes about knowledge and activities that surround it in organisations could be likened to mental model development. Wiig (1997, p.12) claims that “if we do not actively provide them [people] with well founded mental models, people, young and old, tend to develop their own. The self-developed models will most often be inaccurate or wrong since they invariably are based on limited information and prior insights. Early models tend to remain subconscious for life even after attempts to replace them with more correct ones later”. The last sentence could have several implications for the way individuals view knowledge that is based on their prior insights and cultural orientation. Often, it is very difficult to change these formed views, which in turn impacts on knowledge management in organisations.

2.3.2 Cross cultural models: the Hofstede model

Hofstede's original model was based on a study conducted among IBM employees in the late 1960s. It included four dimensions of national culture: power distance, uncertainty avoidance, individualism-collectivism, and masculinity-femininity (Hofstede 1997). Based on a study by Hofstede and Bond (1988), carried out in Asian countries, a fifth dimension was later added: long-term versus short-term orientation.

Power distance indicates the extent to which the less powerful members of organisations and institutions, within a country, accept and expect that power will be distributed unequally. Individualism vs. collectivism refers to the degree individuals are integrated into groups. Individualism refers to societies in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family. Collectivism pertains to societies in which people, from birth, are integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty.

Masculinity vs. femininity is defined as the assertive pole for "masculinity" and the modest, caring pole "femininity". Uncertainty avoidance means the extent to which the members of a culture feel threatened by uncertain or unknown situations. This feeling is, among other things, expressed through nervous stress and in a need for predictability, e.g., a need for written and unwritten rules. Long-term vs. short-term orientation indicates values oriented towards the future, like thrift (saving) and persistence on the long-term side, and values oriented towards the past and present, like respect for tradition and fulfilling social obligations in the short-term.

This model has been criticised by McSweeney (2002). He argues that surveys are not the best way to study culture, and thus the underlining methodology that produces these dimensions was flawed. He also questions the idea of attributing national level actions/institutions to national culture. He then suggests the conceptualisation, interaction and effects of agency and structure in studying the characteristics of individuals, organisations, societies, nations and regions, as an alternative to extreme singular theories such as Hofstede's model of national culture. Walsham (2001) also argues that Hofstede's dimensions could not be used to explain some cultural differences that may not manifest themselves in the western centric organisational environment, where the data for the dimension was collected. He proposes the application of structural analysis which can explain detail elements such as links between structural contradiction and conflict, cultural heterogeneity, an analysis of detailed work pattern and the dynamic and emergent nature of culture (Walsham 2002).

Despite all these criticism, I still use Hofstede's dimensions, since it provides a construct to help our understanding of the cultural issues. It has been widely applied in information systems (Myers and Tan 2002), and the criticisms enable me to know the weaknesses and the strengths of the model and pay particular attention to those in my study. Significantly for this study, Hofstede (1997) noted that theories about organisations are culturally bound and that there can be no assurance that management concepts, theories and principles developed

within a given cultural context of one country or a region, which produce good effect, can be applied in another. Thus, theories, concepts, models and frameworks and may not be universally valid or applicable.

Several authors (Hickson and Pugh 1995; Morden 1999; Schneider and Barsoux 1997) have demonstrated how national culture influences management practices. For example, they relate individualism-collectivism to the management of relationship and the extent to which people prefer to take care of themselves and their immediate families, remaining independent of groups, organisations and other collectivities. Management in an individualist country can be viewed as management of individuals, whereas management in a collectivist country is management of groups. In individualist countries, incentives and bonuses can be linked to an individual's performance, whereas in collectivist countries, management decisions consider the groups that people belong to and their collective performance. Individualist countries emphasis the contractual agreements between an employer and an employee, while in collectivist countries, moral and family links could be a legitimate basis of relationship, even within organisations. Power distance was related to managing authority and unequal distribution of power in institutions and organisations. Power distance shows how society deals with the fact that people are unequal in social status, and how subordinates rate the gaps between themselves and their superiors. In high power-distance societies, subordinates look for directions from superiors, and usually accept those instructions without question. In low power-distance countries, subordinates are more likely to initiate discussions with their superiors and may even challenge what comes from above.

Uncertainty avoidance relates to the extent to which people are threatened by uncertainty or unstructured situations and how they manage the reality of risk. In organisations in high uncertainty-avoidance countries, there are many rules and regulations. In low uncertainty-avoidance country, there are fewer and more ambiguous rules. Masculinity-femininity is related to managing oneself. In masculine countries, like North America, organisations offer achievement-linked rewards, like bonuses, pay rises and promotions. In feminine countries, the quality of life matters, people and the environment should be taken into consideration, and to be of service is important. Lastly, long-term versus short-term orientation is related to managing time. Some cultures are more concerned with time past, others with time present or time future. Short-term oriented cultures are more oriented towards the past and present, and tend to be more static. Long-term oriented cultures are more oriented towards the future (displaying, especially, perseverance and thrift), and tend to be more dynamic. In short-term oriented countries, quick results are expected, whereas in long-term oriented countries, perseverance towards slow results is valued.

Apart from the influence that culture can have on KM, knowledge can also be conceptualised in terms of culture (Tuomi 1999b; Huysman 2000, Reeves-Ellington and Anderson 1997). Culture evolves over a period of time and it requires some common mental programming. Thus, organisations need to find ways to support social interaction at the workplace and to encourage community of practice, in order to nurture an organisational culture that could support several different dimensions of knowledge.

2.4 Knowledge management

If we have difficulties in defining knowledge and knowledge work, it is even more difficult to define KM. Actually my attempt here is not to define KM, but through explanations of various views, to present concepts and various approaches to it within organisations. KM is not a new concept, it is as old as work itself. Wiig (1997) and Prusak (2001) claim that the origin and evolution of KM can be traced as far back as 3000 BC, even though no one specifically called it by that name. Most of these KM efforts focused on individual knowledge and how to build and sustain employee competency. Not much attention was paid to how individual knowledge affected organisational knowledge and the implications of collective knowledge in organisations. This kind of thinking about knowledge is still common, and many organisations still consider traditional factors of production such as land, labour and capital as the main source of competitive advantage.

However, in today's modern organisations, knowledge is quickly becoming the main sustainable competitive advantage for the organisation. As such, it should be protected, cultivated and shared among the people who work together within and outside the organisation. In the past, an organisation could succeed on the basis of the individual knowledge of a handful of strategically positioned individuals. However, organisational knowledge, which is the collective knowledge of individuals and knowledge that has been embedded in the system, makes the value of knowledge stronger and broader. Thus, the full utilisation of an entity's knowledge base, coupled with the potential of individual skills, competencies, thoughts, innovations and ideas will enable a company to compete more effectively in the future (UTA 1998).

The recent interest in KM can be traced to the middle of the twentieth century, when during the information revolution, information technology became available and resulted in closer control of manufacturing, logistics, marketing and other organisational functions. This led to extensive information gathering and exchanges between enterprises, their suppliers, and customers. It also

brought about a range of different management practices and philosophies, such as planning programming budgeting systems, management by objectives, zero-based budgeting, strategic planning, benchmarking, total quality management, just-in-time, and business process re-engineering (Coukos-Semmel 2002; Wiig 1997). At this time, however, less attention was paid to knowledge as an organisational resource that needed to be managed.

Wiig (1997) in his historical account traced the current organisational interest in KM to 1977, when Chaparral Steel adopted a knowledge-focused management practice. It was not until the early 1990s that KM became popular, however, and organisations began to think about knowledge assets as economic goods in their own right (Boisot 1998). Several developments led to this recognition and popularity: most notably globalisation, advances in ICT, and a knowledge-centric view of the organisation (Prusak 2001). Organisations began to notice significant changes in the sources of competitiveness, and there was a proliferation of knowledge-based products and services. Knowledge became a principal raw material in organisations, and intellectual capital became the metric to measure the economic value of an organisation. Practitioners led the quest to explore and implement approaches to manage knowledge (Wiig 1997; Spender 1998a). Their efforts were supported by a set of early academic publications focusing on knowledge management (Sveiby and Lloyd 1987; Wiig 1993; Stewart 1991; Drucker 1988; Nonaka 1991). In recent times more interest has been expressed in special issues of journals and dedicated conferences on KM⁵ and numerous influential books (e.g. Nonaka and Takeuchi 1995; Davenport and Prusak 1998; Leonard-Barton 1995).

The complexity of what knowledge means in addition to the growing interest in the issue of knowledge management has led to different approaches to managing knowledge and thus multiple definitions. The various views have led to different schools of KM (Earl 2001) with different perceptions of knowledge management. Sveiby (1996) summarised these schools into two major tracks and two levels by looking at what KM-vendors (researchers and consultants) and KM users are doing. The first track, which he refers to as IT-Track KM, focuses on the management of information. Researchers and practitioners in this field have their education in computer or information science. They are involved in construction of information management systems, artificial

⁵ Special issues of journals such as *International Journal of Strategic Management* 30(3), June 1997; *Expert systems with Applications* 13(1), July 1997; *Knowledge Management*, 1(1), 1997; *Decision Support Systems* 31(1), 2001, *Journal of Strategic Information Systems* Vol. 9, 2000, *Journal of MIS*, 18(1), 2001; *Journal of International Development*, 14(1), 2002, and conferences such as the European Conference on Knowledge Management and the Knowledge Management and Organisation Learning Conference.

intelligence, re-engineering, groupware and the like. These are the groups that view knowledge as objects that can be identified and handled in information systems. Alternatively they equate knowledge with information access and their focus is on building and managing knowledge stocks (Alavi and Leidner 2001). This track is assisted by new developments in IT.

The second track is People-Track KM, which focuses on management of people. According to Sveiby (1996) the researchers and practitioners in this field tend to have their education in philosophy, psychology, sociology or management. They are primarily involved in assessing, changing and improving human individual skills or behaviour. They view knowledge as processes, as a complex set of dynamic skills and know-how that is constantly changing. They are traditionally involved in learning and in managing these competencies individually - like psychologists - or an organisational level - like philosophers, sociologists or organisational theorists. They focus on knowledge flows and on the processes of creation, sharing, and distribution of knowledge. This track also includes the capability view, where KM is centred on building core competencies, understanding the strategic advantage of know-how, and creating intellectual capital.

Sveiby (1996) identified these two levels as individual and organisational. He omits the group and inter-organisational levels identified by Nonaka and Takeuchi (1995). With the changing form of organisations, and the growing focus on groups and teams, knowledge management at group and team level is equally important. As organisations now operate in clusters and networks with a great deal of knowledge exchange and transfer, the dynamics of inter-organisational knowledge management is also of concern to organisations. Nevertheless, the main point is the identification of the process and the object views, and how these views direct the approach of organisations in their KM. These approaches are what Hansen et al. (1999) refer to as codification and personalisation strategy, and what Earl (2001) has subdivided into schools. All these are reflected in the different definitions of knowledge management. Knowledge management therefore needs to address organisational knowledge from several different directions. We need to manage knowledge resources and manage knowledge as it constrains and enables social activity. We also need to manage the actual articulated knowledge, products and organisational assets and manage the balance between organisational stability changes (Tuomi 1999b, p. 300).

According to Wiig (1997), KM aims to make the enterprise act as intelligently as possible to secure its viability and overall success, and otherwise to realise the best value of its knowledge assets. To reach these goals, advanced

organisations build, transform, organise, deploy and use knowledge assets effectively. KM aims to understand, focus on and manage systematic, explicit and deliberate knowledge building, renewal and application. This definition emphasises the deliberate consciousness and not accidentally performing activities that could be considered as KM.

Von Krogh (1998) refers to KM as the identification and leveraging of the collective knowledge in an organisation for competitiveness. Even though there is no explicit mention of individual knowledge, we cannot talk about organisational competitiveness without including all the actors involved. Therefore leveraging collective knowledge will require building individual competency. A more detailed exploration is given by Hibbard (1997) in his definition of KM as the process of capturing a company's collective expertise, wherever it resides – in databases, on paper, or on people's heads and distributing it to wherever it can help produce the largest payoff.

APQC (1996) defines knowledge management as the systematic strategies and processes of identifying, capturing, transferring, and leveraging information and knowledge from people and the organisation in order to create innovation, compete, and improve productivity. They also consider knowledge as a conscious strategy of getting the 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. APQC (1996) identifies seven processes: create, identify, collect, organise, share, adapt and use, which must be supported by a strong foundation of enablers. The enablers for KM are strategy and leadership, culture, measurement, and technology. Each of these must be designed and managed in alignment with the others and in support of the process.

I have extensively used these notions in this study. The assumptions about KM enablers, which can differ on the basis of various local factors, are a main focus of this study. Without proper attention to the enablers, the processes and the strategies cannot be properly and effectively executed, and the productivity that should be accomplished by KM will not be achieved.

The main aim of knowledge management is to effect changes in knowledge resources: the intellectual capital, the human capital, the social capital, and the structure capital (Holsapple and Joshi 2001; Stewart 1997). Organisations require all these capitals for productivity and innovation. Thus when we talk about knowledge management, we are primarily talking about supporting the knowledge processes with enablers, which include, to name, but a few, leadership, technology, strategy, and people.

2.5 Knowledge management and productivity

One of the main areas of knowledge management that is still not clearly understood is how to measure the return on investment in an organisation. This also extends to the valuation of knowledge itself (Yates Mercer and Bowden 2002; King and Ko 2001). As I discussed earlier, there is a clear focus in knowledge management on the creation and improvement of knowledge resources. Factors that lead to organisational productivity are, however, beyond knowledge resources alone, and wider than the scope of knowledge management. Although productivity has been linked to knowledge (Wrennall 1999) and its management in organisation, it is somewhat elusive to proof.

In the absence of a specific, adequate metric to measure the improvements in productivity that accompany knowledge management, organisations are using various kinds of proxy measurement. These proxies include measuring improvement in competitive advantage, marketing, customer focus, revenue and profit growth, costs reduction, employee development, investment and mergers (KPMG 2000). According to the Lotus Development Corporation, KM generates increased productivity by creating synergy and context between people, places and things. People include colleagues, customers, partners, suppliers and others. Places include virtual workspaces such as customised portals, team rooms, chat rooms and threaded discussion databases. Things are authored by people, managed by systems and stored for easy retrieval (Lotus 2001).

Lotus (1998) presents examples of how Buckman Laboratories improved competency, how Monsanto Life Sciences improved innovation, and how British Petroleum improved responsiveness. Taken together, these organisations' efforts towards KM enabled them to improve the flow of information and knowledge across operating units, improve competitive response, and faster identify new opportunities. They also helped to reduce operating costs and to operate more efficiently on a global scale while maintaining a local outlook. Furthermore, KM accelerated the rate of innovation and reduced cycle times, reduced the loss of intellectual assets due to employee turnover, and improved customer retention.

Improved productivity that accompanies knowledge management could also be explained by information technology, organisational performance, and the productivity paradox (Barua et al. 1995; Brynjolfsson 1993; Brynjolfsson and Hitt 1998; Mahmood and Mann 1993). In some of these attempts, productivity is said to have a causal relationship with IT investment, which Markus and Robey (1988) refer to as a technological imperative. However, some view

productivity gains as a result of a deliberate alignment between managerial and technological choices, which is an organisational imperative. Markus and Robey suggest an interactive approach, but they neglect the environmental factors. In a similar vein, knowledge management can be seen (Figure 2) as the combination of both technological and organisational imperatives, which then, leads to improved productivity and better performance.

