UNIVERSITY OF THE WESTERN CAPE

Thesis Title

Knowledge Management in a South African Organisation:
Application and comparison of the work of Nonaka and Takeuchi to practice.

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PROPOSED DEGREE: **M.Com**

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*"Thank YOU **GOD** for being with me all these years, making things possible and allowing me to succeed where success was not always possible and still being with me, my family and friends"*

The idea for this thesis originated from a discussion with my friends Darryl Jacobs, Clive Julius, Andre Redlinghuys and Thando Mjebeza who all at the time started a thesis or wanted to start a thesis on Masters level. The final stamp of approval for pursuing a Masters degree came from my mother, Muriel Ann Harry, who asks me if I am going to finish my Masters one day. I've never discussed my intentions of completing a Masters degree with my mother and yet she recognized the hunger for knowledge on a higher level within me. My wife, Manita, was very supportive in my quest to pursue a Masters degree. Taking the journey with me was not easy but she managed to help me find the balance with my son Matthew, and the rest of the family, Pepper and Snow.

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R. Harry

KEY WORDS

Knowledge creation process

Information Technology

Human Resources

Knowledge management methodology

Tacit knowledge

Explicit knowledge

Organisation

Knowledge Assets

Ba– physical context

Knowledge management

ABSTRACT

Knowledge Management in a South African Organisation: Application and comparison of the work of Nonaka and Takeuchi to practice.

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The aim of this thesis is to provide a better understanding of how the knowledge creation process can be used to add value to the management of knowledge in a South African organisation. This thesis is an upgrade from the researcher's honours thesis with a more practical nature to the management of knowledge. This thesis describes, explores and explains how knowledge is created within an organisation, how the organisation can use it to add value to its current business practices and how a knowledge management methodology that is aligned with the systems thinking principle can be used to manage the knowledge creation process. The thesis looks at two different perspectives within a South African organisation for knowledge creation and sharing: one from an Information Technology perspective and one from a Human Resource perspective. The findings of this study suggest that, by understanding how knowledge is created and how Information Technology and Human Resource departments can add considerable value to the organisation's competitive environment through the implementation of a knowledge management methodology to manage the knowledge creation process, using different types of technology, different training methods and different approaches to the initiative

September 2005

DECLARATION

I declare that Knowledge Management in a South African Organisation: Application and comparison of the work of Nonaka and Takeuchi to practice is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by references.

Full Name: Ricardo Harry Date: September 30, 2005

Signed:……

1. CHAPTER 1 - INTRODUCTION

1.1 Introduction.

"For the last two hundred years, neoclassical economics has recognised only two factors of production: labour and capital. Knowledge, productivity, education, and intellectual capital were all regarded as exogenous factors – that is, falling outside the system. New Growth Theory is based on work by Stanford economist Paul Romer and others who have attempted to deal with the causes of long-term growth, something that traditional economic models have had difficulty with. Following from the work of economists such as Joseph Schumpeter, Robert Solow and others, Romer has proposed a change to the neoclassical model by seeing technology (and the knowledge on which it is based) as an intrinsic part of the economic system. Knowledge has become the third factor of production in leading economies."

Abstract from the New Zealand Government Report on the Knowledge Economy, August 1999.

Two hundred years after the industrial revolution dramatically changed the established world order; we are once again in the midst of a sharp transformation. The likely effects of this, according to Jeremy and Tony Hope, would be a period of dislocation followed by a period of prosperity. The only uncertainty regarding transformation is how long the process will take. (Hope & Hope 1997)

According to Hope and Hope (1997), Peter Drucker believed that we are now entering a post-capitalist society in which capitalist and proletarians will be replaced by knowledge and service workers. Peter F. Drucker, as cited by Hope & Hope 1997, stated that *"every few hundred years in Western history there occurs a sharp transformation"*. Within a few short decades, society rearranges itself – its worldview; its basic values; its social and political structure; its arts; its key institutions. A couple of decades later there is a new world and the people born cannot even imagine the world in which their grandparents lived and into which their own parents were born (Hope & Hope 1997).

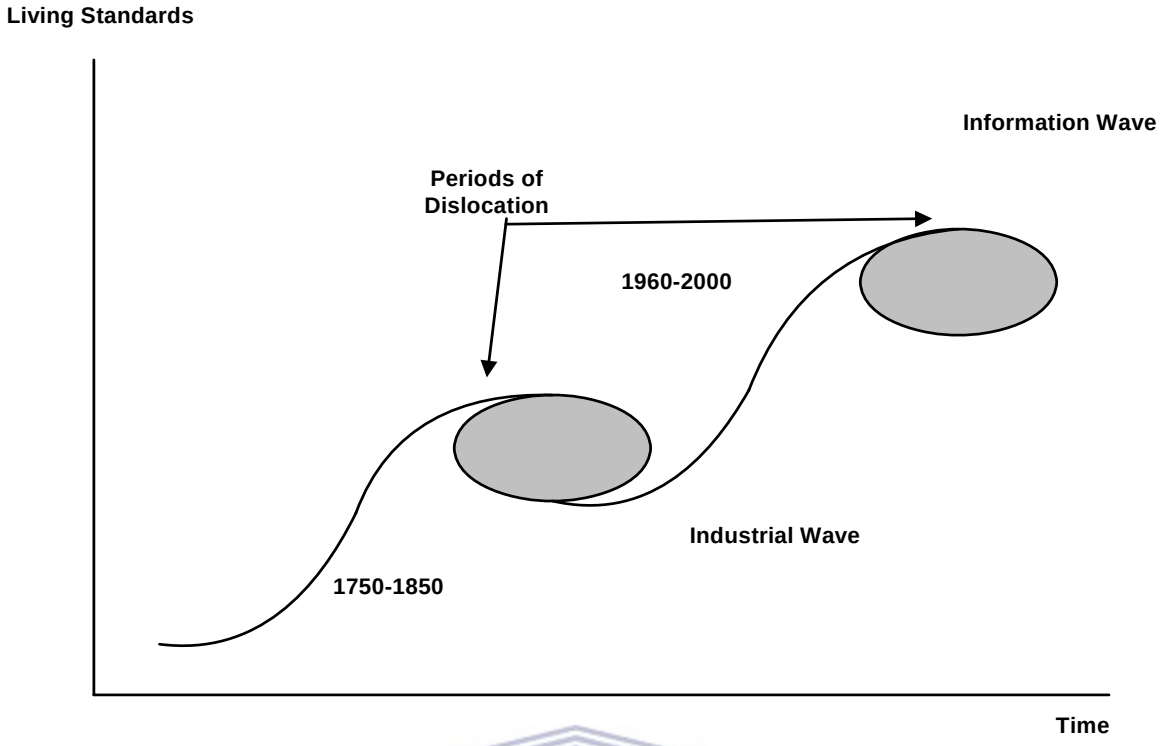


Figure 1: The Three waves of Economic Change
Source: Hope & Hope (1997)

1.2 The Three waves of Economic Change

The transitional periods between these three great waves of change have been anything but smooth. In the figure above each wave is represented by an "S" curve that shows an early period of dislocation, followed by a long spell of maturity, and then its eventual demise as new technologies take over. Old jobs become obsolete, vast retraining programs are needed, and education formats have to be adapted as new wave businesses demand more appropriate skills and relevant knowledge (Hope & Hope 1997).