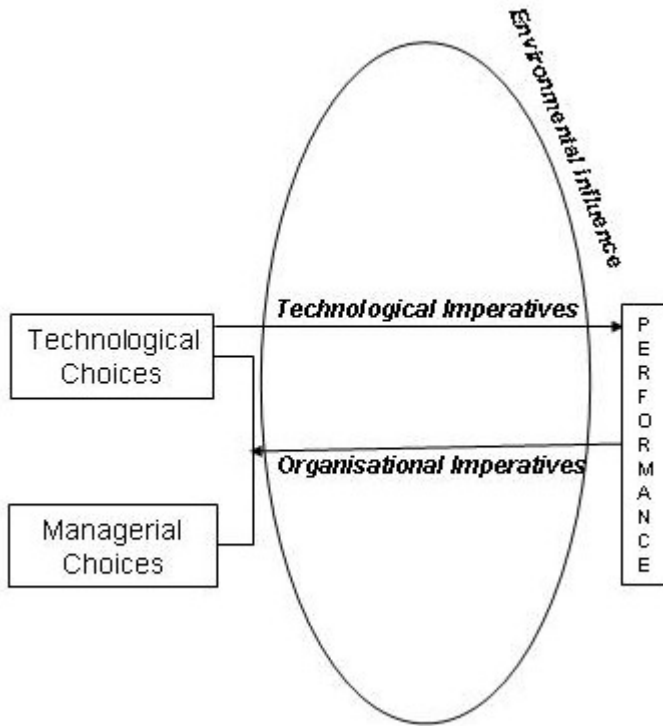


Figure 2. Technological, organisational and environmental imperatives: Drivers of productivity in knowledge management (adapted from Francalanci and Galal 1998)

The benefit and value of knowledge management and its effect on organisational productivity has indeed made the predictions (Wiig 1997) of the mid- to late 1990s come to pass within a decade. We have begun to witness the disappearance of KM as an explicit and isolated management initiative. It is now being assimilated into daily mainstream work, and it is seen as an integral element of organisational effectiveness (Wiig 1997; Prusak 2001). Specific knowledge roles are now less common in organisations, since their functions have become distributed and embedded in corporate practices. The earlier tendency to relate KM only to knowledge organisations no longer holds, as many organisations now compete on knowledge, irrespective of their industry and primary functions.

As discussed earlier, this even extends to the societal level, where nations have also begun to re-engineer themselves into knowledge societies (Mansell and Wehn 1998). The World Bank Development Report of 1998 was dedicated to knowledge and development, emphasising how KM could help organisations and on a broader level facilitate development. This makes the issue of KM even more crucial for organisations and societies in developing countries. In the efforts, much emphasis has been on connectivity and access to information, which in itself can not directly effect economic developments without guided applications at organisational level.

3 Knowledge, Globalisation and Information and Communication Technology

One of the main triggers of KM at the scale we are witnessing in organisations is provided by advances in information and communication technologies, which enhance codification of knowledge and facilitate interaction among people. Often, people erroneously attribute changes following the effective use of ICT as KM, due to the fact that ICT can assist in connecting people and making information more accessible by and available to a large number of people. ICT projects are often used as an example of KM. This again leads us back to the complexity of the concept of knowledge and its attributes. What ICT enables, is information processing. The transformation of information into knowledge, however, is dependent on the context. Specifically, the Internet, as an example of ICT, through the World Wide Web (WWW) and other applications, provides a quick means of publishing information that can be shared on a worldwide basis: "every user is also a publisher" (Richardson 1996). This universal repository of information means that information resources can be updated and widely shared at an attractive cost. Internet has been credited to be the first ICT to enable every individual with connectivity to become a narrowcaster and a broadcaster (Richardson 1996). E-mail also connects people and makes document sharing much easier than post mail and other alternatives. However, at any level of analysis, KM goes beyond the sharing of information. In this section, several connected issues are discussed about ICT, globalisation, knowledge, and how they could all affect organisational practices such as KM.

3.1 Globalisation and ICT

Globalisation is another concept that is difficult to define, as there is a great variety of opinion and prejudice, both among supporters and opponents (Walsham 2001). Globalisation has been referred to as the process by which the world is being made into a single place with systemic properties (Robertson and Lechner 1985). This "single place" has also been referred as the global arena (Robertson 1992). Walsham (2001) relates this global arena directly to time and space compression (Harvey 1989), while Giddens (1990) sees globalisation as associated with the disembedding of social relationships from their local context of interaction, which can be traced back to the emergence of modernity. In both "compression of time and space" and the "disembedding of social interaction", IT is said to be playing a significant role (Walsham 2001; Avgerou 2002).

Globalisation also raises some ethical concerns (Avgerou 2002), especially about non-economic implications and risks, the erosion of local culture (through the influence of global companies), and the possible widening of the gap between the poor and the rich. Economically, globalisation is supposed to enhance the convergence of income levels and consumption patterns between countries (industrialised, developing, emerging etc), and enable increasing interdependence between these countries (Dunning and Narula 1999). However, it has been argued that globalisation benefits only the Western industrialised countries, at the expense of developing ones.

Information and communication technology (ICT) has been defined as the hardware, software, telecommunication technology, human skills and intellectual content that enable the study, design, development, implementation, support, management or use of intellectual expressions. This includes data, knowledge, and language, in all digital, print, audio, and visual formats (Meyer 1997).

ICT is one of the primary influences on globalisation; and with little knowledge of the significance and consequences of ICT within in the whole processes of globalisation, it has been suggested that we consider the social processes through which ICT acquires significance. Furthermore, there is a need to consider how these social processes are applied for economic and social purposes, and how they affect our thinking about global, societal and organisational boundaries (Avgerou 2002; Robertson 1992).

ICTs are increasingly playing an important role in organisations and in society's ability to produce, access, adapt and apply information. They are being heralded as the tools for the post-industrial age, and the foundations for a knowledge economy, due to their ability to facilitate the transfer and acquisition of knowledge (Morale-Gomez and Melesse 1998). These views seem to be shared globally, irrespective of geographical location and difference in income level and wealth of the nation.

ICT may not be the only cause of changes we are witnessing in today's business environment, but the rapid developments in ICT have given impetus to the current wave of globalisation. The use and production of ICT plays an important role in the ability of nations to participate in global economic activities (Mansell and Wehn 1998; Morale-Gomez and Melesse 1998; Nherera 2000). Notably, the ICT of the Internet is playing a significant role in socio-economic development. The Internet could have an impact on economic productivity, health, education, poverty alleviation and empowerment, democracy and sustainable development (Madon 2000; Nath 2000).

In all these aspects, developing countries could benefit in many ways (Avgerou 1998). Apart from facilitating the acquisition and absorption of knowledge, ICT could offer developing countries unprecedented opportunities to change educational systems, improve policy formulation and execution, and widen the range of opportunities for business and for the poor. It could also support the process of learning, knowledge networking, knowledge codification, teleworking, employment, and science systems. ICT could be used to access global knowledge and communicate with other people.

However, over major parts of developing countries ICT is available only on a very limited scale, and this raises doubts about developing countries' ability to participate in the current ICT-induced global knowledge economy. There has also been concern that this unequal distribution of ICT may in fact further contribute to the marginalisation of poor countries in relation to developing countries, and to disruptions of the social fabric (Avgerou 1998; Braga and Alberto 1998; Heeks 1999). The main challenges facing developing countries on effective utilisation of ICT include the issues of awareness, advocacy and policy formulation, connectivity (i.e. affordable and equitable access to telecommunications infrastructure, ICT hardware, software and networking facilities), capacity and institution building (d'Orville 2000a).

The wide gap in the availability and use of ICT across the world, and the influences ICT exerts on globalisation, raise questions about whether globalisation entails homogeneity for organisations and societies in developing countries. It also raises questions about the feasibility and desirability of efforts to implement the development of ICT through the transfer of best practices from Western industrialised countries to developing countries, and whether organisations can utilise ICT in accordance with the socio-cultural requirements of the contexts (Walsham 2001; Avgerou 1998; Morales-Gomez and Melesse 1998). These questions are currently being addressed in the literature (Bada 2000; Walsham 2001; Avgerou 2002), and the concluding trend is that the local context does matter, and that the global techniques employed in western industrialised countries should not be implemented mechanically in developing countries without consideration for the local context (Bada 2000).

3.2 Knowledge, ICT and Development

There is a similarity between a society and an organisation. Both face the problem of how to use widely dispersed knowledge and, therefore, how to extend the span of utilisation of resources in a way that exceeds that of any one

mind. Efficiency within an organisation also has cumulative effects on national development. International development agencies have put significant resources into knowledge initiatives with special emphasis on ICT and learning (Johnstone 2002). In this regard, Hans d'Orville, Director of IT for the Development Programme at UNDP, identifies a dual role for ICTs in development (d'Orville 2000b). He argues that ICT could transform national economies if applied in production, delivery and management processes and services. Furthermore, ICT could be used as a tool for delivering various services and applications, including distance learning, telehealth, e-commerce, and e-governance.⁶

The World Development Report of 1998, dedicated to knowledge and development, brought a renewed interest in the issues of knowledge and development, and many development organisations are now actively engaged in the issue (Bellanet 2001). From a development perspective, the potential of ICT to achieve development goals, such as access and control over information, empowerment, employment creation and democracy, is often linked to knowledge and it remains as their main focus. Nath has linked knowledge to improved quality of life, which is the ultimate goal of development activities:

.....Knowledge is empowering. Lack of knowledge is debilitating. Knowledge empowers an individual to form his or her own opinion, to act and transform conditions to lead to a better quality of life. Approaching development from a knowledge perspective can vastly improve the quality of people's lives. Knowledge about nutritional values of food grains can mean better health, even with those with little to spend on food. And knowledge about benefits of micro-credit programme can make it possible for poor people to invest in a better future for themselves and their children. In a broad sense, access to right information at the right time gives people greater control over their destinies. (Nath 2000)

In explaining types of development knowledge, Stiglitz (1999) uses two dimensions: general vs. local knowledge, and explicit vs implicit knowledge. He categorises 'general knowledge' (or 'global knowledge') as the knowledge that holds across countries, cultures and times, and 'local knowledge' as the knowledge of specific place, people and time. Of relevance and importance to my focus are his remarks that it is the local components of knowledge that require adaptation. This requires the participation of those who know and understand the institutional environment, and predicates that local adaptation

⁶ For comprehensive discussion on development theories and ICT, see Mursu 2002, p.120, Madon 2000, p.2.

cannot be performed by passive recipients of development knowledge, it must be done by the doers of development in the course of activities. This is related to the concepts of de-scription and in-scription (Akrich 2000) discussed earlier. The capacity of a society to effectively position itself as a consumer and producer of local knowledge is important to its social and economic development, and the correlation between knowledge and development appears to be well established (Morales-Gomez and Melesse 1998). Socio-economic and political progress has been linked with the ability of countries to make informed decisions and knowledge-based choices (The World Bank 1999). This agrees with the concept of development, which is considered to present positive social and economic changes, as well as strategies and policies to achieve these changes. There is no well defined characterisation of 'development', but rather a general idea of the implications of development in a particular context (Mursu 2002).

For development purposes, knowledge is primarily viewed as a global public good that requires active public support. According to the World Bank report on knowledge for development (The World Bank 1999), the concept of knowledge that is required for successful development is different from that for new products or new processes. This explains the reason why development organisations usually take ICT and a learning approach to knowledge management and lay a heavy emphasis on society. Their approaches focus on the relationship between knowledge and social economic development, and their main strategy lies in the creation of an infrastructure to enable local level development and for local organisations to participate in a knowledge economy (Johnstone 2002). The provision of infrastructure alone, however, cannot deliver the support required by the organisations, and sometimes is not even sustainable beyond the active life of the project. Despite the investment of development agencies in several ICT initiatives, this approach has not directly assisted corporate and non-corporate indigenous organisations in developing countries, which fail to gain the benefits that could follow effective KM. The approach of development organisations could enable faster and wider access to information, but the organisations lack the understanding of how to convert this into knowledge for competitive advantage.

3.3 The Concept of Developing Countries

Before discussing KM in developing countries, the use of the term 'developing countries' in this treatise needs to be discussed, as it can have different meanings depending on the context and the focus of the discussion. Also, referring to a group of countries as 'developing' automatically implies that

some countries are ‘developed’ (often called ‘western industrialised countries’ in this treatise). It is important to explain this division of the world into blocks and how it affects our thinking about them. Sometimes, the western industrialised countries are referred to as the ‘North’, while the rest of the world is called the ‘South’. Also, there has been a division of the world into the ‘First’, ‘Second’ and ‘Third’ worlds. Korpela (1994) argues against all these divisions, and concludes that it is erroneous to simply divide the world using colour, culture, geographical locations or even economy, as most explanations to support these divisions are based more on convention than on any theoretical evidence.

There have been many analyses of these divisions, making use of many different concepts and theories to explain them. The modernisation theory attributes the reasons why some countries are developed and why some others are not to a “missing factor” which has created a gap between them (Korpela 1994). This theory uses quantitative variables such as capital investment and income to express the degree of development (Mursu 2002). However, many ancient civilisations possessed enormous wealth, and thus alternative measures have been suggested, such as lack of entrepreneurship (Roxborough 1979; Korpela 1994). In a critical response to modernisation theory, dependency theory was proposed, on the premise that capitalism actually produces a core and periphery, where the periphery is made to be dependent on the core. In summary, Korpela (1994) argues that while modernisation theory claims that the reason for underdevelopment is a delay in entering capitalism, dependency theory claims that underdevelopment was designed, with some countries predicated in a subordinated position. Multiplicity theory, again, views development from a qualitative perspective, in opposition to the quantitative dimensions of growth and profit which were the focus of the other theories. This theory presents an alternative approach to development which is based on the meeting of basic needs, self-reliance, and participatory democracy. The propositions in multiplicity theory have been criticised as utopian, however, and they are not seen as an adequate basis for an acceptable theory of development. Nonetheless, Mursu (2002) contends that it provides a basis for the desired goals, and an alternative to western values.

In this short review, the existence of the divisions is not questioned, and there is general consensus about inequality and the superiority on certain measures of some countries compared to others. The main contention among the theorists concerns the selection of criteria for grouping countries, and which countries belong to where. In our contemporary world, many countries, which incidentally are geographically located in Europe, North America and parts of Asia, are highly industrialised, and they have an edge in modern science and

technology. They also show similar patterns in level of wealth, with a stable governance structure. On the other hand, we have many countries, which are geographically located in Africa and most parts of Asia, that have not shown much improvement on most fronts of development, especially when considered on a global scale. They are characterised by war and famine, and corruption is seriously affecting the development and functioning of the public infrastructure.

The convention to refer to the former category as western industrialised countries and the later as developing countries is followed here. However, countries in each category still maintain differences and exhibit their own particular characteristics and culture. This view is similar to that of the World Bank (2002), where

low-income and middle-income economies are sometimes referred to as developing economies. The use of the term is convenient; it is not intended to imply that all economies in the group are experiencing similar development or that other economies have reached a preferred or final stage of development. Classification by income does not necessarily reflect development status.

Although this definition is thus based solely on a quantitative measure of income, it can be claimed that the provision of basic needs, self-reliance and even good governance are all functions of the income level of a country. While all countries and societies are unique, and maintain their sovereignty, continuing global integration and modernisation call for comparisons and the use of similar standards to measure development. When these are applied, the primitiveness or advances in any nation no longer account for much difference.

While this definition might be adequate for use here and for the development bureaucracies, it still lacks a fundamental explanation of the divisions. Nonetheless, where a group of countries shares very similar values and characteristics, I collectively refer to them using one grouping, while also recognizing the differences that exist among countries even when they are generically grouped together. Within this thesis, the emphasis is on differences in culture, infrastructure, government, educational, political, social and economic factors, both within any one country, between countries in the same region, and much more between countries in the same grouping. It is also important to note that in the new knowledge era, the prototypical thinking that relates poverty and backwardness to third world, developing countries or the South may no longer be applicable. If the classification is based on the extent of access to information and application of ICT, for example, many communities in the so-called first world fit the description of the third world.

3.4 KM in Developing Countries

From the previous sections on knowledge management, knowledge management and productivity, one can conclude that the majority of the past experience and developments in the area of KM have so far occurred in Western industrialised countries. This is not limited to KM, but seems to be a general feature throughout the information systems disciplines.

According to Avgerou,

... .. these confident views of ICT and organisational change are based on limited selection of organisations found in contemporary societies and hide many uncertainties. Research on information systems innovation has studied only a narrow range of organisations an even narrower range of aspects of change. By far the largest research effort has been dedicated to professionally managed business organisation in a free market context. (Avgerou 2002, p.1)

This is exactly the situation in KM, since the world comprises many different organisations outside the free market, with different levels of infrastructural capability. The outcome of the research is often narrowly focused on organisations within one region, and refers to application exclusive within that region. This partly explains the reason for a lack of synergy between the existing KM literature and the reality of developing countries.

However, some developing countries that have local contexts similar to Western industrialised countries have been able to apply these findings and to benefit from KM. For example, some organisations in South Africa and India⁷ do have KM initiatives. South Africa is also a developing information society and active in applying knowledge for development (KMSSA 2000). In most organisations in sub-Saharan Africa, however, KM is still an unknown concept. Nevertheless, international organisations and development agencies are engaged in several projects across the developing countries which they label

⁷ This is, however, only in a restricted sense. Infrastructure and management style of organisations in urban centres in South Africa are highly influenced by Western culture, with which they have historical links. As I have demonstrated elsewhere (Okunoye 2003b), there are often significant differences between organisations within the same country. Concerning India, most players in KM are in the software industry, which cannot be considered local companies in all respects; as in South Africa, they are influenced by their partners and customers located in Western countries. The information I have on these efforts is personal and I could not find further details in any widely accessible publications.

KM, but which often focus merely on connectivity and ICT applications. Thus KM is in developing countries still a relatively new idea. The situation in those societies makes the applicability of KM different from the Western countries, and requires further understanding.

4 Research problems

In the reviews presented in the foregoing section, the need for this study has been clearly established. There is agreement in the literature that knowledge is contextual and important at all levels: individual, group, organisation, inter-organisation and society. It does therefore need to be managed. There is also a consensus that knowledge management is no longer an issue for Western countries only, but important in all organisations. Studies have established connections between ICT, knowledge and development, and nearly all the literature concludes that it is important to consider local adaptation, while embracing globalisation. The influences of different cultures on organisational practices, and on the adoption and diffusion of technology, have been also confirmed. There is an understanding that management can differ in different parts of the world, and that cultural practices must not be underemphasised.

As noted in the literature reviewed in the last section, cultural differences, underdevelopment of ICT in developing countries, and the need for contextualisation of ICT innovation are all known to affect information systems and KM for development. The ICT-focused KM in developing countries is now attracting greater attention. However, there has not been adequate recognition of exactly how these issues affect KM in developing countries, and in which ways they can hinder organisations from participating in the knowledge economy. Without understanding the specific features of organisations in developing countries, the tendency is to make the same old mistakes all over again (in spite of all the recommendations). The assumption is still made that KM in organisations in developing countries could be viewed as it is in Western industrialised countries.

The overall question which this thesis attempts to answer is: What is knowledge management in the global context? What kind of support does KM in the global context require? What kind of framework could support KM, considering global diversity? The research studies were therefore designed to answer the following questions:

- What kind of efforts related to managing knowledge are currently (or have been recently) under way in the research organisations selected for the study? (Paper I, Paper III, Paper V)
- What kind of enablers, including information technology infrastructure, are available in them? (Paper II, Paper III)
- What kind of IT infrastructure would facilitate or inhibit these KM efforts?
- What kind of major changes could be expected as a result of more efficient KM, supported by more appropriate IT infrastructure?

After the first phase of the study and initial analysis (Okunoye 2001), I added the following questions:

- What are the contextual issues of KM in organisations in developing countries (Paper I, Paper III, Paper VI)?
- What kinds of enablers are essential for KM in organisations in developing countries? (Papers I -IV)
- How can we cater for the contextual local issues in the context of a global organisation and competition? (Paper V, Paper VI)

5 The Philosophical and Methodological Approaches

As stated in the last section, my interest is in investigating which kind of framework best describes and explains what I observed from the case studies. This kind of study can be categorised as theory creating or building (Järvinen 2001). Even though KM is not a new phenomenon, little is known about it in organisations in developing countries. Thus, initially the study is exploratory, and considers the past and then investigates the present circumstances. However, before there can be a meaningful or substantial advance of knowledge in any discipline, there must be a firm foundation laid in theory of knowledge, an epistemology, and how this applies to the particular discipline. Conclusions cannot be any sounder than the method of attaining them (Anderson 1989). In this section, I discuss my philosophical perspective and the methods used to carry out my investigations.

My primary aim is to theorise through frameworks, and my approach is intended to follow the stages of theory building research as discussed later. However, I do not pretend to follow the usual stages of theory building research that do not have any theoretical basis or a kind of grounded theory (Strauss and Corbin 1990). As pointed out by Stafford Beer (1980) in his preface to Maturana and Varela's book on Autopoiesis: "*we need a theoretical framework for any empirical investigation, this is the raison d'être of epistemology.....*" The only difference here is how I use the theories and concepts. They are used to justify the need for this study and the type of organisations that can be included. They also help in the analysis and subsequent interpretation of the data. Furthermore, these theories and concepts provide good support for the framework presented in this study, and could help in its future applications. My arguments are guided by insights drawn from systems thinking, with an emphasis on socio-technical systems theory, using the Leavitt Diamond (Leavitt 1965) and cross-cultural models.

5.1 The Philosophical Approach

According to Myers and Avison (2002), there are two dominant groups of research methods in information systems (IS) - quantitative and qualitative. Although quantitative methods were originally developed in the natural sciences to study natural phenomena, they have been applied in social sciences through survey methods, laboratory experiments, formal methods and numerical methods. Qualitative methods were developed in the social sciences to enable researchers to study social and cultural phenomena. These methods are useful in understanding people and the social and cultural contexts within

which they live. Qualitative methods include action research, case study research and ethnography. Each of these methods has different ontological, epistemological, axiological, rhetorical, and methodological characteristics (Creswell 1994, 1998).

As described earlier, this study is focused on social and cultural, rather than natural phenomena. The issue of knowledge management involves many uncontrolled variables that cannot be approached by using methods appropriate for studying closed systems. Hence I approach the study with qualitative methods. One of the main areas of interest of this study is to explore the role of context in a framework that could support the management of knowledge in organisations. Qualitative research is believed to be good in describing and illuminating the context and conditions under which research is conducted (Cook and Campbell 1979). To further justify using qualitative approach for this kind of study, Kaplan and Duchon explain that

Immersion in context is a hallmark of qualitative research methods and the interpretive perspective on the conduct of research. Interpretive researchers attempt to understand the way others construe, conceptualise, and understand events, concepts, and categories, in part because these are assumed to influence individuals' behaviour. The researchers examine the social reality and intersubjective meanings held by subjects by eliciting and observing what is significant and important to the subjects in situations where the behaviour occurs ordinarily. Consequently, qualitative methods are characterised by (1) the detailed observation of, and involvement of the researcher in the natural setting in which the study occurs, and (2) the attempt to avoid prior commitment to theoretical constructs or to hypotheses formulated before gathering any data. (Kaplan and Duchon 1988, pp. 572-573)

Qualitative research can be positivist, critical, or interpretive (Orlikowski and Baroudi 1991). Positivist studies are premised on the existence of a priori fixed relationships, within phenomena, that are typically investigated with structured instrumentation. Positivist research generally attempts to test theory, in an attempt to increase the predictive understanding of phenomena (Myers and Avison 2002; Orlikowski and Baroudi 1991). Orlikowski and Baroudi classified IS research as positivist if there was evidence of formal propositions, quantifiable measures of variables, hypothesis testing and the drawing of inferences about a phenomenon from a sample of stated population.

Critical research assumes that social reality is historically constituted and that it is produced and reproduced by people, and contends that the ability of people to

change their socio-economic situation is constrained by various social cultural and political factors. Critical research focuses on the oppositions, conflicts and contradictions in contemporary society, and seeks to be emancipatory; it aims to help to eliminate the causes of alienation and domination. Critical studies critiques the status quo through the exposure of what are believed to be deep-seated, structural contradictions within social systems (Orlikowski and Baroudi 1991; Myers and Avison 2002). Orlikowski and Baroudi classify IS research as critical if there is evidence of a critical stance towards taken-for-granted assumptions about organisations and information systems, and a dialectical analysis that attempts to reveal the historical, ideological and contradictory nature of existing social practices.

Interpretive methods of research adopt the position that knowledge of reality is a social construction by human actors. In this view, value-free data cannot be obtained, since the enquirers necessarily use their own preconceptions in guiding the process of enquiry. Furthermore, when the researcher interacts with the human subjects of the enquiry, the perceptions of both parties are changed (Walsham 1995). Interpretive studies reject the possibility of an 'objective' or 'factual' account of events and situations, seeking instead a relativistic, albeit shared, understanding of phenomena (Orlikowski and Baroudi 1991, p.5). They classify IS research as interpretive if there is evidence of a non-deterministic perspective: for example, where the intent of the research is to increase understanding of the phenomenon within its cultural and contextual situation, where the phenomenon of interest is examined in its natural setting and from the perspective of the participants, and where researchers do not impose their outsiders' a priori understanding of the situation.

It is also important to emphasise the remark made by Myers and Avison (2002) that 'qualitative' does not necessarily mean 'interpretive'. The determining factors lie in the underlying philosophical assumptions of the researcher. The choice of method of inquiry is independent of the underlying philosophical position adopted. Research methods can be positivist, interpretive or critical; that is, actual case studies and action research may implement positivist, interpretive or critical research.

Irrespective of the research approach, there are various perspectives with which IS researchers may approach their phenomena of interest. Orlikowski and Baroudi (1991) draw on Chua's (1986) classification of the assumptions constituting the philosophical stances that researchers adopt to carry out their investigation. They categorise these assumptions into beliefs about physical and social reality, beliefs about knowledge, and beliefs about the relationship between knowledge and the empirical world.

In this study, knowledge activities are seen to be socially enacted. Influences around these cannot be taken in an objective manner, as they can all be influenced by social, economic and environmental factors. The framework to support organisations in managing these processes cannot be static, since each of the components involved is dynamic and depends heavily on context. People are central to the functioning of such a framework, and cannot be described in an objective way. Thus the ontology of this study emphasises the importance of subjective meanings and of social, political and symbolic action in the processes through which humans construct and reconstruct their reality (Morgan 1983; Orlikowski and Baroudi 1991). In all the papers that form the major discussion of this work, my main argument is to assert the contextuality of issues involved in KM. What is more, we cannot view an organisation and its environment in totally objective ways. This study believes that organisations, groups, and social systems do not exist outside human reality, and hence cannot be totally measured in objective, universal ways, but only through their interrelationships. Although there are phenomena that can be measured, a complete understanding of them still requires subjective interpretation.

The aim of this study is to provide a framework that could be used by organisations in their KM efforts, irrespective of the inherent diversity posed by geographical, economic, political, social, cultural, educational and infrastructural factors and the type of industry. This is approached by an exploration of the state of KM, and issues that surround it in organisations in developing countries. This requires analysis of several known influences on KM, and assessment of knowledge processes and of how the social, cultural orientations of people are affecting these. It also requires a view of people and knowledge which is entrenched in their societal beliefs and collective understanding. From the initial idea that culminated in this thesis, as described earlier, it has been my interest to understand the KM issues from the perspective of those individuals that are directly involved in it, in research organisations in developing countries.

Many issues that surround KM embody social processes that cannot be fully captured in hypothetical deductions, covariances and degrees of freedom (Orlikowski and Baroudi 1991), but rather are understandable through interaction with the real world that surrounds these issues. This requires interpretation and explanation of different meanings, and how they all account for the actors' views on the phenomenon in discussion. Thus, the epistemology of this work is interpretive. The focus of this research is in building a context-aware framework which is synonymous with the theory building which Glaser and Strauss (1967) argue could be best approached with inductive qualitative research rather than through continual hypothesis testing. Interpretive is now a

well-accepted approach in IS (Walsham 1993, 1995), and specifically in KM (Schultze and Leidner 2002).

Knowledge is at the centre of this research, and the several enablers which support its management in organisations. The concept of knowledge is contextual and has different meanings to different individuals, organisations and even societies. Also, the provision and availability of the enablers are not at the same level. However, through social interaction, a group of individuals, organisations and societies develop a common understanding and develop shared mental models. Since they live with the KM enablers, they influence the enablers and the enablers in turn also influence them, in a circular manner. Understanding this phenomenon therefore requires studying it from their perspective. This agrees with the underlying premises of interpretive research. While the framework is expected to be used by any organisation, the main inputs emphasise context. There are several approaches to conduct interpretive research in IS. The most appropriate one for this study is the case study, which is the most common one used in qualitative research in IS (Alavi and Carlson 1992; Orlikowski and Baroudi 1991). It is also arguably the most appropriate strategy for conducting empirical research from an interpretive stance (Walsham 1993).

Before I discuss the case study methodology and data analysis procedure, it is important to point out that in spite of my research approach being interpretive, some of my arguments fit some of the principles of critical research; likewise I have used a structured instrument, which is common in positivistic research. This can be explained by the fact that the boundaries between these approaches are actually not sealed off from each other, and there is possibility of cross-approach influences (Deetz 1996; Schultze and Leidner 2002). There have also been calls for an integration of various approaches and methods (Lee 1991; Marble 2000; Kaplan and Duchon 1988; Mingers 2001; Gable 1994).

5.2 Case Study Methodology and Data Analysis

5.2.1 Introduction

I have used the case study approach, which has been noted as suitable for theory creation or where the theory is at an early formative stage, and for sticky, practice-based problems where the experiences of the actors are important and the context of action is critical (Eisenhardt 1989; Benbasat et al 1987; Järvinen 2001). This study uses a case study approach because it enables us to study the knowledge management issues in natural settings, and to learn about the state of

the enablers and knowledge processes and the knowledge resources of interest to the organisations. It also enables us to discover hitherto neglected enablers that are essential in the context of the organisations included in our study. Secondly, the case study approach allows us to explain why existing frameworks may not be effectively applied in the circumstances of organisations in developing countries. Thirdly, there is a scarcity of empirical research on the issue of knowledge management in developing countries, and case study has been proven to be appropriate in such research (Benbasat et al. 1987).

There are several definitions of case study, but Benbasat et al. (1987) present a comprehensive definition that draws from a variety of sources. They define case study as a research approach that examines a phenomenon in its natural settings, employing multiple methods of data collection to gather information from one or few entities (people, groups, or organisations) on a phenomenon that is not clearly evident at the outset. Case study is also good in research where no experimental control or manipulations of variables are involved. Compared to other approaches (laboratory and field experiments), researchers have less prior knowledge of what the variables of interest are and how they will be measured. This is confirmed in our study, as we did not originally plan to study most of the issues that eventually became of major interest, and our findings on environmental influences were not part of the original proposal.

In support of case study, Yin (1994), in his popular book on case study research, considered investigation of a contemporary phenomenon or event in its real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident. In a case study, the researcher does not, or cannot, control or manipulate the situation. Case study method does not necessarily require step-by-step data analysis, and this allows of various interpretations of research data. Admittedly, interpretation could introduce bias, and affect the outcome of the research. However, case study method allows use of multiple methods of data collection such as interviews, documentary reviews, archival records, direct and participant observations (Yin 1994). The triangulation (Denzin and Lincoln 1998) of these data sources can reduce the problem of bias. Another limitation of case study is in its generalisations of the findings, which can be addressed through the use of multiple case studies.

5.2.2 Multiple Case Study

Yin (1994) suggests that a single case study is appropriate in a situation previously inaccessible to scientific investigation, an extreme or unique case, or for theory testing purposes, while multiple case study provides general

explanations that are applicable to individual cases in spite of differences in each individual case. Multiple cases also support the development of abstraction across cases and make the result more generalisable and reduce any possible bias (Merriam 1988; Miles and Huberman 1994).