The first wave (see figure 1) was driven by physical labour and the second wave by machines and blue-collar workers, and the third wave by information technology and knowledge workers (Hope & Hope 1997).

The business organisation as we know it today has evolved during the second wave, but many of the accepted management principles and practices that brought success throughout the period are not aligned with the competitive environment of the information age.

According to Maynard and Mehrtens (1993) our society and businesses are facing more challenges in the twentieth century. Organisations need visions of the future so attractive, inspiring and compelling that people will shift from their current mind-set of focusing on immediate crises to one of eagerly anticipating the future, a future where the health and well being of the earth and inhabitants is secure. Business will really have to invest in society to lift and enhance the local economy in the knowledge era (Maynard & Mehrtens 1993).

Manville and Ober (2003) argue that corporate ownership structures, governance systems and incentive programs are still firmly rooted in the industrial age. Apart from investing in society, organisations need to conform to new management styles and techniques to govern their corporate structures in the knowledge economy.

Moving past the industrial age and into the knowledge economy an organisation's primary source of survival is the information and knowledge they possess. The most successful organisations are those that utilise their intangible assets better and faster then their competitors. Knowledge and information are nowadays the drivers and determinants of the organisation's livelihood, much more than land, capital or labour.

Business constantly needs to improve, but improvement requires change. The question to be posed in this regard should be based on how the change should be implemented, and not whether to change. Again there is very little choice. Cutting costs by cutting budgets and trying to reduce the work force has been attempted to save on capital investments. Introducing quality programmes to existing business processes has also been tried. These methods were not successful in providing a sustainable solution and were merely introduced to solve short problems. Even the most recent approach, business process re-engineering (BPR), which is just a repeat of previous cost cutting approaches, could not convince practice and industry leaders of its effectiveness in the longer term since more complex factors arise as the business environment evolve.

According to Ponzi and Koenig (2002) knowledge management is not just another management fad. They state that the academic and industrial communities have observed numerous management fads over a period of time. Some of the most popular management

fads include Quality Circles, Total Quality Management, and Business Process Reengineering.

In the early 1980s, Quality Circles became of interest to American manufacturers as a competitive tool in response to the quality gap between America and Japan. This management technique theorised the importance of organisational goals to achieve greater quality and labour productivity. Ponzi and Koenig (2002) stated that the growth pattern of Quality Circles depicts a rapid growth starting in 1978 and then reversing in 1982 and by 1986, this measure returned to its pre-popularity levels, which indicates a management fad.

Total Quality Management and Business Process Reengineering were quality movements that became popular in the 1980s and 1990s. Between 1992 and 1994 Total Quality Management showed strong growth as a management tool. It started declining in popularity after 1994. Business Process Reengineering (BPR) is the redesign and reorganisation of business activities that result from questioning the status quo and seek to fulfil specific objectives and can lead to break through improvement and is often associated with cultural and organisational change according Sethi and King (1998). The BPR concept was introduced in the 1990s and reached its peak in 1995. It started declining after 1995 as a management tool due to the rise of the knowledge economy. Knowledge management is being considered by many as an emerging multidisciplinary field associated with the likes of system engineering, organisational learning, and decision support, to mention a few (Ponzi and Koenig, 2002). Subsequent Knowledge Management (KM) initiatives were arguably a response to this problem. Organisations have realised that the increased importance of knowledge does not simply add an additional variable to the production process of goods and services; but it substantially changes the rules of the game. Business processes are seen as knowledge assets that belong to the organisation and its sub processes can consist of other knowledge assets. Chapter Two of this thesis will discuss how business processes will fit into the knowledge management environment.

Newell, Huang, Galliers and Pan (2003) state that BPR is typically associated with downsizing. This means that many employees were made redundant as organisations sought to improve the efficiency of their business processes and reduce costs. They argue that many

organisations subsequently found that an unintended negative consequence of their BPR initiative was a loss of organisational knowledge, which they had quite literally allowed to 'walk out the door' in the form of redundant employees. If the organisations that undertook BPR initiatives were to be informed about the value of the knowledge assets they dispose off when they redesign their business processes, then it would be an entirely different story.

An organisation consists of many functional departments, which include the Marketing, Finance, Production and Operations, Purchasing, Public Relations, Information Systems and Human Resource management functional department. Traditionally most of the organisation's knowledge transfer has been and still is part of the Human Resource management function. This knowledge transfer initiatives used to be part of Training and Development, Personnel Development and Career and Succession Planning in order to align the organisation for current and future skill's needs. The same can be said about the Innovation Management (IM) and Organisational Development (OD) fields, which have always been concerned with learning and the transfer of knowledge in the form of training and other knowledge sharing programs. Soliman and Spooner (2000) state, *"the human resources departments are well positioned to ensure the success of knowledge management programs, which are directed at capturing, using and re-using employees' knowledge"*. They also argue that human resources management can create a culture that encourages the free flow of knowledge for meeting organisational goals. Although Human Resources Management (HRM) has played an increasingly important role in the structure of organisations in recent years, there are still areas where it can progress even further to improve the competitive position of organisations. Sharing knowledge requires trust, mutual respect and collaboration between employees and the Human Resource department. The Human Resource department can implement initiatives to create a trustworthy environment where employees will have mutual respect for each other's contribution to the body of organisational knowledge and motivate them to share knowledge throughout the organisation. Soliman and Spooner (2000) argue that the role of human resources management goes beyond mapping the human resources knowledge and that a significant part of the HRM role lies in identifying the knowledge gap(s) and thus assisting in filling the strategic gaps of organisations.

Allen Lee (as cited by Mjebeza 2002) states that in order to understand Information Technology (IT) one should understand the concept of an Information System (IS) first. Lee defines an Information System as "*a system that include all processes and components used to capture data, process it and produce output"* and can be computer based or manual system.