This study was initially exploratory, but our interest has also been to describe the state of knowledge management in organisations in developing countries and to develop a framework to support their initiatives to manage knowledge. These definitely require some degree of generalisability of the findings and multiple case study was thus seen from the beginning as appropriate. While the conduct of multiple case study can require extensive resources and time, the evidence from multiple cases is often considered more compelling, and overall study is therefore regarded as being more robust.

A successful case study also requires determination of the unit of analysis (Yin 1994) at the beginning of the research. Benbasat et al. (1987) found this lacking in many of the published works they analysed, and suggested it could be related to the lack of clear research objectives. In the choice of the unit of analysis, they suggested close examination of the research questions and the level of generalisations that the researcher aims at. The unit of analysis could be at individual, group, organisational or societal level (Korpela et al. 2001). For this study, we focus our interest on organisations, and explore issues that relate to knowledge management at the organisational level.

5.2.3 Site Selection

There is also a need for careful selection of the site(s) for case study, argues Yin (1994). In this study we considered their main activities, which dealt with knowledge production and application. In addition, the country of their location had to be a developing country, in order to ensure both possibilities of literal replications that predict similarities, and also theoretical replications that predict contradictory outcomes (Yin 1994). We also considered access and cultural proximity as among the main criteria for choosing our case organisations. According to Taylor and Bogdan (1998), an ideal research setting is one where the observer has easy access, is able to establish immediate rapport with informants, and can gather data that is directly related to the research interests. During this study, the main researcher is Nigerian by birth and has lived and worked in The Gambia. However, none of the people involved at any stage of the research have any direct personal or professional stake in any of these organisations.

The original plan was to include as many research organisations as possible in five different countries in sub-Saharan Africa. This was specifically reduced to four organisations in two countries (Nigeria and The Gambia) due to limited funding. However, we eventually studied six research organisations. After careful selection of the organisations, we followed the usual method of gaining access to organisations by requesting permission from those in charge. All the initial contacts were made by e-mail and phone calls. We were granted access to some of these very quickly, while some took some time, due to bureaucracy.

5.2.4 Data Collection Methods

The study used several methods of data gathering: semi-structured interviews were complemented with short time on-site observations and surveys with quantified responses. Organisational documentation and presentations by senior management about their KM-related initiatives were collected and analysed. Multiple respondents were sought in each organisation, to achieve triangulation of data and insights. Visits were made to all these organisations for about two weeks each, to interview and to administer questionnaires and to collect other relevant information. Some of the sites in all of the multi-site organisations were visited and all the relevant people were interviewed, especially the heads of sections, the IT managers, and the librarian.

In Table 1, the summary of data gathering methods per research question is described. As the data gathering process was quite long and complex – two countries, six organisations on several sites, and five different kinds of data gathering methods, a daily diary was kept. The daily diary in the Sub-Saharan African study was used in revising the instruments for the India study (Okunoye et al. 2002).

Research question	Main data gathering methods	Supplemented by
What kind of efforts related to managing the knowledge are currently (or have been recently) actual in research organisations selected for the study?	KMD questionnaire	Interviews, observations, documents
What kind of enablers, including information technology infrastructure, are available in them?	Documents and presentations, interviews, observations	KMD questionnaire
What kind of IT infrastructure would facilitate or inhibit these KM efforts?	Interviews, documents and presentations	Observations, KMD questionnaire
What kind of major changes could be expected as a result of more efficient KM, supported by more appropriate IT infrastructure?	Interviews, documents and presentations	Observations, KMD questionnaire

Table 1. Data gathering methods for each research question

KM was evaluated using the knowledge management diagnostic (KMD) created by Bukowitz and Williams (1999). The KMD enabled us to evaluate the KM efforts of an organisation, even when these efforts were not called ‘knowledge management’. The KMD consists of 140 statements, for example “When people are given the task of searching for information, they are able to fulfil the request.” The respondents are asked whether the statement is strongly, moderately, or weakly descriptive of her or his organisation. There are seven sections in the KMD, each with 20 statements (see Appendix 1)

The possible problems with this diagnostic include – not surprisingly – its orientation to US working life and KM enablers. It was reviewed in the African student community in Jyväskylä, but to maintain comparability, the instrument itself was not modified for the exploratory study in sub-Saharan Africa. However, we modified the questionnaire based on the evidence we found in Sub-Saharan African organisations before we used it for a similar study in India (Okunoye et al. 2002). The on-site observations and the interviews of the key people complemented and enlarged the instrument, which also enabled recording the local KM practices. In addition, the short time spent in the organisation (2 weeks in each) might unveil only a portion of the practices, as some are likely to appear only periodically. Nevertheless, by combining data gathering methods, a more solid understanding of the KM practices could be gained.

Even though the KM diagnostic already included some statements about the use of IT, it was also approached from the perspective of an assessment of information technology infrastructure (ITI) (see Appendix 2), using the

approach developed by Broadbent and Weill (1997). In this, ITI is linked to the business by means of maxims which reflect the company's strategic context. The information for this was gathered from the review and analysis of organisational documentations and presentations, and from interviews and observations. The interviews and observations are also important because it is not sufficient to have something installed, but it also needs to be in working order, and used for the purposes it was acquired for (Korpela 1996).

Individual interviews were conducted in English language with the heads of computer sections, the librarians, heads of training, and the researchers in each organisation. A series of open-ended questions were used in the interview process. The interviews were recorded on audiotape and in the field diary. The questions were focused on their knowledge management processes and the application of information technology infrastructure to facilitate it. (see Appendix 3 for the interview themes). The interviewees (see Appendix 4 for positions of the interviewees) were selected randomly from the staff list in the annual reports, with the assistance of the organisations contact person. Their permission was sought to record the discussion. Most of them agreed, and they were all willing to discuss without reservations. Most of the people interviewed had also previously completed the questionnaire, which gave them an idea of what was to be discussed during the interview. All interviews started with a brief self-introduction by the interviewee for objectivity and reference purposes.

Historical documents were collected, primarily annual reports. The analysis was conducted to establish the output of each organisation in term of publications, source of funding, organisational settings, and staff strength. Where available, the long-term strategic plan was also reviewed.

Direct observations were used in this study during the field visits. Some of the behavioural and operating environmental conditions, which could not be captured by interviews, were observed. Observations were made on the use of information technology infrastructures and the processes of knowledge management. When a person is observed, the fact of being observed can change the normal process of carrying out the observed action. To minimise this, the observation was performed by being part of the system during the duration of staying in the organisations. This was facilitated as the researcher was given office accommodation in most of the organisations and, additionally, the researcher was welcome as ex-employee in one organisation in The Gambia and seen as one of the locals in all the others.

5.2.5 Data Analysis

Analysis of qualitative data depends on the capability of the researcher to integrate evidence from multiple sources (Benbasat et al. 1987). The analysis may not be as mechanical as the analysis of quantitative data (Patton 1990; Miles 1983), but the conclusions from these analyses are reliable. This study used both quantitative and qualitative methods of data collection. For the quantitative data, a simple weighted average that was recommended from the source of the questionnaire was followed, albeit in a flexible manner to cater for all adjustments to the original questionnaire.

Important ideas were immediately taken down in the field notes, while all the recorded tapes were later transcribed. The transcribed data was thoroughly read and particular attention was paid to discussions about issues that concerned the management of knowledge and the information technology infrastructure. Further meaning was ascribed to the salient points that emerged from these analysis based on the insight from the observation.

For each finding reported in the published papers, a clear chain of evidence was established (Benbasat et al. 1987), supported also by interview statements on the theme reported. Leavitt's Diamond (Leavitt 1965) was used, which calls for the interdependence of variables to apply one specific KM framework (Bukowitz and Williams 1999) in interpreting the data. This also enabled us to extract other assumptions and factors that could not be explained within the existing framework. After reporting the first series of our findings, I proposed a framework (Okunoye 2002a) based on a discovery from the systemic analysis of the data and the continuous interpretation of the observations through the pre-knowledge of the phenomenon.

6 Summary and overview of the articles

In this section, I present the summary of the articles that form the main body of this thesis. I discuss the main focus of each article and its relation to the whole. The first article emphasises the importance of understanding local contextual factors for successful knowledge management. We present the exploratory case from which we draw the variation in enablers of KM. We highlight the need for a global organisation to consider the local factors and suggest the need for a framework that could guide this. The second article focuses on one particular enabler: IT infrastructure (ITI). We show the relationship between ITI and KM and argue that where there is low availability and use of IT, it can constrain KM. The third article focuses on the comparative analysis of IT infrastructure in international organisations and national organisations in our study. The main goal of this paper is to show the differences in capability due to different infrastructure support levels and other enabling factors available in international organisations. The fourth article uses the example of Internet as an ITI, to demonstrate and support our arguments in the previous article. We focus on how knowledge workers are using the Internet to support their work, and the changes and challenges which it has brought to them. In the fifth article, the results and conclusions from the first four articles are used to suggest a framework for a sustainable KM in research organisations in developing countries. The last article concludes with a new context-aware framework of KM. This article builds upon each of the previous five papers to show the variations in the assumptions about the components of existing KM and the detailed discussion about knowledge processes. The specific focus is on culture and infrastructure, which are central to the variations.

This thesis is thus based on one empirical study and the subsequent theorising. Each article was written separately. The need to improve the readability of each article independently of the others necessitated some duplication in the general sections (e.g., in the methods sections, the case descriptions, and results sections). However, each article is distinct in its content and the whole is a cumulative report of a single endeavour.

6.1 Where The Global Needs The Local: Variation in Enablers in the Knowledge Management Process

Okunoye A. and Karsten H. (2002a). Where The Global Needs The Local: Variation in Enablers in the Knowledge Management Process, *Journal of Global Information Technology Management*, Vol. 5 No 3, pp. 12-31.

6.1.1 Research Objectives

The aim of this paper is to examine how availability of information technology infrastructure (ITI) and other enablers influence the nature of KM efforts in research organisations in sub-Saharan Africa (Okunoye & Karsten 2001, 2002a). The overall goal of the study is to complement the earlier works in the West and Japan (Nonaka and Takeuchi 1995; APQC 1996; Davenport and Prusak 1998) and contribute towards developing a model that could be relevant to organisations in developing countries. This study seeks to answer the following questions:

- What kind of efforts related to managing the knowledge are currently (or have been recently) actual in research organisations selected for study?
- What kind of enablers, including information technology infrastructure, are available in them?

In this article, the focus is on the enablers and especially on their specific nature in the context of sub-Saharan Africa.

6.1.2 Methods and Analysis

To categorise the knowledge processes, the seven processes described by Bukowitz and Williams (1999) and the American Productivity and Quality Centre APQC (1996) are used. Bukowitz and Williams (1999) broadly divided the processes into tactical and strategic ones (Figure 3), where the tactical side of the framework is concerned with the process of gathering the information needed for daily work, using of knowledge to create value, learning and contributing back into the system to make knowledge available to others. The strategic process involves realising value from the tactical process where the organisation's knowledge strategy is harnessed with the goals of the organisation. These processes require assessment and valuations of the knowledge assets for future use. Building and sustaining knowledge sources is also of strategic importance in organisations.

APQC (1996) puts all these processes in the centre of their framework and surrounds it with enablers which could help or hinder the knowledge processes (see Figure 3). The enablers that they include in KM are strategy and leadership, culture, measurement, and technology. Each of these must be designed and managed in alignment with the others and in support of the KM process.

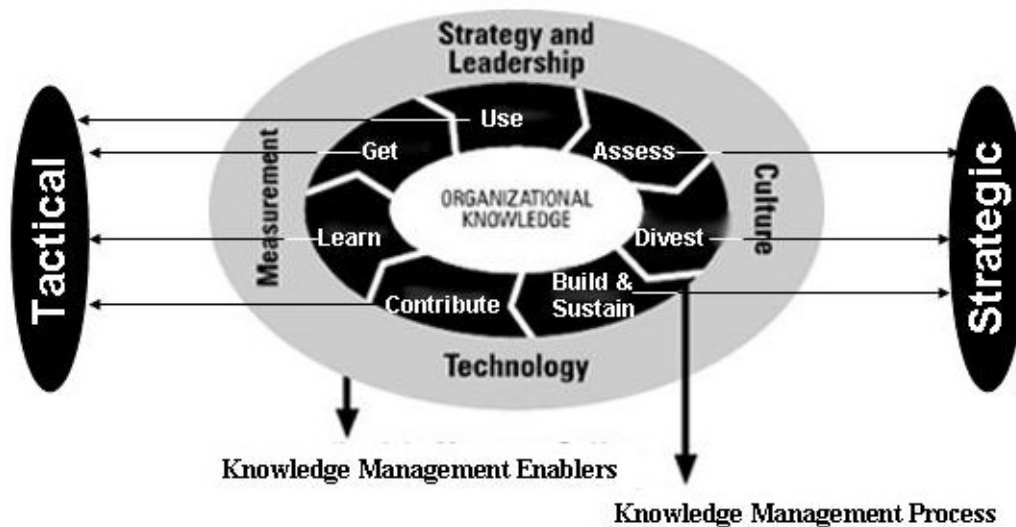


Figure 3. The APQC Knowledge management framework (APQC 1996, Bukowitz and Williams 1999)

6.1.3 Results

Knowledge management processes

The assessment of KM efforts revealed that the research organisations generally performed well in their efforts in creating, finding and collecting internal knowledge and best practices. They averaged in sharing and understanding those practises and were weak in adapting and applying the practises to new situations. That is, the organisations performed reasonably well in the tactical processes and averagely in the strategic processes of KM. According to Bukowitz and Williams (1999), this can be interpreted as indicating that the case organisations put more effort into managing day-to-day knowledge, as they are required to respond to demands or opportunities in the marketplace, compared to the long-range process of matching organisational knowledge assets to strategic requirements. A summary per each part of the process is given in Table 2. The research institutes we studied all have a well-established process of obtaining knowledge, which does not necessarily involve much use of information technology. Most of the organisations still use manual ways of managing documents through filing. They have invested in the library and encouraged informal networks of experts for knowledge sharing and acquisition. They are confronted with problems when stocking their library with modern books and current journals as well as when applying information technology to support some of their efforts in obtaining knowledge. How well the researchers use their acquired knowledge is assessed through their

publication record and rewarded by promotion and support for further funding. Some of the organisations also encourage individual projects, which drive innovation and application of knowledge.

Process	Key findings
Get	All the organisations use collaborative means to get knowledge. Library and documentation unit is central as a knowledge source.
Use	Research work involves getting knowledge from diverse sources. Publishing research results is a major way of externalising knowledge and measuring knowledge application. Some organisations indirectly hinder the free use of knowledge and slow down innovation. Encouraging individual initiative enhances knowledge application.
Learn	Organisations that incorporate learning into their processes perform better in managing knowledge. Organisations accumulate experience and could learn from it.
Contribute	Time is a major constraint for contributing to the knowledge repository. Knowledge is a source of power, especially new knowledge. Trust is important for knowledge contribution. Contributing to knowledge repositories should be part of the normal work process.
Assess	Organisations assess their knowledge assets through learning and annual appraisal
Build and sustain	Collaboration is a good means to sustain knowledge, keep it in use. Does not depend on ICT.
Divest	Sabbatical leave and changing to another research institute are used as a form of knowledge divestment.

Table 2. Summary of knowledge management processes

Most of the organisations have been able to incorporate learning into their normal work processes. They all have ways of learning from experience at the completion of a research project. Even though they try as much as possible to document properly, the learning process is still affected by inadequate documentation and lack of proper succession plans. This inadequacy might be due to insufficient use of information technology to support this process. They all recognise the importance of knowledge repositories through which researchers can share and acquire knowledge, but their development in some of the organisations is affected by lack of trust among the researchers: they believe that their knowledge is their source of power. Sparing time to contribute to the repositories is another serious constraint. These organisations periodically assess their knowledge-based assets indirectly through a comprehensive annual appraisal which covers training needs assessment and the skills acquired over a period. The knowledge assets of the organisations are built and sustained through collaboration with other researchers and institutions. Staff movement to similar research organisations is a normal practice, through which researchers

sustain their knowledge. It also serves as a form of divestment, with the hope of gaining more benefit in the future.

Enablers within the organisations

All the organisations are trying to improve their communication capabilities by using information technology. In principle, they all have Internet connectivity and access to some of the applications related to it. Apart from this general trend, most other technologies that can support KM, such as intranet, data warehousing, and the like, were not found in most of the organisations. The leadership of the organisations in general encourage communication and collaboration. They recognise and reward good ideas and innovations. They put a high emphasis on training and learning, and they have performance-based promotion systems. Some of the organisations have good induction or orientation programmes for new staff. The researchers are expected to give a long notification period when leaving the organisation and to maintain future contact and collaboration. Face-to-face periodic regular meetings are used for deliberation, planning and decision-making. Only one of the organisations had a KM initiative. Most of the others have, however, separate strategies to improve communication and learning, which have been found to facilitate KM. They use seminars and workshops for learning and for knowledge sharing. They all use various forms of training (on-the-job, online, distance training) to develop the skills and expertise of researchers. The organisational culture and structures of the organisations provide a good ground for KM. Most of the research programmes in all the organisations are multidisciplinary and interdisciplinary in nature, making everybody useful and important to each other and hence they enable knowledge sharing. There are forums for informal networking of the experts.

In our case organisations, there was support for individual researchers to collaborate with others both internally and externally, in order to achieve the set objectives. Thus they were able to link sharing of knowledge to solving practical problems (McDermott and O' Dell 2001) and to driving the innovation process (Leonard and Sensipar 1998). There is existence of the kind of communication, collaboration and interaction that is essential in sharing both tacit and explicit knowledge and support for transforming this knowledge from individual to organisational level (Gold et al. 2001). The issues of trust and how to reward knowledge sharing are among the concerns expressed in the organisations. Since knowledge can only be volunteered (Snowden 2000), there is need for trust and openness to support KM.

All the organisations are structured in what could be described as a centre organisation (Cusumano and Nobeoka 1998), which facilitates knowledge retention and transfer mechanisms. In all the organisations, there are functional managers available to all the projects and programmes, and each of these has a leader. The project and programme arrangement provides enough flexibility to make quick and efficient decisions without the problems of a hierarchical organisation. They all operate in collegiate ways and they use multidisciplinary project arrangements to encourage cooperation among the researchers. The organisations also identified specific local factors in both the KM processes and their enablers. These factors include local orientations and beliefs, persistent under-funding, and operating environmental influences. For organisations thinking of implementing KM in developing countries, our findings suggest due consideration for the influences of operating environmental factors, national culture and beliefs, and local orientation on the KM enablers. With the diversity of people and countries in developing countries, provision should be made for varying the context and meaning of knowledge in each circumstance

6.1.4 Relation to the whole

This paper lays down the foundation for the need to consider local factors in KM frameworks. It presents the comprehensive and detailed results, using examples from each organisation. The contextual issues of knowledge management processes and enablers are highlighted, and the factors which make assumptions about the components differ in each environment are also discussed. The remaining articles in this dissertation are all based on the findings presented and the foundation laid in this paper. All the issues raised are subsequently given a more in-depth and thorough analysis. Information technology as an enabler of knowledge management is discussed in Okunoye and Karsten (2002b, Paper II) and Okunoye and Karsten (2003, Paper IV), and the impact of differences and influence of local capabilities in Okunoye (2003b, Paper III). The context-aware framework recommended at the conclusion of this paper was the main focus in Okunoye (2002a, Paper V) and Okunoye (2003a, Paper VI).

6.2 ITI as Enabler of Knowledge Management: Empirical Perspective From Research Organisations in sub-Saharan Africa

Okunoye A. and Karsten H. (2002b), ITI as Enabler of Knowledge Management: Empirical Perspective from Research Organisations in sub-Saharan Africa. In Proceedings of the 35th *Hawaii International Conference on Systems Sciences*, January 7-10, 2002, Big Island, Hawaii.

6.2.1 Research objective

Information technology infrastructure (ITI) is said to play a significant role in knowledge management (KM) efforts. Yet, there is little research that focuses on how the availability and use of IT infrastructure enable or constrain KM efforts. This paper explores the KM-ITI relationship. We use the results of an empirical study in six research organisations in sub-Saharan Africa (Okunoye and Karsten 2001). More specifically, we explore the relationship in knowledge-intensive research organisations, in circumstances where use of technology might be more problematic than in the affluent Western industrialised countries (Odedra et al. 1993). Even though the KM-ITI relationship is our primary focus, we do not disregard the other enablers of KM.

6.2.2 Methods and Analysis

KM was evaluated using the knowledge management diagnostic (KMD) created by Bukowitz and Williams (1999). This diagnostic enables us to know of the KM efforts of an organisation also when these efforts are not called 'knowledge management'. The detail of the seven processes assessed was discussed in Okunoye and Karsten (2002a, Paper I). Even though the KM diagnostic already included some statements about the use of IT, the situation was again approached from the IT infrastructure perspective (Figure 4), by assessing information technology infrastructure, using an approach developed by Broadbent and Weill (1997).

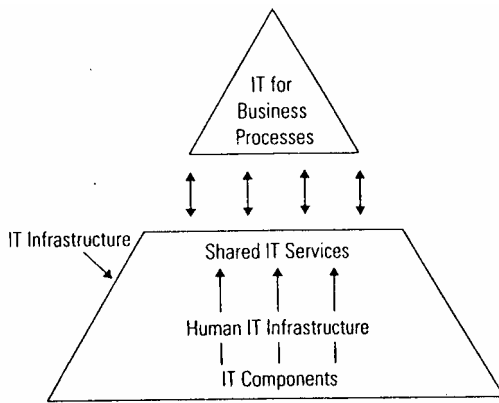


Figure 4. Elements of IT infrastructure (Broadbent and Weill 1997)

In this, IT infrastructure is linked to the business by maxims which reflect the company’s strategic context. Based on their instrument, 23 maxims were identified describing ten core ITI services (managing firm-wide communication network, managing messaging services, recommending standards for the ITI components, implementing security services, providing advice and support, managing centralised data processing facilities, performing project management, providing data management consultancy) and thirteen additional services (enforcing architecture and standards, LAN management, dealing with suppliers and outsourcers, testing new technologies, developing business-specific applications, managing them, security implementation for business units, providing management information, providing data management, managing electronic linkages to suppliers and customers, developing a common systems development environment, providing training, providing multi-media operations).

6.2.3 Results

The availability of IT infrastructure and its use in each of these organisations was next compared to the knowledge management efforts, highlighting the relationships that exist between them (see Table 3). We sought to find out how the availability of the IT infrastructure has enabled or constrained managing knowledge.

	MRC	NARI	ITC	IITA	NISER	NIMR
ITI capabilities	2	5	4	1	3	5
KM efforts	5	4	2	1	3	6

Table 3. Ranking of KM and IT infrastructure capability by organisation

Four of the organisations appear to correspond to our expectations: In NARI in The Gambia and in all the Nigerian organisations, the ranking in IT is similar to the ranking in KM. The exceptions to this are the MRC and ITC in The Gambia. In the MRC, they had plenty of ITI services, yet in their KM efforts, they ranked only fifth. In ITC, the situation was the opposite. ITC had not invested much in ITI services, but they ranked second in their KM efforts. Overall, the organisations with a reasonable level of IT infrastructure performed well in their knowledge management efforts, with high potential for improvement, while the organisations with a low level of IT infrastructure did not do well. Two exceptions to this otherwise consistent finding were noted. In one of them, a high level of ITI co-existed with a low level of KM. This organisation needs to be studied further to find out their specific deterrents to efficient KM. In one organisation, a high level of KM existed despite a low level of ITI. This could be explained by their strong focus on organisational efficiency and on research, leaving the IT of the small organisation to be taken care of by an outside vendor. Taken together, these two organisations confirm that IT infrastructure needs not only to be available, but also understood, accepted, and in proper use before it can play its enabling role in KM efforts (McDermott 1999; Robey and Sahay 1996).

In spite of the readiness of people to nurture a knowledge culture in these organisations, the unavailability of the minimum technologies to support their efforts has a profound impact on their KM activities. The results from these organisations can be explained with the Leavitt Diamond (Leavitt 1965), which emphasises the balance of different organisational dimensions. Leavitt's Diamond shows four of these: tasks, people (actors), technology, and structure (Figure 5). These four dimensions are highly interdependent, as indicated by the arrowheads, so that change in any one usually results in compensatory or retaliatory change in others.

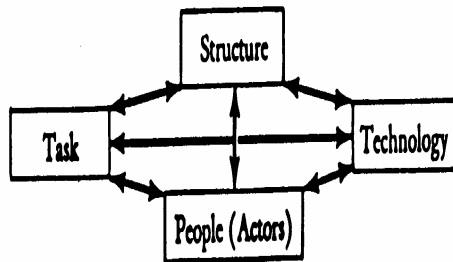


Figure 5. Leavitt's Diamond organisation model (Leavitt 1965)

Of the case organisations, the people dimension was found to be problematic in several respects: the international, expatriate staff members tended to come and go and take their knowledge with them. This had resulted in discontinuity: knowledge could not be assessed, sustained or divested in any systematic way. The local staff members were often discouraged from ambitious projects, as they were not seen as able to perform beyond a certain level. They also often lacked the personal access to funds that the expatriates might have for supplementing the possibly meagre resources at the institutes. The task and structure dimensions had to do with management – which was in some institutes better than in others – and with ability to carry out the tasks planned. Here the external circumstances had their strongest impact: if there is no electricity, no working phone, and very slow mail, work in general is slowed down. Communication between people not at the same site is greatly hampered. Visiting and sending messengers are the only possibilities, and they take time.

Technologies are considered to be tools that help organisations to get work done, and mechanisms for transforming inputs to outputs. Also in the case organisations, knowledge management was not only about managing knowledge-work processes or the people that carry out these processes; technology and organisational structure are also affected. The findings support the views of Bhatt (2001) and Duffy (2001) in that only through balancing these four dimensions is it possible to bring out the value of the knowledge management efforts in an organisation. Therefore, rather than trivialising any one of the variables, or neglecting one set (such as technology), each must be present and be given equal priority for knowledge management efforts to be successful. The performance of these organisations could be attributable to their inability to balance all these dimensions.

6.2.4 Relation to the whole

This paper discusses Leavitt's Diamond, which becomes more prominent in the final design of the framework. It presents a thorough discussion of each of the variables in the organisations, and how these are related to knowledge management efforts. This paper specifically looked into information technology and how it becomes essential where it is not readily available. This paper also laid the background for the detailed discussion of the differences in information technology infrastructure in the national and international organisations (Okunoye 2003b, Paper III), and specifically how Internet is helping researchers in the knowledge management processes (Okunoye and Karsten 2003, Paper IV).

6.3 Organisational Information Technology Infrastructure in Developing Countries: A Comparative Analysis of National versus International Research Organisations in Two sub-Saharan African Countries

Okunoye A. (2003b). Organisational Information Technology Infrastructure in Developing Countries: A Comparative Analysis of National versus International Research Organisations in Two Sub-Saharan African Countries. *Journal of Information Technology Cases and Applications*, Vol. 5 No2.

An earlier, shorter version won the best paper award at the 3rd Global Information Technology Management World Conference, 2002 and was published as:

Okunoye A. (2002b). North in the South: Comparative Analysis of Information Technology Infrastructure in International vs. National Research Organisations in sub-Saharan Africa, pp. 140-143, In Palvia P. and Ponnappa S. (eds.), *Proceedings of 3rd The Global Information Technology Management World Conference, June 23-25*, Long Island, New York.

6.3.1 Research Objectives

This paper examines the imbalances in the availability and usage of information technology infrastructure between the international and national research organisations in sub-Saharan Africa. The main focus of this paper is to show the impact of the level of provision of IT infrastructure on organisational performance.

6.3.2 Methods and Analysis

Based on the list of ITI collected, the provision of ITI at the national organisations was compared with that at the international organisations. This was supplemented with other measures of information technology gathered from observations, interviews and reviews of historical documents. In Table 4, the services provided have been separated from those not provided, and summed separately. The organisations differ in the extent of their ITI. They are here ranked in ascending order of availability of services.

	International			National		
	IITA	MRC	ITC	NISER	NARI	NIMR
Services provided	19	16	8	12	7	7
Services not provided	4	7	15	11	16	16
Ranking	1	2	4	3	5	5

Table 4. IT infrastructure summary and ranking

6.3.3 Results

In sum, IITA and the MRC, the two international organisations, have the highest IT infrastructure ranking, whereas the national organisations NARI and NIMR have the lowest ranking. However, ITC, which is an international organisation, had fewer IT services than, for example, NISER, a national organisation, although this was compensated by outsourcing strategies (Okunoye 2003c). This indirectly gave them better services over national organisations with higher IT infrastructure services. All the organisations, except one, had a computer department, with personnel ranging from two to ten. An expatriate usually managed the IT units of the international organisations. The expatriate heads of the IT units were generally more experienced and exposed to relevant modern technologies, due to their training and access to Western markets. This usually had an influence on the performance of the IT unit and on the adoption of technologies. The IT units of the international organisations were better staffed than the national organisations. Most of the staff members had a university degree and some had other special training.

Although there was Internet connectivity in all the organisations, the access mode was different in the international organisations. The available figures from one national and two international organisations indicate a wide margin in estimated IT expenditure. It was difficult to obtain the estimated annual IT expenditure in the national organisations, due to their diverse ways of acquiring and procuring IT infrastructure services, but observation suggests that they might have similar figures to that of NISER. All the organisations used outsourcing partners for some services, with ITC solely dependent on vendors (see Table 5). Thus it is difficult to give a sum of the yearly IT expenditure.

	International			National		
	IITA	MRC	ITC	NISER	NARI	NIMR
IT Unit	Yes	Yes	No	Yes	Yes	Yes
Status of the Head	Expatriate	Expatriate	N/A	Local	Local	Local
Outsourced services	Some	Some	All	Some	Some	Some
Staff No.	10	7	N/A	8	2	4
LAN/intranet	Yes	Yes	No	No	No	No
Internet	Yes	Yes	Yes	Yes	Yes	Yes
Intercoms	Yes	Yes	No	No	No	No
Estimated expenditure on IT per year	\$ 200 000	\$1422438	Not known	\$8 900	Not known	Not known

Table 5. Summary of selected IT capabilities in the six organisations.

There are several factors that can be seen as responsible for the gaps in the availability and use of IT infrastructure between the international and national research organisations. Funding is one major factor, from which other factors take their root. The national organisations usually have little support from the government. International organisations appeared to have enough funds to acquire the needed IT infrastructure, compared to national organisations. The next factor is managerial and technical expertise, which is closely related to education, training, and experience. An expatriate or a Western-trained local expert usually headed the IT sections of the international organisations, and this could account for their better IT services. The expatriate staff members usually had received high-quality training, and they were aware of current developments in their field. The national organisations do not usually have the adequate resources to provide the kind of IT training necessary for professional development in IT. Staff who have received training abroad, once they return to the home country, often lack the continuous awareness that is required due to the dynamic nature of IT. Most of the researchers in the national organisations have limited exposure to the possibilities of IT and cannot even properly utilise the little they have; for example, they may not be aware of upgrades available for the software they are using, and thus lose the benefit of improved features and ease of use.

⁸ Exchange rate of \$1 = £0.7, from www.oanda.com, 30/05/2001.