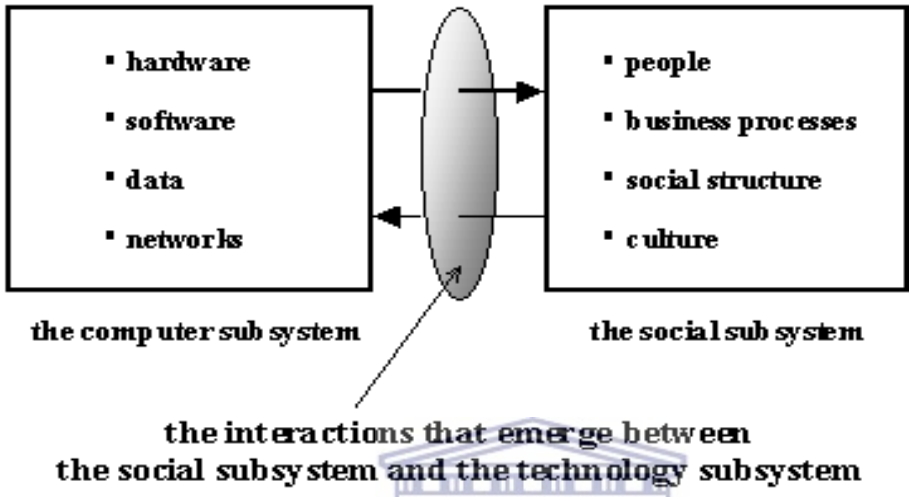


Figure 2: A way of conceptualising an Information System as system (Mjebeza, 2002)

As shown in figure 2 there is interaction between the social sub-system and the computer-sub-system. This means one does not function without the other. For example, without people, there would be no one to operate (e.g. data capturing) computers and networks. Mjebeza (2002) argues that Information Technology is the technological part of IS. He further states that the Information Systems model (figure 2) conceptualises Information Systems as the computer sub-systems.

The Information Technology (IT) department manages the technology and computer infrastructure that drives an organisation's business systems and processes. O'Brien (1991) states that the information society's economy is heavily dependent on the knowledge worker who has to deploy their knowledge to the benefit of themselves, their organisations and the society. Computers and Information Technology are major tools in the production and use of information. In the knowledge economy the role of the IT department goes beyond their daily operational activities that include end-user technical support, desktop management, network management, communication and the implementation of business applications.

Malhorta (as cited by Srikantaiah and Koenig 2001) argues that an organisation's strategic needs for creating and re-creating knowledge can be met by synergy between data and information processing capabilities of advance information technologies and innovative and creative capabilities latent in the organisations human members. This gave rise to the importance of IT and HR's role in the knowledge management in the organisation that will be discussed in Chapter Two.

1.3 Problem statement

The specific problem that has been identified in this project is that knowledge management (KM) means different things to professionals in different industries and is often associated with huge capital investments in Information Technology (IT) with little or no return on investment. Managing information is just one component of knowledge management, managing the people component and the knowledge creation components add different dimensions to knowledge management. There are currently numerous KM frameworks adding to the knowledge management literature but none are fully compliant with the systems thinking concept and very few explain how knowledge is created and how the other components should be managed. One cannot manage something to best effect if one does not know how it is created and the circumstances surrounding its application.

This project will investigate the degree to which one South African organisation, EPI-USE, with its culturally rich workforce, conforms to the unified knowledge creation process from Nonaka and Takeuchi (1995), and how this process can add value to the management of the knowledge management components in the business environment. This thesis will specifically focus on the contribution that Human Resource (HR) and Information Technology (IT) management makes to the management of knowledge in the organisation. This thesis will also seek to find a methodology that is aligned with the systems thinking concept to manage the knowledge creation process within the organisation. At this stage a research design will be established and tested in one organisation. In summary the research objective is to indicate:

- How do HR and IT facilitate the KM process?
- What type of KM methodology is aligned with systems thinking, and how can it be implemented to facilitate a KM initiative at EPI-USE.

- How can the SECI process add value to the management of knowledge at EPI-USE.

1.4 Thesis Outline

This paper is divided into 7 sections:

- Chapter One – introductory chapter.
- Chapter Two will discuss the literature reviewed for the purpose of this study and the Conceptual Framework.
- Chapter Three will discuss the Research Methodology.
- Chapter Four will discuss the Results from the data collection.
- Chapter Five will discuss the data analysis and conclusion.
- A comprehensive reference list is attached.
- The appendices contain an overview of the interviews, a copy of the interview guide used to gather information for the case studies and the responses to the questionnaire.

1.5 Thesis framework

The framework below in figure 3 outlines the layout of this research paper.

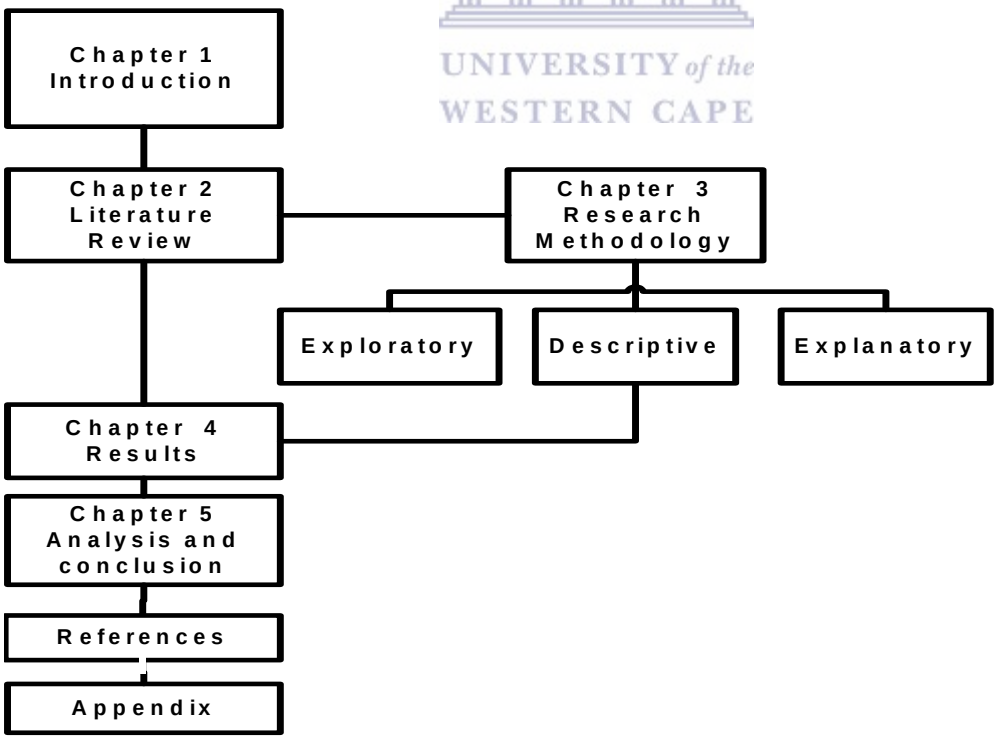


Figure 3: Thesis Framework

2. CHAPTER 2 – Literature Review

In this chapter some of the concepts and definitions used through out this thesis will be introduced. The history of knowledge management and the creation of knowledge will be discussed. An explanation of the knowledge conversion process of Nonaka and Takeuchi (1995) as well as a critical appraisal thereof in terms of the contribution made to the knowledge management body of knowledge will appear later in the chapter. In order to start answering the research questions in chapter one it is important to understand how knowledge is created and what the current and future trends are in the knowledge management environment.