The last factor is the other national infrastructures, which were summarised by Odedra et al. as follows:

Certain prerequisites, such as reliable power supply to operate the computers, a well-functioning telephone network to transmit data, foreign currency to import the technology, and the computer literate personnel, are necessary for successful use of IT. Such infrastructural elements remain inadequate in many sub-Saharan Africa countries. (Odedra et al. 1993 pg. 26)

The discussion here is limited to the organisation-level problems, but it recognises the many other common problems at national level, such as complicated purchasing procedures, vendor control of technical direction, dependency on outsiders, poor maintenance procedures, and under-utilisation of machines and human potential. The problems apply not only to availability (Odedra et al. 1993), but also to application (Morales-Gomez and Melesse 1998; Avgerou 1998).

Based on these results, some recommendations are made which carefully incorporate local considerations, without which any policy can be unsuccessful (Moyo 1996). We recommend that the national organisations formulate a sustainable IT policy and develop an appropriate strategy to implement this policy. The international organisations usually have a long-term strategic plan which they update as the dynamism of work environment and technology demand. We suggest cooperation and alliance among research organisations to cushion the costs and problems associated with acquisition of IT equipment. Another possibility is forging alliances with the international organisations. With the already good relationships this should not be too difficult, especially on an ad hoc basis.

There is a neglect of past findings and recommendations, as noted by Odedra et al. (1993) and Moyo (1996). Since the real gap between the North and the South has been attributed to the criteria of skill, it is imperative to start improving technologies (which include more than machines and tools) within organisations. By this, the skills and the knowledge level of people could be improved and thus also the wealth of the nation. We would like to conclude that the governments of developing countries should carefully examine how the international organisations establish and maintain their IT infrastructures, in order to apply similar procedures in their national organisations, since the local situations are the same.

6.3.4 Relation to the whole

In this paper, the emphasis is again (cf. Okunoye and Karsten 2002b, Paper II) on how local factors specifically affect organisations in the same environment. The context of each organisation is highlighted and a detailed in-depth analysis is provided of a component of KM framework - IT. This paper does not specifically discuss a particular KM technology and its use to support knowledge work, but provides a general overview of the situation. Thus, it provides a good background for the discussion of how Internet as a knowledge management system is enabling some knowledge activities (Okunoye and Karsten 2003, paper IV).

6.4 Global Access to Knowledge in Research: Findings from Organisations in sub-Saharan Africa

Okunoye A. and Karsten H. (2003). Global Access to Knowledge in Research: Findings from Organisations in sub-Saharan Africa, *Information, Technology and People*, Vol. 16, No 3.

6.4.1 Research Objectives

This exploratory study develops a more detailed picture of African researchers' use of the Internet as a system for managing knowledge. The main questions we sought to answer in this paper are: How are African research institutes utilising the Internet to become members of the global knowledge community? What might prevent or slow down the realisation of expected benefits?

6.4.2 Methods and Analysis

Evidence about Internet use for knowledge management was primarily based on interviews, questionnaires about KM and the use of information technology (IT), observation of IT equipment including local set-ups and IT use, and on analysis of documents, especially IT-related reports. The interviews focused on the means of acquiring and sharing knowledge before and after the introduction of the Internet, and how this had influenced research activities. Both authors read the written materials. The transcribed interviews on Internet use were independently coded by each author using keywords that related to each knowledge process, and the results compared, to arrive at the joint interpretation presented here. In this paper, we analyse Internet as a form of knowledge

management system (Jennex 2002; Detmar and Shortliffe 1997), which supports the creation, transfer, storage and application of knowledge in organisations (Alavi and Leidner 2001). Table 6 summarises this KM processes typology along with examples from its application in the context of academic research.

KM process	In research work, for example:
Creation/acquisition	Analysis of data, synthesis of earlier studies – needs access to the data and to earlier literature, procurement of tools and materials
Transfer/sharing	Communication between researchers, publishing
Application/utilisation	Constructing new inventions, reporting results, joint writing, preparing project proposals
Storage	Storage of data sets, article abstract databases, body of own work

Table 6. Knowledge management processes in research

6.4.3 Results

Overall, we found that these research organisations were already making use of the Internet in their KM efforts, even when the services at their disposal were not state-of-the-art. Of the four knowledge processes described, informants used the Internet for knowledge creation and acquisition, transfer/sharing, and application. However, we found no evidence of the Internet being used for knowledge storage. We described a variety of benefits and issues associated with informants' use of the Internet for supporting knowledge processes, as summarised in Table 7. In terms of knowledge creation/acquisition, the main benefit appeared to be in supplementing the local institute library collections.

KM process	Benefits	Issues
Creation/ acquisition	<p>More materials are available than in institute libraries (references, abstracts, whole articles).</p> <p>Cheaper and faster than travelling to do literature reviews.</p> <p>Can use libraries abroad to do searches.</p> <p>Overall, access to literature is considerably faster than without the Internet.</p>	<p>Internet searching is used instead of specific databases, because of cost.</p> <p>Undirected searching of the Internet may produce sub-quality references.</p> <p>Mainly shared computers are used for literature searches. Not all computers are connected.</p>

Transfer/ sharing	E-mail very much quicker than post. E-mail can be sent to several people at once: considerably easier compared to telephone or letter. E-mail is asynchronous, and therefore collaboration is easier. E-mail attachments enable exchanging of reports. Possibility to receive information from unknown scholars far away. Being on mailing lists enables keeping up to date in a certain field. Tools and materials can be procured from e-shops if credit card available.	E-mail might not work always. Alternative communication channels might not work on occasion. Network capacity may limit sending of attachments. Credit cards in limited use. Cultural readiness there, but resources to implement limited.
Application/utilisation	E-mail attachments enable exchanging of reports. The whole publication process is faster. Coordinating efforts in organising events is easier. More visibility can be attained by electronic publishing and other web presence.	E-mail might not work always. Alternative communication channels might not work on occasion. Electronic publications lower ranking than traditional ones. Electronic publishing is lower in cost, but not free. IT skills still need improvement.
Storage	None as of 2001	

Table 7. Benefits and issues in global KM with the Internet for researchers in sub-Saharan Africa

In knowledge transfer/sharing, the benefits of the Internet were significant. Electronic mail seemed to be the ‘killer application’ for Internet use by researchers in sub-Saharan Africa, who often used e-mail to eliminate communications delays that previously could have taken weeks or months. In knowledge application, the main benefit was improved visibility of researchers and their research through their web presence and through their ability to publish results quicker on the web and in e-journals.

One possible factor that made the Internet useful in these organisations, despite the odds, was the level of education and exposure of the researchers themselves (Straub, Loch and Hill 2001). Even if researchers did not come from, or had not been educated in a high-income country, they occasionally attended conferences and received visitors from these countries. Through these experiences they became aware of the use of these technologies for academic

purposes. The training level and exposure also varies between organisations, as we discussed earlier.

Even though African knowledge was not yet integrated into services on the Internet (Jimba and Atinmo 2000), the possibilities were there and were already being exploited. We also found many problems with Internet use. Insufficient funding, low IT literacy among staff, problems with the IT function, problems with organisational IT infrastructure, and problems with national infrastructure (electricity, telecommunications, banking systems) put major limitations on the Internet becoming a reliable, dependable service, constantly available for all researchers. There was also only limited government support for research. Despite researchers' enthusiasm and significant efforts to use ICT in academic research, these problems present very strong constraints on effective use. We make suggestions about what could be done to alleviate the problems we identified, based on our observations and interpretation of the study data. We suggest forging alliances with other research organisations within the country (and possibly elsewhere in sub-Saharan Africa) to collectively subscribe to electronic journals and databases, to reduce the burden on each individual organisation. Development of long-term IT strategies could also help in effective management of limited funds.

These experiences from research organisations in sub-Saharan Africa indicate that more attention needs to be paid to funding, infrastructure, and management before the full benefit of Internet can be realised in countries and areas with similar infrastructural and environmental problems.

6.4.4 Relation to the Whole

This paper uses Internet as an example of how an IT infrastructure can enable or constrain KM processes in research organisations in sub-Saharan Africa. It also shows the level of differences in each organisation, which further brings the context of each organisation and environment to the foreground in the issue of knowledge management. It complements the other papers in the arguments about the influence of local factors and technology, which can vary from one organisation to the others, and also between regions. It specifically shows the circumstances of organisations in sub-Saharan Africa and the need to develop sustainable solutions.

6.5 Towards a Framework for Sustainable Knowledge Management in Organisations in Developing Countries

Okunoye A. (2002a). Towards a Framework for Sustainable Knowledge Management in Organisations in Developing Countries. In Brunstein K. and Berleur J. (Eds.). *Human Choice and Computers: Issues of Choice and Quality of Life in the Information Society*, pp 225-237. International Federation of Information Processing, World Computer Congress August 25-30, 2002, USA: Kluwer Academic Publishers.

6.5.1 Research objectives

The aim of this paper is to use the findings highlighted in previous papers to work towards a framework that could later be developed and assessed as a model for KM. The framework is expected to incorporate each of the concerns and the local factors specific to developing countries, and to guide its implementation.

6.5.2 Methods and Analysis

Since the aim is to develop a sustainable KM model that considers interaction between all the organisations' social and technical subsystems, a socio-technical approach was found relevant, which allows to presents each of the subsystems in detail. I expand on the Leavitt Diamond, using contextual factors identified in all the background papers to reflect on the issues of interest in knowledge management. Socio-technical systems theory is used to emphasise the inter-relatedness of the functioning of the socio-cultural, organisational and technological subsystems of the organisation, and the relation of the organisation as a whole to the environment in which it operates. On the premise of my understanding of contextual issues in knowledge management (Okunoye and Karsten 2002a, Paper I), ITI as enabler of KM (Okunoye and Karsten 2002b, Paper II), differences in the level of provision and IT, a knowledge management enabler (Okunoye 2003b, Paper III) and the use of a specific IT infrastructure in knowledge work (Okunoye and Karsten 2003, Paper IV), I suggest a framework that encompasses social, economic and organisational factors, technological factors, and operating-environment factors. All these are required to support KM activities and meet the expectations of the researchers in terms of productivity, efficiency, innovation and competency.

6.5.3 Results

Based on the findings in these organisations, I outline my suggestions for a context-specific framework, using the Leavitt Diamond (Leavitt 1965) as a starting point. The Diamond needs to be adapted to guide KM in developing countries. First, I add a component to represent the socio-cultural elements. For example, age stratification and the accompanying respect in traditional African societies automatically arrogates some power to the elders. It does not allow juniors to question the authority or views of seniors. This culture may then be filtered into organisational settings, where supervisors may assume the role of elders. This can then influence the way the subordinates integrate the knowledge from their sources.

While each of the other components can be specific to each organisation, the contextual issues are more pronounced in the socio-cultural aspect. In the context of the national organisations, where most of the staffs are national, the above example can be noticed easily. It may be less pronounced in the international organisations, where the members of staff are composed of various nationals. Application of the same model in these organisations might be inefficient, even when the organisations are located in the same country.

To further expand on the Diamond, the knowledge tasks (“processes”) could be seen to require a better organisation than currently. They then would need to be supported by an organisational structure that puts more emphasis on the kind of coordination and supervision which would enable empowerment, that is, power and control to be more distributed among the staff. This would enable decreased supervision, and greater encouragement for independent work teams, which focus collectively on the goals of the organisation and perceive the achievement as team-based while acknowledging individual contributions. As also suggested by Leavitt (1965), the knowledge processes have to be streamlined with the available information technology infrastructure. However, people are the connecting link for all these components. Together, as suggested also by Bhatt (2001), the dimensions have to be balanced. Moreover, all this has to be aligned with the goals and the vision of the organisations while taking into consideration the society in which they operate.

Thus, the proposed framework (see Figure 6) for KM in organisations in developing countries should consider the socio-cultural and organisational factors, technological factors and operating environmental factors, based on this study and existing literatures. All these should be aligned with the aims of each organisation. The proposed model should also examine each knowledge process, and provide adequate enablers to support each of these. The

technological component should be explicit on the degree of availability of IT and how the business goals increase with increase in the application and availability of technology. The business goals have been summarised broadly as responsiveness, innovation, competency and efficiency (Lotus 1998). These were also confirmed as expectations in the case organisations. The processes that should be supported could also be broadly summarised as knowledge generation and adaptation, knowledge codification, refinement, storage and organisation, knowledge transmission, distribution or deployment, and knowledge application or leveraging (Okunoye and Karsten 2003, Paper IV)

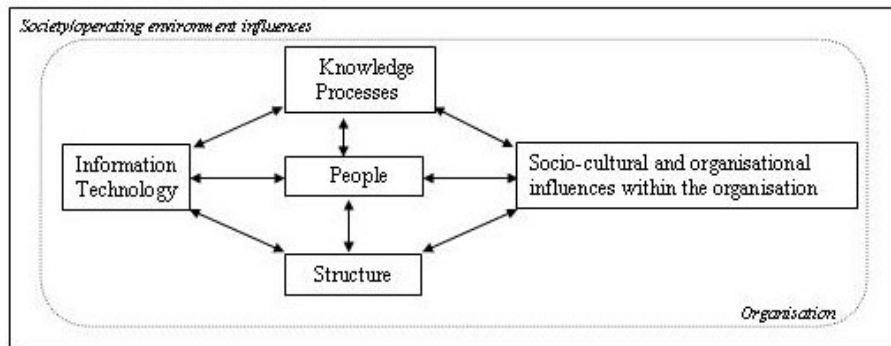


Figure 6. The suggested framework for sustainable knowledge management

The major problem in representing the goals and subsequently measuring them in the proposed framework is in the dynamism of the associated variables. We cannot predict the scope of any of the goals, even with proper application of the framework. Thus, the application and determination of its success will vary from one organisation to another and their subjective interpretations. In a similar manner, each of the processes can improve with adjustment or balancing of the enablers, but it would only add to the complexity of the framework without enhancing the contextual point proposed. Nevertheless, despite all these limitations, it is still essential to try out the realities and the applicability of this framework in practice. Only in this way can the problems be clarified and a path to a more refined model be paved.

6.5.4 Relation to the Whole

This is my first attempt to tie all the findings in the study together, and to suggest a framework that could consider the contextual factors that specifically pertain to organisations in sub-Saharan Africa in particular and developing countries in general. This paper uses the local factors that were already identified in Okunoye and Karsten (2002a, Paper I) and which were developed further in Okunoye and Karsten (2002b, Paper II) and in Okunoye and Karsten

(2003, Paper IV) to argue for the inclusion of operating environmental factors in a KM framework. It also uses all the differences in organisational issues and technology that are discussed in Okunoye (2003b, Paper III) to apply the Leavitt Diamond that suggests the balancing of organisational variables for organisational changes.

6.6 Context-Aware Framework of Knowledge Management: Cultural and Infrastructural Considerations

Okunoye A. (2003a). Context-Aware Framework of Knowledge Management: Cultural and Infrastructural Considerations. Research in progress, in the CD-ROM Supplement of the Proceedings of the ISGLOB 03 - IS Perspectives and Challenges in the Context of Globalisation, IFIP8.2+9.4 Working Conference, Athens, Greece, June 15-17, 2003.

6.6.1 Research objectives

The main aim of this paper is to synthesise all the insights from the studies, to build a context-aware framework, which I call KAFRA (an abbreviation of Kontext Aware FRAmework), with an explanation of its components. It also aims at addressing the limitations of the earlier suggestion for a framework discussed in Okunoye (2002a, Paper V).

6.6.2 Methods and analysis

In building KAFRA, some well-known concepts and theories in organisation studies were used to support the arguments. Leavitt (1965) calls for interdependence of organisational variables for effective organisational change, and Scott (1998) asserts that environment and organisation are inseparable. Powell and DiMaggio, in their institutionalist perspective (1991), support the argument on the need to consider the operating environment in a KM framework. For a study on change to contribute towards a robust theory (framework) that can guide practice, it must examine change as a process and in a historical and contextual manner (Pettigrew 1987). Hofstede's (1997) cultural model and Galbraith's (1977) conceptualisations of organisational variables are also brought in to strengthen the arguments for the KAFRA framework. The diversity in the case organisations studied—which include national and international organisations in different research fields—formed the basis of evidence on contextual issues in organisational variables and information

technology. With this evidence the cultural and infrastructure diversity and their influences on KM are discussed.