2.1 Definitions

2.1.1 What is Knowledge?

Wigg, as cited by Liebowitz (1999), defines knowledge as *"a concept that consist of truths and beliefs, perspectives and concepts, judgement and expectation, methodologies and know how*".

Beckman, as cited by Liebowitz (1999), defines knowledge *as "reasoning about information and data actively enable performance, problem solving, decision-making, learning and teaching*".

Both Wigg and Beckman's definitions acknowledge that the knowledge concept has a strong relation to cognition. Judgement, problem solving, decision-making are all part of the thinking process.

Nonaka and Takeuchi (1995) have divided knowledge into two categories according to accessibility: *explicit* and *tacit* knowledge. They argue that explicit knowledge can be stored in documents or electronic media and reside outside the human mind, and that tacit knowledge is knowledge that resides within the human mind and is therefore difficult to express explicitly. For example, a surgeon might find it difficult to explain to an assistant how to perform an operational procedure in the operating theatre.

2.1.2 What is Organisational Knowledge?

There are several media in which knowledge can reside within an organisation, including documents, computers and the human mind. Organisational knowledge, as defined by Brooking (2000), is a collective sum of human centered assets, intellectual property assets, infrastructure assets and market assets.

Meyer, as cited by Liebowitz (1999), defines organisational knowledge as "*processed information embedded in routines and processes that enable action. It is also knowledge captured by the organisation's systems, processes, products, rules and cultures*".

Brooking and Meyer both acknowledge that organisational knowledge is greater than knowledge on an individual level and both view it from the whole organisation's perspective.

2.1.3 What is Knowledge Management (KM)?

Beckman, as cited by Liebowitz (1999), states that "*KM is the formalization of and access to experience, knowledge, and expertise that create new capabilities, enable superior performance, encourage innovation and enhance customer value".*

Van der Spek, as cited by Liebowitz (1999), defines KM as "*the explicit control and management of knowledge within an organisation aimed at achieving the organisation's objective*".

Thus, KM is the concept of fostering organisational learning, both internally and externally, to enhance the organisation's competitive position in a highly competitive, constantly changing and innovative market environment. This concept will be applied throughout this thesis.

2.1.4 Knowledge assets

Knowledge assets include the knowledge regarding markets, products, technologies and organisations, that a business owns or needs to own and which enable its business processes to add value and generate profits. Knowledge management is not only about managing these knowledge assets but also concerns managing the processes that act upon these assets. These

processes include the development preservation, usage and sharing of knowledge (Brooking, 2000).

2.1.5 Characteristics of Knowledge

Mattison (2000) argues that knowledge is different from information. She states that *"sharing knowledge requires a different set of concepts and tools*". Mattison argues that six characteristics of knowledge distinguish it from information:

- To know something is human nature
- It's the left-over that comes from thinking
- It is created in the present
- It belongs to communities
- It moves in many ways through communities
- New knowledge is created at the boundaries of old.

The next section will discuss the characteristics of knowledge as stated by Mattison (2000).

2.1.5.1 Knowing is a human act

Knowledge management usually starts with information (what is available) and experience (what do we know about it). Apart from these, we can also reflect on our own personal experience to obtain a deeper understanding of knowledge and how best it is being applied by humans who developed a need for it.

To know something about anything is not only for the purpose of having information about it, but also to apply this very same information. When problems arise, such information must then be converted into solutions for various intended purposes. To effectively solve problems, information needs to be analysed and must be applied to solve whatever problems exist.

The next step is the thinking process. It is the key to making information useful. It is all about changing information into insights, and insights into solutions. What it is definitely not is the utilisation of past experiences.

Thinking and professional practice cannot be parted. Here the idea is to make information useful, by thinking about it. Thinking transforms information into insights and insights into solutions. The art of the professional is to turn information into solutions. To solve problems, knowledge workers analyse and group information together, reflect on their experience, generate insights and use those insights to solve problems. Mattison (2000) argues that to know a field is to be able to think within its territory.

2.1.5.2 Knowledge is the residue of the thought process

Knowledge is gained through experience, and not just any (raw) experience. It is usually experience that has been tested, reflected upon and judged against other experiences that are also available. It also comes about as a result of thinking your way through a problem and what we remember when we first started taking that route of thought. *"Knowledge comes from experience that we have reflected on, made sense of and tested. Knowledge is a kind of sticky residue of insight"* (Mattison, 2000).

2.1.5.3 Knowledge is created in the present moment

Many of us cannot express what we know and what is on our mind, it usually only comes to the fore mind when a question needs to be answered or a problem needs to be solved. This isn't because knowledge is difficult to recall from our memory but it is because it is vested in our brain. To access it, we need to engage in an act of knowing. In order to utilise or apply our knowledge in the present, we need to make sense of our experience. This involves guiding someone through our way of thinking or using our thoughts to help them in understanding their own situation better.

In order to do this, we need to know something about those who will use our insights, the problems they face, and the level of detail needed and even the pattern of thinking. Sharing knowledge is the act of knowing who will benefit for the intended purpose. For contemporaries it involves mutually discovering which insights from the past are relevant in the present.

It is our imagination of the next person – their needs and strengths – that determine the level of content, tone and emphasis of the insights we share. Most of us cannot articulate what we know. It is largely invisible and often comes to mind only when we need to answer

a question or solve a problem. To use our knowledge we need to make sense of our experience again, here in the present. Insights from the past are always mediated by the present, living act of knowing.

"*Sharing knowledge involves guiding someone else through our thinking or using our insights to help them see their own situation better. We need to know who will use our insights and for what purpose*" (Mattison 2000).

2.1.5.4 Knowledge belongs to communities

Every day we learn from a world that is already filled with knowledge that makes sense to other people – parents, neighbours, church members, community, etc. We learn by participating in community activities and such e.g. giving expression to the ideas, views, prejudices, language and applications of that community. The same applies when learning a craft or discipline. When acquiring a discipline we learn more than just facts, ideas and skills. We learn by participating with others in the language of that skill and look at the world through its characteristics. We learn to think in a certain way.

This view is rooted in its learning and handed down through generations of people who did it in a particular fashion. We do not learn on our own because we are born into a world filled with knowledge. We learn by participating in communities that have the knowledge. We learn by entering a territory already occupied by others and by participating with them in the language of that discipline. Knowledge flows through professional communities, from one generation to the next. Even when we develop ideas that contradict the thinking of others it is meaningful only in relation to the community's beliefs (Mattison 2000).

2.1.5.5 Knowledge circulates through communities in many ways

A community's knowledge is not only entrenched in textbooks, articles, written procedures, individual file cabinets and the way people think, but it is contained in many other unwritten work routines, tools, work products, machinery, the design of work area, stories, special jargon and common wisdom about cause-effect relationships.

"*Knowledge is typically thought of as the information in textbooks, articles, procedures and people's minds. But, many other artifacts contain a community's knowledge such as stories, specialised language and work practices. So where does a community's knowledge reside? This unrecorded knowledge circulates through the community in many ways. People see each other's thinking as problems are solved, revision and in notes jotted down in the margins of workbooks. Only a small percentage of a community's knowledge resides in a written form. The rest is in these informal, undocumented practices and artifacts. All contacts within the community can be used as tools for sharing knowledge even thought most are not intended to be. All contacts within the community can become vehicles for sharing knowledge*" (Mattison, 2000).

2.1.5.6 New knowledge is created at the boundaries of the old

The way things are learned is by comparing the new idea, fact, or tools to ones familiar to you. New knowledge does not come from thinking within the limits of a skill, but is often developed by the little guys (companies) at the edge of the marketplace.

If we reflect on how we learn new things, we probably find that most of the time we learn by comparing the new ideas or facts to the existing ones. It comes from thinking at the edge of current practice. New ideas emerge in the conflict of perspective, the clash of disciplines and on the boundaries of old knowledge (Mattison 2000).

2.1.6 Characteristics of Explicit Knowledge

The part of the knowledge that can be communicated as information to others and which can be arranged to a fixed structure in different IT solutions, is of course very important. This knowledge, called explicit knowledge, can be stored in documents or electronic media and reside outside the human mind. Explicit knowledge can be expressed in formal and systematic and shared in the forms of data, scientific formulas, specification, manuals, reports etc. Explicit knowledge can be processed, transmitted and stored relatively easy (Nonaka and Takeuchi, 1995).

2.1.7 Characteristics of Tacit Knowledge

Tacit knowledge (Polanyi, 1966) is entrained in action (practice) and is linked to concrete context. This knowledge is difficult to communicate to others as information, and can at best be difficult to digitize. Polanyi (1966), who was the first to introduce the concept tacit

knowledge, expresses the meaning of the concept in the following simple and precise way: "We can know more than we can tell".

The previous section explained the characteristics of knowledge and how it will be defined for the purpose of this thesis. The next section will discuss the history of knowledge management and what the future expectations are for managing knowledge.

2.2 History of KM

The creation and transfer of knowledge has a long history in industry and the business world. The idea of sharing knowledge is not new. In the South African context long before the Europeans set foot at the Cape of Good Hope, the tribal people shared their rich cultural knowledge of cooking and art with the younger generation. The Bushmen drew stories on rocks and in caves so that their succeeding generations could be able to discover and share in their ways. This would enable them to interpret drawings and stimulate within them fresh insights and creativity.

In other cultures, such as the art of war conducted by the Zulu King Shaka, the building of the pyramids of Egypt and Great Wall of China over a period of time, have served similar knowledge sharing functions. "*In tribal villages, from time immemorial, the elder, the traditional healer and the midwife have been the living libraries of distilled experience in the life of the community. Interactive knowledge-sharing mechanisms have always been used such as village square debates, town meetings, to conclaves, consultations to kings, emperors and chiefs from druids, magicians and traditional healers, all functioning to enable individuals to share what they know with others in the relevant area of knowledge*" (Denning, 2000).

Migrations of people have been a principle mode of knowledge transfer across continents. The Europeans have brought with them a wealth of knowledge on cultivating the mining and the resource rich South African land, the Indians brought along spices from the far East and their exotic Indian recipes, the Chinese and Japanese are well known for the exquisite silk clothing range. All these different cultures shared the knowledge they have brought from their country of origin to contribute to the rich cultural diversity of South Africa.

In modern times, reports of activities, minutes of meetings, memoranda, proceedings of conferences, and document filing systems maintained by organisations are traditional commonly used methods for recording content in paper format so that it can be transferred to others. Today, a host of technologies ranging from computers to video-conferencing for distance learning offers unprecedented opportunities to disseminate know-how and insights rapidly and cheaply to a worldwide audience. The reach of know-how and experience possessed by individuals can be greatly extended once it is captured and for so that others to easily access it, understand it and ultimately apply it.

More recently, the unit cost of computers, communications and transactions has been on the decline and electronic transfers have been growing rapidly. Electronic databases, audio and video recordings, interactive tools and multimedia presentations have become available and have become viable options for the extension of techniques for capturing and disseminating content.

The Digital Divide i.e. the gap to access to Information Technology between the rich and the poor is shrinking slowly. Although these technological tools are not yet easily available in the developing world, they are spreading rapidly and present a unique opportunity for developing countries to benefit most from the technological revolution now unfolding. Low-cost telecommunications systems could help countries to leapfrog ahead through distance education, distance health services, and much better access to markets and private sector partners abroad (Denning, 2000).

Even with modern tools, the process of knowledge transfer is inherently difficult, since those who have knowledge may not be conscious of how significant the extent of their knowledge is to others. Thus, knowledge can be in an explicit form, such as observing the hunting methods of Bushmen, or a tacit form where it resides in the memories and thoughts of traditional healers and advisors to the heads of states.

Prusak (2001) argues that KM is both old and new and comes from a *"combination of new ideas with ideas that everyone has known all along"*. He also states that KM is not just a "*consultants' invention but a practitioner-based, substantive response to real social and economic trends"*.

In the knowledge economy there is a misconception that tacit knowledge can be codified and stored for future use. The problem with that is that as soon as tacit knowledge is codified it become explicit. Industrial leaders should understand the dynamics of transferring tacit knowledge before they spend huge amounts of money on information technology that should in fact be used to facilitate the transfer of knowledge.

Software vendors may claim that their software products can capture and store tacit knowledge but according to Prof. Dorothy Leonard, Harvard Business School (1998), "*Information Technology (IT) managers need to be very aware of the fact that knowledge management is as much about connectivity as it is about repositories of bits and bytes. IT is critical in facilitating knowledge management*". She also states that one of the remarkable things about Intranets and the Internet is the way it allows the creation of communities with similar practice across departments in which knowledge transfer can occur. A McKinsey survey of 40 companies in Europe, Japan and the United States showed that many executives are of the opinion that knowledge management begins and ends with building sophisticated Information Technology systems (Hauschild, Licht, & Stein, 2001).

In an organisation where tacit knowledge is important to generate sustainable competitive advantage the focus should be on harvesting knowledge from people. If not, they will easily lose their competitive edge, if they invest in the use of IT without taking tacit knowledge into consideration.