6.6.3 Results

The main result of this paper is the presentation of KAFRA (Figure 7) and an explanation of each of the components. This paper also presents a new definition of KM as an effort to properly put all the organisational variables into best use with the support of relevant information technology to facilitate the knowledge processes with the main goals of organisational productivity, responsiveness, innovation, and competency through the creation and protection of knowledge resources.

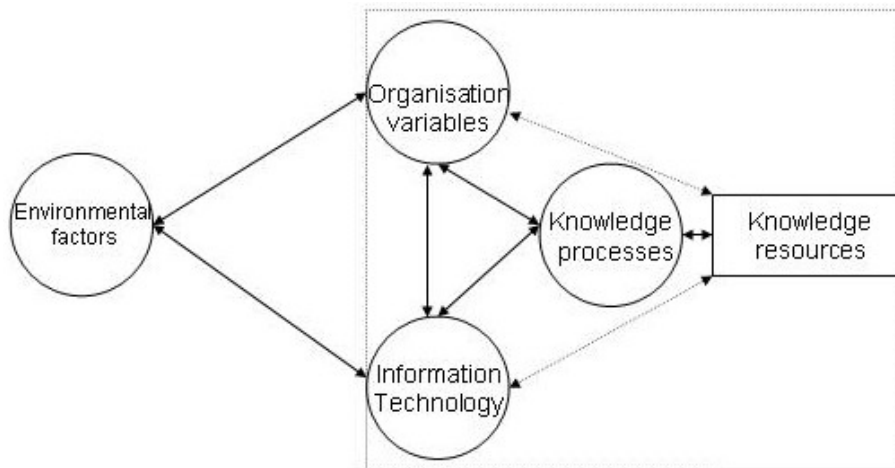


Figure 7. KAFRA - Context-aware framework of knowledge management

All the organisation-related influences that can enable or constrain KM can be put together as organisational variables. This is one of the main differences between KAFRA and the framework suggested earlier in (Okunoye 2002a, Paper V). Instead of treating each variable as a component on its own, they are all collated, to cover all possible organisational variables that have been identified as affecting changes. However, information technology is a separate component, due to its strategic importance in supporting the knowledge processes of knowledge creation, storage, sharing and application. All these are directly affected by the environmental factors (that is, in this discussion, culture and infrastructure) where the organisation operates. The organisational variables and information technology can influence each other, and they are both enablers of knowledge processes. On the other hand, the kind of knowledge to be created can determine what kind of information technology is

to be used and which variables in the organisation need to be adjusted. Effective handling of knowledge processes yields the main aim of KM, which is improving the knowledge resources in which the competitive advantage and all other benefits of KM lie. Also, knowledge resources can effectively affect knowledge processes.

The double arrow that joins the organisational variables and the technology to the operating environment shows the interdependency between the organisation and the environment, ensuring that the KM processes are consistent with the external environment in which the organisation operates and that those activities meant to improve knowledge resources are undertaken in a coordinated manner. Each component is linked to the others in a cyclic manner, which indicates the continuous dependency and influence between them. There is also a possibility of direct interaction between knowledge resources, organisational variables, and information technology, though this is not explicitly explained in this framework.

This framework differs from those presented earlier in that it considers the relationships between and interdependency of all components, with particular attention to the environmental context. This framework enables organisations to pay attention to the local context and to how this affects the assumptions about each component. The method and the research approach used to arrive at the assumptions about the components also ensure that the projected users are the actual users. Also, the gap between the world inscribed in it and the world that will be described by its displacement can be expected to be narrowed, if not eliminated.

6.6.4 Relation to the whole

The discussion in this paper summarises and concludes the earlier reports of the studies. It progressively links all the arguments from all the earlier papers to deduce a context aware framework that can help organisations in their KM efforts. Each of the components is based on the discussions that are spread in other papers. The framework presented in Okunoye (2002a, Paper V) is also improved upon, and presented clearly to conclude the study. Unlike this earlier framework, the framework presented in this paper implicitly includes mechanisms for measuring the final outcome of knowledge management, through the measurement and control elements of the organisational variables.

7 Contributions and Future Research

I began this thesis with the intent of addressing the lack of evidence on knowledge management in developing countries. I wanted to contribute to the body of knowledge through a comprehensive report of the experience of knowledge workers in developing countries. This eventually led to the idea of the framework, which encompasses all the organisational aspects of knowledge management. As stated at the very beginning of this treatise, the main goal is to develop a context-aware framework of knowledge management that could support organisations in developing countries and guide their transition to a knowledge economy. Although this has obvious relevance to practice (Robey and Markus 1998), I also strove to put rigour into the study over the two-year investigative period, by using proven research approaches and pluralistic methodologies in the enquiries.

I address technological issues which are fundamental to information systems, and also discuss other organisational issues. This study also opens opportunities for further investigation and new ways of thinking about knowledge management on a global perspective. In this closing chapter, I summarise the detailed contributions of this study to knowledge management practice and research, the implications that the application of the framework can have on both, the limitations of this study in general, and my immediate future plans.

7.1 Contributions for research

Prior to this thesis, there were very few published sources that considered the differences in knowledge management enablers in developing countries and how they could influence organisational efforts to manage knowledge. Although knowledge management practice and research is not yet common in developing countries, this study was able to provide insights into the state of knowledge management, the perception of the organisations and a whole range of issues for further investigation. For the KM community, I raise the issues of differences in the conceptualisation of knowledge which need to be considered in any design of research that relates to knowledge management. With the continuing influence of globalisation and internationalisation of labour, there has been continued interest in understanding the culture of knowledge workers and what could influence their relationships in a global team. This thesis touches on these issues and has particular implications for global software outsourcing, a growing concern in the knowledge economy.

I have also applied the Leavitt Diamond in the study of knowledge management, and empirically confirmed the need to consider the environment, which was missing in Leavitt's original design. Methodologically, a pervasive problem has been knowing how to measure knowledge processes in organisations. With this study, I demonstrate the possibility to use a knowledge management diagnostic to assess the knowledge processes in knowledge management research. The diagnostic was originally developed for practical use. This study also provides an empirical basis for amendment of the instrument to fit the purposes of any organisations, regardless of location and industry. The findings on environmental influences contribute to an understanding of the institutionalist perspective of organisational challenges (Powell and DiMaggio 1991), from a knowledge management perspective. The emphasis on the importance of the context within which the framework will be applied also brings knowledge management into the current discussion on information systems and global diversity (Korpela 1994; Bada 2000; Walsham 2001; Avgerou 2002).

7.2 Contributions to KM practice

In recent times, there has been increased interest in research on contextual issues on IT in global perspectives. There have also been attempts to convince the research community that the world is not homogeneous and that solutions therefore have to be designed with consideration for local issues. This has influenced the design of artefacts as reflected in software and technologies (e.g. The Simputer Trust 2000). It is also influencing some methodologies like the Made-in-Nigeria methodology (INDEHELA 1999). However, management practices and tools to guide organisations which include models and frameworks are still largely ignored. Large organisations operating in developing countries are able to adapt imported practices, due to economic challenges and their capabilities. The problems arise when the issue impacts on all organisations, irrespective of contextual factors. This is where the contribution of these research findings could play a significant role if adequately utilised.

The framework produced by this research could be used by any organisation, irrespective of size, location and economic background. The only prerequisite is the willingness of the organisation to be competitive and to participate in the knowledge economy. Any consultant with adequate background training could also adapt the framework in providing knowledge management solutions for their client. Firstly, this framework could guide organisations in their knowledge management initiatives, in order to analyse their environmental

factors, and determine what organisational and technological factors need to be addressed. Secondly, a chief knowledge officer, or other knowledge role person, could use the framework to establish a knowledge management project team and justify the decision to the organisations leadership. Thirdly, the framework could be used to support the argument that knowledge management is neither a technological nor organisational issue; rather it is a holistic approach that requires interaction of both. All these could make knowledge management appealing to organisations and assist them to reap the accomplished benefits. They could also save resources, by doing the right thing at the right time through adequate guidance.

7.3 Limitations and future research directions

This work forms a basis and entry point to other areas of interest on knowledge management in developing countries. As one of the pioneering attempts of knowledge management research in developing countries, there are, nevertheless, some limitations in this research.

Foremost are the number of organisations that could be included in the study, and the generalisability of the findings. Although I attempted to improve the generalisability of the results by drawing inferences from a multiple case study, it would be difficult to conclude from only six research organisations out of the thousands in the developing countries. On the other hand, my emphasis on the context of each organisation and its operating environment agrees with the principle of interpretive research, which does not necessarily seek generalisations from the setting to a population, but rather provides an understanding of the deeper structure of a phenomenon, which can then inform other settings (Orlikowski and Baroudi 1991). I have also only looked at research organisations, with the intent to study knowledge workers. However, my framework is meant to be used in any organisation. The question therefore also arises whether conclusions drawn from the evidence from research organisations is directly applicable in business or other types of organisations.

These two limitations have been critically considered, and minimising their effects has been attempted. My conclusion was that the phenomena of the study do not necessarily change with the number of people or organisations. The sample of six organisations in two different countries, with similar characteristics to many other developing countries, is diverse enough to reveal several possible differences that could occur in any parts of these countries. Regarding the second limitation, I have already argued that knowledge management is no longer the concern of knowledge-based organisations alone,

and thus any organisations with interest in managing their knowledge resources should be able to benefit from these findings. However, people working in research organisations seem to be more knowledgeable on knowledge management issues than people in average organisations. Future research could cover this shortcoming by applying the framework in other types of organisation and filling in any missing points.

Hence, the natural continuation of this research will be the practical application of the framework in organisations in developing countries. In the process, we could further validate the framework and learn from the possible problems to be encountered. In this regard, we have planned to conduct action research in two organisations in developing countries (Okunoye 2003e). Also, a more comprehensive case of knowledge management in some of the organisations we studied will be appropriate to support teaching of global knowledge management and evidence of the state of knowledge management in developing countries.

There is also, however, a need to carry out similar studies in research organisations in Western industrialised countries, in order to further establish the arguments for the contextual issues in knowledge management, especially environmental influences. Considering the role of the Internet as an infrastructure for knowledge management systems (Okunoye and Karsten 2003), more in-depth studies in areas that are experienced as problematic in sub-Saharan Africa, such as the reliability of access to the Internet and its influence on work and communication practices would also be necessary.

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APPENDIX 1 Knowledge management diagnostic

Dear Participant,

Knowledge management is a wide-ranging field and these diagnostic questions have been divided into seven sections that will help us in identifying the areas in which your organisation is weak or strong in their knowledge management efforts.

Each section contains a list of 20 statements that needs to be evaluated for the whole organisation.

The evaluation criteria are:

S – the statement is strongly descriptive of my organisation.

M – the statement is moderately descriptive of my organisation.

W – the statement is weakly descriptive of my organisation.

Please note that you are expected to provide your view at the organisation level and not at project or group level.

We rely on your accurate and objective answers to get a reliable outcome.

Name of the Organisation:

Location:

Department/Group or Project Name:

Position:

Previous knowledge about knowledge management (Y/N):

Access to Internet services (email, www etc):

Please note that you may not answer any question you don't feel like answering. All the information you provide here will remain confidential and will only be used for research purposes.

Thanks

Adekunle Okunoye

	Section 2: Use	S	M	W
S2A	Our reporting relationship do not interfere with people getting the information they need			
S2B	Office space is not used as a symbol of status or seniority in our organisation			
S2C	People would say that changes in our workspace are based as much on a need to collaborate as on a need to cut cost			
S2D	Every one can describe how their decisions can affect overall organizational performance			
S2E	Everyone speaks up if they have an opinion or idea to offer			
S2F	We seriously consider what others might call crazy or outrageous ideas as part of our problem-solving process			
S2G	We view collaborating with competitors to grow the industry as a good thing to do			
S2H	We give all promising ideas thorough consideration, no matter who they come from			
S2I	We make a point of not structuring some of our meetings because it helps us think more creatively about problem solving			
S2J	Involving our customers in the process of creating and developing new products and services is a well-established practice in our organisation			
S2K	Our workspace provides us with the flexibility to take our work where we need to with very little effort.			
S2L	Anyone who has a good idea can get support to follow up on it			
S2M	People would describe our organisation as flexible rather than rigid			
S2N	We have just right level of security protocols for our sensitive information			
S2O	Everyone in our organisation can explain the basics about our financials			
S2P	We frequently partner with other organisations/individuals to improve the value we deliver in our programmes			
S2Q	Our workspace is designed to promote the flow if ideas between work groups			
S2R	People in our organisation can use the information they get to improve their work			
S2S	We adjust our reporting relationships based on the work that people need to do			
S2T	We use approaches that people would call playful as part of our problem-solving process			

	Section 3: Learn	S	M	W
S3A	Before people fix problems, they consider the overall context in which the problem occurred			
S3B	We build models of our decision-making systems to better understand why things happen the way they do			
S3C	Teams engage in off-site learning experiences to find better ways of working together			
S3D	We use work-related games and simulations to think more clearly about our business situations			
S3E	Reflecting on lessons learned from work experiences is an established practice in our organization			
S3F	People apply what they learn outside the organisation to their work			
S3G	When people finish projects, they generally take the time to meet with their team and analyse what went wrong and what could have been done better			
S3H	Our learning process often includes gathering feedback from customers			
S3I	Our planning process includes looking at a number of scenarios so that we can think through how to respond in different situations			
S3J	When a failure occurs, our first response is not to assign blame			
S3K	People in our organization exhibits a natural curiosity			
S3L	People admit when they fail			
S3M	People apply the ideas they developed in past work situations to new ones			
S3N	When we have a big success, we talk together about what we did right			
S3O	In our organisation failure is considered as opportunity to learn			
S3P	Our organisation supports group activities that promote mutual learning			
S3Q	At some time or another, everyone in our organisation does ‘hands-on’ work to get first-hand experience of the consequences of their decisions			
S3R	Learning from failure is incorporated into how we conduct subsequent work			
S3S	We try to ensure that people have some overlapping responsibilities, so that it is easier to learn from one another			
S3T	We treat disagreement as an opportunity to learn from one another			

	Section 4: Contribute	S	M	W
S4A	Dedicated roles, such as knowledge manager or knowledge coordinator ⁹ , support the knowledge-sharing process			
S4B	The organisation has determined where knowledge sharing across groups will yield the highest mutual benefits			
S4C	We acknowledge individual contribution to our groupware ¹⁰ systems by linking it to the name of the original author			
S4D	Face-to-face interactions are used to strengthen electronic communications			
S4E	People would say that sharing knowledge does not diminish the individual's value to the organisation			
S4F	People are members of multiple communities, making it easier to transfer knowledge across the entire organisation.			
S4G	People who refuse to share knowledge do not get certain organisational benefits			
S4H	We link people across traditional organisational units and functional groups to promote knowledge sharing			
S4I	Professional moderators and facilitators help people better express what they know so that others can understand it			
S4J	Electronic and physical spaces where we store our knowledge have an intuitive structure that helps people direct their contributions			
S4K	People have a say in what happens to the ideas and expertise they share with others			
S4L	Knowledge-sharing behaviours is built into the performance appraisal system			
S4M	Face-to-face interactions are used to transfer difficult to articulate 'tacit' knowledge			
S4N	Our organisation looks for ways to remove barriers to knowledge sharing			
S4O	Processes for contributing knowledge to the organisation's repositories are seamlessly integrated into work activities			
S4P	People can identify others in the organisation who might benefit from their knowledge			
S4Q	Knowledge sharing is publicly recognised			
S4R	The organisation has legitimised sharing knowledge by giving people the time to do it			
S4S	People focus their knowledge sharing activities on mission-critical information			
S4T	People operate under the assumption that when they use knowledge contributed by others in the organisation, they are obligated to contribute their own knowledge at some point			

⁹ Including Head of Training

¹⁰ Please specify if you do not have any groupware in your organisation (e.g. NO GROUPWARE)