The part of the knowledge that can be communicated as information to others and which can be arranged to a fixed structure in different IT solutions, is very important. Explicit knowledge can be stored in document or electronic media and can quite easily reside outside the human mind and therefore there is no need for concern as in the case of tacit knowledge.

With tacit knowledge it is different. It cannot be used in instruction manuals or stored in data bases, and neither can it be transmitted by means of electronic mail, internet or intranet, or be embodied in groupware.

It is difficult to communicate with others using tacit knowledge, because sharing it is an analogue process that requires a kind of 'simultaneous processing'. To explain to somebody how you solve a mathematical problem verbally, thinking about the solution and communicating it verbally in the simplest understandable manner at the same time is a difficult process. Tacit knowledge forms the part of the knowledge that will make the difference in making and maintaining competitive advantages for companies in the information and knowledge society. Nonaka tried to differentiate between two types of information, namely syntactic versus semantic aspects of information. He shifted from information processing to information creation. With this in mind, he continued research on the innovation process. Through this research, he discovered that information creation is not enough; finally, he arrived at the concept of knowledge creation.

2.3 Towards the knowledge creation cycle.

Brooking (2000) describes four types of knowledge based on the work of Karl Wiig in the knowledge management field. These four types of knowledge categories are as follows:

- Goal setting or Idealistic knowledge
- Systematic Knowledge
- Pragmatic knowledge
- Automatic knowledge

These different knowledge categories described above do not have any interaction with each other and therefore no relation exists between them. It also exists independently from each other and there is no clear method or technique on how it is created, although the management thereof is mentioned very vaguely by Brooking. It is evident that attempts were made to define knowledge in a manner that it can be managed and reproduced in a very simple way. This is arguably not the case since many attempts fail to distinguish knowledge from information or data and to define the complex form that knowledge possesses.

Polanyi (1983) made the first distinction between tacit and explicit knowledge. Polanyi describes these as two different types of knowledge rather than two forms of the same thing. He argues that neither can be substituted or turned into the same thing. Tacit knowledge can

be defined as the things we know, but cannot be explained. Conversely, explicit knowledge can be said or read and so on. Polanyi (1983) argues that each type of knowledge, tacit or explicit, needs to be learned or acquired in its own right. Explicit knowledge can be learned in a number of ways, such as consulting an expert, reading books or manuals, learning from videos or through group interaction. Tacit knowledge, Polanyi (1983) proposes, is learned on its own and is not made up of explicit knowledge.

Nonaka and Takeuchi (1995) expand on Polanyi's concept of tacit knowledge by suggesting that it involves both cognitive and technical elements. The cognitive element centres on mental models in which humans create working models of the world by forming and manipulating analogies in their minds. These include schemas, beliefs and viewpoints which help individuals perceive and define their world. Nonaka and Takeuchi (1995) contradict this with the technical element of tacit knowledge that covers "*concrete know-how, crafts and skills they apply to their specific contexts*". Nonaka and Takeuchi (1995) also see a close relationship between tacit and explicit knowledge whereby they assume, in contrast to Polanyi, that knowledge is created through conversion between tacit and explicit knowledge. They, therefore, propose four modes of knowledge conversion i.e. Socialization, Combination, Externalization and Internalization (the "SECI" process) (Nonaka and Takeuchi, 1995). As a result of the interaction between the modes, knowledge assets are created in what they call "*ba"* the space or environment within which the interaction happens. SECI, knowledge assets and *ba* together form the unified knowledge creation process. These knowledge conversion processes, knowledge assets and *ba* will be discussed in more detail later in the chapter.

Cook and Brown (1999) argue that there is an implied tendency in the growing body of knowledge management literature to treat knowledge as essentially being of one kind. They state that individual knowledge is biased over group knowledge and explicit knowledge over tacit knowledge. They emphasise that organisations are better understood if explicit, tacit, individual and group knowledge are treated as four distinct coequal forms of knowledge. Nonaka and Takeuchi (1995) clearly distinguish between tacit and explicit knowledge and the concept of *ba*, which will be discussed later, emphasise that the interplay between tacit and explicit knowledge can occur on individual or group level.

Chumber, Hull, Prichard and Wilmott (2000) criticise the work done by Nonaka and Takeuchi in the knowledge management field and argue that their work is poorly grounded in the literature on theories of the firm. In their view, Nonaka and Takeuchi (1995) rarely addressed the question of knowledge and the existence of the organisation or firm within which it exists, the decisions made within the organisation, and how it gains and maintains competitive advantage. However, Chumber *et al* state that the work of Nonaka and Takeuchi clearly provoked a challenge.

In contrast to Chumber, Hull, Prichard and Wilmott's view Denning (2000) argues that knowledge sharing is not merely an alternative strategic option for an organisation to survive in a turbulent environment, but rather that it is a required source of organisational survival. He further argues that traditional hierarchical organisations cannot cope with fast-changing client demands unless they are able to agilely share knowledge among employees, partners, and clients. He states that group knowledge is more important than individual knowledge and that innovation and creativity in the new economy depends on communal rather than individual knowledge. The knowledge of the community is always larger than the individual's and it is quicker to combine and share knowledge to create new ideas rather then to *"re-invent the wheel*". This requires that organisations develop knowledge sharing culture and processes.

In response to the criticism Nonaka, Toyama and Nagata (2000) argue "*that various theories exist to understand the firm and its activities, but it is not enough to understand the firm in today's economy in which knowledge is considered as the only meaningful resource"*. They acknowledge that a new theory is needed to understand the existence of the firm (which differs from economic and organisational theories). By introducing the concept of *'ba'* and the knowledge creating function they argue that the firm is a dynamic configuration of *'ba'* and that it internalises knowledge-creating activities when it can create knowledge more effectively then the market does.

The next section will critically appraise the unified knowledge creation model from Nonaka and Takeuchi (1995) and Nonaka and Konno (1998). The unified knowledge creation model forms the basis of the work reported here.

2.4 A critical Appraisal of the Knowledge Creation Process

In order to manage knowledge we need to understand how it is created and where it originates. This section will discuss how knowledge is created based on the work done by Nonaka and Takeuchi (1995) and Nonaka and Teece (2001). Nonaka and Teece identify three elements of knowledge creation:

- the SECI process
- *ba* (shared context or place) and
- knowledge assets

These elements are discussed in the section below.

2.4.1 The SECI process

According to Nonaka and Takeuchi (1995) an organisation creates knowledge through the interactions between explicit knowledge and tacit knowledge. There are two different types of knowledge that interact to form different knowledge conversions. There are four modes of knowledge conversion: It is created through the conversion from tacit to explicit knowledge.

The four modes of knowledge conversion are:

- **socialization** - from tacit knowledge to tacit knowledge;
- **externalization** – from tacit knowledge to explicit knowledge;
- **combination** – from explicit knowledge to explicit knowledge;
- **internalization** – from explicit knowledge to tacit knowledge.