	Section 5: Assess	S	M	W
S5A	We recognise that knowledge is part of our asset base			
S5B	Members of the senior management team frequently talk about knowledge management when reporting on the state of the organisation			
S5C	The process of measuring knowledge helps us better understand what it is we are trying to manage			
S5D	We measure our knowledge management process and its result			
S5E	We issue an external document that reports on how well we manage knowledge			
S5F	We can link knowledge management activities to measurable results			
S5G	People know what metrics are used to monitor the knowledge management process and its results			
S5H	We talk about measuring knowledge in ways that people can readily understand			
S5I	We have developed a framework that links knowledge management activities to strategic outcomes			
S5J	We have a framework that describes how our organisation's knowledge-based assets interact with one another to create value			
S5K	We experiment with different ways of measuring how well we manage knowledge			
S5L	We rely on a blend of hard facts, numbers, rules of thumb and non-metric information to make knowledge management decisions			
S5M	Senior management assesses what knowledge needs to be developed when it allocates resources			
S5N	Assessment of knowledge-based assets is part of our overall organisational performance measurement process			
S5O	We have been practicing knowledge management for some time without calling it that.			
S5P	We issue an internal document that reports on how well we manage knowledge.			
S5Q	We rely on a team whose members have valuation, measurement and operating expertise to assess our knowledge management process and its results			
S5R	We have mapped the process flow of knowledge management activities			
S5S	People can explain the difference between valuation and performance			
S5T	We use qualitative as well as quantitative metrics to gauge the effectiveness of our knowledge management process and its results			

	Section 6: Build/Sustain	S	M	W
S6A	We routinely ask ourselves how we can leverage our knowledge into other areas			
S6B	It does not matter which group came up with an idea or technology, anyone in the company can use it			
S6C	We believe that knowledge management is everybody's business			
S6D	We encourage people to think about how their non-work-related activities could benefit the organisation			
S6E	Our IT systems connect us to information sources we need to do our work			
S6F	Our formal and informal values are aligned			
S6G	Our IT systems promote the formation of different networks of people			
S6H	Our top executives ask all managers to include knowledge management in their business plans			
S6I	Our products development process explicitly includes our customers			
S6J	Our organisation treats people like assets rather than cost			
S6K	We have launched a group or appointed a person to lead our knowledge management effort			
S6L	People generally trust the information they find in our IT systems			
S6M	We find ourselves increasingly teaming up with other organisations in strategic networks or partnerships to bring innovative products to market			
S6N	We view information technology as a tool to help us get our work done			
S6O	We have had successful new product ideas from employees' non-work interests			
S6P	Our products(or services) deliver much higher value as a result of the knowledge they contain			
S6Q	We strive to retain people who have mission-critical skills			
S6R	We have a formal policy that insures we share technology and ideas across units or group borders			
S6S	People know when it is not appropriate to share knowledge externally			
S6T	We see our products and services as having both tangible and intangible (or knowledge-based) dimension			

	Section 7:Divest	S	M	W
S7A	Our decision to acquire knowledge is based on how much we can leverage it			
S7B	When new opportunity arises, we first try to retool our existing skills before we hire a lot of new people			
S7C	We make divestment decisions based on both the strategic importance of knowledge-based assets and financial projections			
S7D	We try to understand the impact of relationships on productivity before we automate tasks and replace person-to-person contact with person-to-computer contact			
S7E	Before we accept new projects or orders, we think about whether the knowledge we will build for our organisation can be used in other ways			
S7F	We participate in industry-based research groups to help us decide whether we need to acquire new knowledge			
S7G	When groups find ways to work with fewer people, they figure out how to pursue higher value activities rather than terminate people			
S7H	We may refuse to work for a customer of doing the work does not build knowledge that we can use in other ways			
S7I	We divest knowledge in a planned, deliberate way			
S7J	When we get rid of businesses or groups of people, we treat the people who are affected with dignity and respect			
S7K	We regularly review our promotion practices to make sure that we are not losing people with strategically important knowledge			
S7L	We apprentice our people to other organisations to determine if we need to acquire new skills or expertise			
S7M	We form alliances with organisations that complements our skill sets as an alternative to doing everything ourselves			
S7N	When we divest tangible assets, we are aware of the knowledge components they carry			
S7O	We outsource skills and expertise that do not support our core competencies			
S7P	We routinely examine whether we are supporting non-strategic knowledge at the expense of strategically critical knowledge			
S7Q	Before we terminate people, we try to determine if their skills and expertise can be used elsewhere			
S7R	We prefer to use the resources and skills we have in place when testing a new business idea			
S7S	We make use of informal relationships with related businesses in our local area to keep our knowledge pool up to date			
S7T	Our organisation considers the impact that letting people go will have on loyalty contribution and commitment			

APPENDIX 2 Interview themes

Knowledge Management

- Respondent view about knowledge management
- What can be the effects of knowledge management
 - key employee's departure
- How fully are they utilising the technology infrastructure?
- Different ways of storing information
 - where do they store (people's head, paper etc)
 -
- Which type of technology that facilitate knowledge management has been implemented in their organisation
 - Internet access, intranets, document management systems
 - Data warehousing/knowledge repositories
 - Decision support system, group support systems
 - Creation of networks of knowledge workers
 - mapping sources of internal expertise
 - Establishing new knowledge roles
- Are their methods and processes available electronically to all who need it ?
- Are they doing anything currently about knowledge management? what stage are they ?
 - Investigating the problem of knowledge management
 - Implementing knowledge management
 - Establishment of informal knowledge management networks
- Is there any knowledge management strategy in place ?
 - Allocation of responsibilities at management level, knowledge role
 - Budget
- Are they prepared for knowledge management
 - Resources (time, people, willingness to share)
 - Reward
 - Knowledge is power?

- if they have knowledge management initiative,
 - what was their expectations,
 - have they achieved any significant benefit.
- What is their perception about knowledge management ?
 - information centric – provision of right information at the right time
 - technology centric – considering a specific form of information systems and technologies as part of knowledge management initiatives
 - organisational centric – view KM in terms of organisation learning, communication, organization culture, etc
- What do they consider as a barrier to knowledge management
 - technology, people, organisation
- What knowledge domain is of interest to them
 - access to grant information, expert network, current related publications etc
- How are they currently getting, and sharing their knowledge
- Could technology help to change the way things are being done currently
 - Communication, coordination, cooperation, interaction etc
 - Joint paper writing and editing
 - Grant application
 - Knowledge about local community
 - Training and education

Information technology Infrastructure

- Are they fully aware about the available infrastructures?
 - How to effectively utilise it?
- Do they sometimes felt constraint by the infrastructure?
 - Could improved infrastructure make any difference?
- How easy is it for them to get software /hardware they required for their work?
 - Technical support
- Their experience in other countries
- How are they doing things in the absence of information technology infrastructures?

APPENDIX 3 Information technology infrastructure capabilities

ServId	Core Information Technology Infrastructure Services	IITA	NISER	NIMR	MRC	ITC	NARI
1.	Manage firm-wide communication network services	Y	N	N	Y	N	N
2.	Manage group-wide or firm-wide messaging services	Y	N	N	Y	Y	N
3.	Recommended standards for at least one component of IT architecture (e.g., hardware, operating systems, data, communications)	Y	Y	Y	Y	N	Y
4.	Implement security, disaster planning, and business recovery services for firm-wide installations and applications	Y	Y	N	Y	N	N
5.	Provide technology advice and support services	Y	Y	Y	Y	N	Y
6.	Manage, maintain, support large-scale data processing facilities (e.g., mainframe operations)	Y	N	N	N	N	N
7.	Manage firm-wide or business-unit applications and database	Y	N	Y	N	Y	Y
8.	Perform IS project management	Y	Y	N	N	N	N
9.	Provide data management advice and consultancy services	Y	N	Y	Y	Y	Y
10.	Perform IS planning for business units	Y	N	N	Y	N	N
Additional Information Technology Infrastructure Services							
11.	Enforce IT architecture and standards	Y	N	N	Y	Y	N
12.	Manage firm-wide or business-unit workstation networks (e.g., LANs, POS)	Y	N	N	Y	N	Y
13.	Manage and negotiate with suppliers and outsourcers	Y	Y	Y	Y	Y	N
14.	Identify and test new technologies for business purposes	Y	Y	N	Y	N	N
15.	Develop business-unit specific applications (usually on a chargeback or contractual basis)	Y	Y	N	N	N	N
16.	Implement security, disaster planning, and recovery for business units	Y	Y	N	Y	N	N
17.	Electronically provide management Information (e.g., EIS)	Y	Y	N	Y	Y	N
18.	Manage business-unit-specific applications	N	Y	Y	N	Y	N
19.	Provide firm-wide or business-unit data management, including standards	Y	Y	Y	Y	Y	Y

20.	Develop and manage electronic linkages to supplier or customers	N	N	N	Y	N	N
21.	Develop a common systems development environment	N	N	N	N	N	N
22.	Provide technology education services (e.g., training)	Y	Y	N	Y	N	Y
23.	Provide multimedia operations and development (e.g., video-conferencing)	N	N	N	N	N	N

APPENDIX 4 Detailed list of participants by organisation

	ORG.	LOCATION	POSITION	DEPARTMENT	QUES	FORMID	RECORDED	TAPENO	DATE
1	IITA	IBADAN	HEAD, ISAT	ISAT	Y	IITA01	Y	IITA4	25.1.2001
2	IITA	IBADAN	RESEARCH FELLOW	GRU	Y	IITA02	Y	IITA1	2.2.2001
3	IITA	IBADAN	HEAD, LIBRARY AND DOCUMENTATION UNIT	ISAT	Y	IITA03	Y	IITA3	25.1.2001
4	IITA	IBADAN	HEAD OF COMPUTING	COMPUTER SERVICES	Y	IITA04	Y	IITA2	29.1.2001
5	ITC	BANJUL	RESEARCH ASSOCIATE	ANIMAL NUTRITION	Y	ITC01	Y	ITC1	27.2.2001
6	ITC	BANJUL	RESEARCH ASSOCIATES (BIOMETRICIAN)		Y	ITC02	Y	ITC1	27.2.2001
7	ITC	BANJUL	RESEARCH FELLOW	HORTICULTURE LIVESTOCK INTEGRATION	Y	ITC03	Y	ITC2	1.3.2001
8	ITC	BANJUL	SENIOR SCIENTIST	MARKET ORIENTED SYSTEMS RESEARCH	Y	ITC04	Y	ITC2	1.3.2001
9	MRC	FAJARA	DATA MANAGER	HIV PROGRAMME	Y	MRC01	Y	MRC2	27.2.2001
10	MRC	FAJARA	STATISTICIANS	STATISTICS	Y	MRC02			
11	MRC	FARAFENNI	RESEARCH GYNAECOLOGIST	REPRODUCTIVE HEALTH	Y	MRC03	Y	MRC3	24.2.2001
12	MRC	FAJARA	EPIDEMIOLOGIST	HIV PROGRAMME	Y	MRC04	Y	MRC2	27.2.2001
13	MRC	FAJARA	HIGHER SCIENTIFIC OFFICE	REPRODUCTIVE HEALTH	Y	MRC05	Y	MRC5	28.2.2001
14	MRC	FAJARA	DIRECTOR OF TRAINING	TRAINING	Y	MRC06	Y	MRC4	19.2.2001
15	MRC	FAJARA	STAFF DEVELOPMENT OFFICER	TRAINING	N		Y	MRC1	28.2.2001
16	MRC	BASSE	RESEARCH PEADATRICIAN	BASSE FIELD STATION	N		Y	MRC3	26.2.2001
17	MRC	FAJARA	HEAD OF COMPUTING	COMPUTER	N		Y	MRC5	28.2.2001
18	MRC	FAJARA	LIBRARIAN	LIBRARY	N		N		

19	NARI	BRIKAMA	PROGRAM LEADER	SEED TECHNOLOGY	Y	NARI01	Y	NARI3	22.2.2001
20	NARI	BRIKAMA	TECHNICAL OFFICER	SOCIOECONOMIC PROGRAM	Y	NARI02	Y	NARI2	23.2.2001
21	NARI	BRIKAMA	RESEARCH OFFICER	GRAIN, LEGUME AND OIL SEEDS	Y	NARI03	N		21.2.2001
22	NARI	BRIKAMA	PROGRAM LEADER	FISHERIES	Y	NARI04	Y	NARI3	22.2.2001
23	NARI	BRIKAMA	Ag. LIBRARIAN	LIBRARY	Y	NARI05	Y	NARI4	21.2.2001
24	NARI	BRIKAMA	SOIL LAB. MANAGER	SOILTESTING	Y	NARI06	Y	NARI4	21.2.2001
25	NARI	BRIKAMA	RESEARCH OFFICER	AGRO FORESTRY	Y	NARI07	Y	NARI5	21.2.2001
26	NARI	BRIKAMA	FARM MANAGER	FARM MANAGEMENT UNIT	Y	NARI08	Y	NARI2	22.2.2001
27	NARI	BRIKAMA	PROGRAM LEADER	PEST MANAGEMENT	Y	NARI09	Y	NARI3	22.2.2001
28	NARI	SAPU	RESEARCH OFFICER	CEREALS	Y	NARI10	N		22.2.2001
29	NARI	BRIKAMA	DIRECTOR GENERAL	RESEARCH MANAGEMENT	N		Y	NARI1	23.2.2001
30	NARI	BRIKAMA	ASSISTANT LIBRARIAN	LIBRARY	N		Y	NARI4	21.2.2001
31	NARI	BRIKAMA	COMPUTER TECHNICIAN	COMPUTER	N		Y	NARI5	22.2.2001
32	NIMR	LAGOS	RESEARCH FELLOW	PUBLIC HEALTH DIVISION	Y	NIMR01	Y	NIMR2	7.2.2001
33	NIMR	LAGOS	RESEARCH FELLOW	BIOCHEMISTRY	Y	NIMR02	Y	NIMR2	12.2.2001
34	NIMR	LAGOS	DEPUTY DIRECTOR (RESEARCH)	BIOCHEMISTRY AND NUTRITION	Y	NIMR03			
35	NIMR	LAGOS	CHIEF MEDICAL LABORATORY SCIENTIST	GENETICS	Y	NIMR04			
36	NIMR	LAGOS	PRICIPAL MEDICAL LAB. SCIENTIST	HIV PROGRAMME	Y	NIMR05			
37	NIMR	LAGOS	RESEARCH SCIENTIST	GENETICS	N		Y	NIMR1	7.2.2001
38	NIMR	LAGOS	RESEARCH FELLOW	TRADO MEDICINE	N		Y	NIMR1	12.2.2001
39	NIMR	LAGOS	LIBRARIAN	LIBRARY	N		Y	NIMR2	14.2.2001
40	NIMR	LAGOS	COMPUTER PERSONNEL	COMPUTER SECTION	N		Y	NIMR2	12.2.2001
41	NISER	IBADAN	RESEARCH FELLOW	BTDD	Y	NISER01	Y	NISER1	31.1.2001
42	NISER	IBADAN	DIRECTOR	ECONOMIC DEVELOPMENT	Y	NISER02	Y	NISER3	1.2.2001

43	NISER	IBADAN	PROFESSOR	PHYSICAL DEVELOPMENT	Y	NISER03			
44	NISER	IBADAN	RESEARCH FELLOW	HUMAN RESOURCES	Y	NISER04			
45	NISER	IBADAN	CHIEF SYSTEMS ANALYST/HEAD	DATA PROCESSING UNIT	Y	NISER05	Y	NISER2	31.1.2001
46	NISER	IBADAN	RESEARCH PROFESSOR	SOCIAL DEVELOPMENT	Y	NISER06			
47	NISER	IBADAN	RESEARCH FELLOW	HUMAN RESOURCES	Y	NISER07			
48	NISER	IBADAN	LIBRARIAN	LIBRARY	Y	NISER08	N		31.1.2001

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