This is defined as the SECI process (Figure4), the four modes of knowledge conversion.

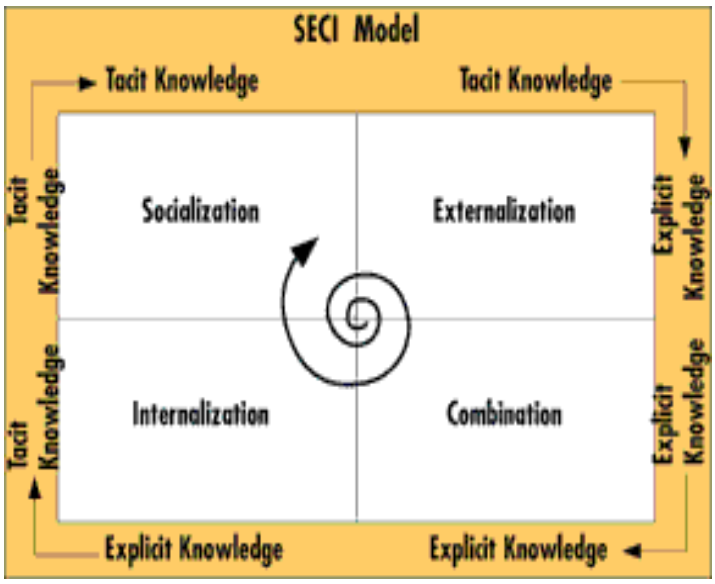


Figure 4: The SECI process.

Source: Report from "Ba" - KM Asia. (2001)

2.4.1.1 Socialization

Socialization is about allowing people to gather and learn together. This is the process where new tacit knowledge is converted through shared experiences. Tacit knowledge is often difficult to determine and often time- and space-specific, and can only be reached through shared experience such as spending time together and living in the same shared environment (Nonaka and Takeuchi, 1995).

A good example is the master craftsman teaching his apprentices by letting them watch and help him work. Becoming a good mechanic takes years of practice and much of the tacit knowledge in this profession can only be passed on by Socialization. It is extremely difficult to grasp and learn from someone else's thinking process if you do not share at least some of their experiences. Information that is transferred between people when separated from associated emotions and experiences often make little sense to the receiver.

Socialization usually occurs in a traditional form of apprenticeship. Apprentices learn the tacit knowledge needed in their crafts by being exposed to hands-on experiences rather than from written manuals or textbooks. It can also take place in informal social meetings outside the workplace, where such tacit knowledge such as a worldview, mental models and mutual

trust can be created and shared. This also occurs outside organisational boundaries. Often firms acquire and exploit the tacit knowledge embedded in customers or suppliers by interacting with them to their own advantage.

2.4.1.2 Externalization

This is the process where tacit knowledge is expressed as explicit knowledge. When the latter is made explicit, knowledge becomes clearer and can then be shared with others, it then becomes the basis of new knowledge (Nonaka and Takeuchi, 1995).

When we try to explain a situation that we have experienced, we try to solidify our abstract and liquid thoughts about the situation into clear verbal statements and expressions that our listener can understand. Often, we have to use the tools mentioned above (e.g. ”analogies”) to describe a situation to really make the listener comprehend our experience. In many cultures proverbs and sayings have an element of trying to make tacit knowledge explicit through analogies or metaphors. Creating new conceptual models in a new product development environment is an example of this conversion process.

2.4.1.3 Combination

During this process explicit knowledge is changed into more complicated and systematic sets of explicit knowledge. Explicit knowledge is gathered from inside or outside the organisation and then added, prepared or processed to form new knowledge. The new explicit knowledge is then distributed among the members of the organisation. It is the process of changing explicit knowledge into more difficult, fixed and organised sets of explicit knowledge (Nonaka and Takeuchi, 1995).

Different sets of explicit knowledge are combined into new knowledge. Combination of knowledge could take place in meetings, over the telephone, through the exchange of documents or as communication through electronic networks. The existing explicit knowledge can be sorted, added, combined or categorised to form new knowledge. For example:

- we can combine different market analyses reports and find new patterns in consumer behaviour,
- we can add the knowledge of a new ceramic compound to the knowledge of how to build an engine to find stronger and lighter engines or
- combine sciences and economics, psychology and organisational theory to form something like knowledge management.

Making use of computerised communication networks and large-scale databases can make this mode of knowledge possible. E.g. an accountant of an organisation collects information in the organisation to produce a financial report, that report is new knowledge in the sense that it is a synthesis of information from many different sources in one context. The combined mode of knowledge conversion can also contain the breakdown of concepts. When breaking down a concept like the vision of a company into functional business or product ideas also creates systemic, explicit knowledge. Making use of computerised communication networks and big databases can make this mode of knowledge conversion possible.

2.4.1.4 Internalization

"Internalization is the process of making explicit knowledge part of tacit knowledge. Through this, explicit knowledge is formed throughout an organisation and changed into tacit knowledge by people/ individuals" (Nonaka and Takeuchi, 1995).

Explicit knowledge can also be included in experiments that encourage learning-by-doing. Internalization comes close to learning by doing. This can be a very valuable asset if knowledge is internalized to be a part of an individual's tacit knowledge. This concept is close to learning by doing and is what happens when we for instance goes to university or read a book (i.e. we pick up and understand what we are given). Internalization is often about re-experiencing what others have already learnt, and converting what they have put down on paper into tacit knowledge. This could occur when listening to a well-told story (e.g. about a failed project) or when examining someone else's blueprints. If the explicit knowledge is clever in content and structure, the reader/receiver will learn more about the

information than what is actually presented, and will in an ideal case realise how and what the original creator actually thought when creating the blueprints or worked on the project.

Explicit knowledge such as product ideas or manufacturing procedures must be actualized in action and practice, e.g.: training programmes can help trainees to understand an organisation and themselves. By reading documents or manuals about their jobs and the organisation and reflecting upon them, trainees can internalise the explicit knowledge in such documents to enrich their tacit knowledge. Explicit knowledge can also be included in simulations or experiments that trigger the learning-by-doing process.

Knowledge becomes a valuable asset when it is internalised to become part of individuals' tacit knowledge in the form of shared mental models or technical know-how. Such accumulated knowledge at an individual level can then set off a new spiral of knowledge creation when it is shared with others through the process of socialization.

2.4.2 How the modes interact in knowledge creation

Creating knowledge is a continuous process of dynamic interactions between tacit and explicit knowledge. Such interactions are formed between different modes of changing knowledge, not just one mode of interaction. Knowledge created by each of the four modes of knowledge conversion interacts in the spiral of knowledge creation. (See figure 2 above).

It is important to mention that the movement through the four modes of knowledge conversion forms a *spiral* and not a circle. In the creation of knowledge, each of the four modes of knowledge conversion increases the interaction between tacit and explicit knowledge. This spiral becomes bigger in size as it moves up the ontological levels (the philosophical levels of study of being and knowing) since new meaning is added to the existence of old and the creation of new knowledge assets. Knowledge created in the SECI process can start a new spiral of knowledge creation, increasing horizontally and vertically across organisations. This dynamic process starts at the individual level and increases as it moves through communities of interaction that go beyond sectional, departmental, divisional

and even organisational boundaries. Creating organisational knowledge is a never-ending process that upgrades itself continuously and automatically as the process continues.

*"This interactive spiral process happens both intra- and inter-organisational. Knowledge is created inside and outside the organisational environment and is transferred beyond organisational boundaries and knowledge from different organisations interacts to create new knowledge" (*Nonaka and Takeuchi, 1995). Through this dynamic reaction, knowledge created by the organisation can start the mobilisation of knowledge held by outside bodies such as consumers, affiliated companies, universities or distributors. For example, if two or more companies form a partnership it may lead to the development of innovative thinking and new product development. Another example is the articulation of tacit knowledge possessed by customers who have not been able to articulate it. A product works as the trigger to elicit tacit knowledge when customers give meaning to the product by purchasing, adapting or even avoids purchasing it. Their actions are then reflected in the innovative process of the organisation and so a new spiral of organisational knowledge creation starts again. (Nonaka and Teece, 2001)

It should also be noted that knowledge creation is a self-transcending process, in which one surveys beyond the boundaries of one's own existence. In knowledge creation, one transcends the boundary between self and other, inside and outside, past and present. In socialization, self-transcendence is fundamental because tacit knowledge can only be shared in direct experiences, which go beyond individuals. For example, in the socialization process, people empathise with their colleagues and customers, thereby diminishing barriers between individuals.

In externalization, an individual transcends the inner and outer boundaries of them self by committing to the group and identifying with it. Here, the sum of the individuals' intentions and ideas fuse and become integrated with the group's mental world.

In combination, new knowledge generated via externalization transcends the group in analogue or digital signals.

In internalization, individuals access the knowledge realm of the group and the entire organisation. This again requires self-transcendence, because one has to find oneself in a larger entity (Nonaka and Teece, 2001).

In order for the knowledge conversion process to occur there must be a place or environment to facilitate it. This place or environment is called *ba*, as previously stated, and will be discussed in the next section.

2.5 *Ba*: The shared context to create knowledge.

Ba is the Japanese word for place or field. Here we will use the name *ba* when we refer to a place in which knowledge can be created. Nonaka and Teece (2001), state that knowledge must have a context to be created in. As apposed to the Cartesian belief of knowledge, which emphasizes the absolute and context-free nature of knowledge, the process of creating knowledge is necessarily context-specific on the basis of who participates and how they participate.

Nonaka argues that knowledge needs a physical context if it is to be created and that there is no creation without place. *Ba* offers such a context. In other words, *ba* is a shared context in cognition and action (Nonaka and Teece, 2001).

This means that in order to create knowledge in the context of *ba* it needs to be connected with thinking or a conscious mental or cognitive process that together produce knowledge. Knowledge should be the product of cognition and action in order to understand it else it cannot be understood if it does not form part of a cognitive process.

"In knowledge creation, generation and regeneration the ba concept is the key, because ba provides the energy, quality and places to perform the individual conversions and move along the knowledge spiral" (Nonaka and Teece, 2001).

One can never be free in the creation of knowledge. Social, cultural and historical contexts are important because such contexts are the basis on which one interprets information to

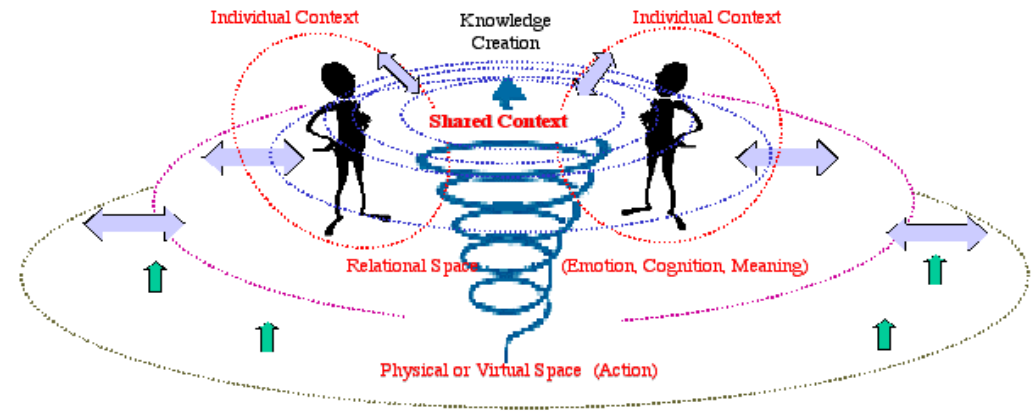
create meanings. There are certain specific characteristics about *ba*. It is a place where information is interpreted to become knowledge. It does not necessarily mean a physical space. The Japanese word `*ba*' does not just mean a physical space, but a specific time and space.

Nomura (2002) state that '*the resource of the most important competitive advantage for a company is social capital formed by networks and communities where people collaborate based on their trust* '. Nomura also agrees with Nonaka and Teece (2002) by stating that the key elements of *ba* are said to be space and time and argues that the establishment of *ba*, to support important communities, is one of the most important strategies for a company to maintain its future competitive advantage.

Ba (figure 5) allows participants to share time and space yet it goes beyond time and space. Sharing time and space is very important in the creation of knowledge - especially in socialization and externalization. *Ba* has a complicated and ever-changing nature. It sets a boundary (that is open) for interactions among individuals where participants with their own context can come and go, and the shared context *ba* can evolve continuously. Because knowledge is difficult to explain completely - it has no boundaries, it is dynamic and it is not able to be stocked - *ba* operates as the platform on which knowledge is created by collecting the applied knowledge of the area into a certain time and space, and integrating it.

Nonaka argues that there are four types of *ba*:

Figure 1: Ba as Shared Context in Motion



Individual contexts are shared at Ba (inter-subjectivity), and the shared context and individual contexts expand themselves through interaction (trans-subjectivity).

Figure 5: The concept of *Ba*

2.5.1 Originating *ba*

This is defined by individual and face-to-face interactions. Originating *ba* is the world where an individual rises above the boundary between himself and others by either sympathizing and/or empathizing with others. From this type of *ba* emerge care, love, trust and commitment that are the basis for the conversion of knowledge among individuals (Nonaka and Konno, 1998).

2.5.2 Dialoguing *ba*

"Dialoguing ba is defined by collective and face-to-face interactions. It offers mainly a context for externalization and is more consciously constructed than originating ba. The key to control and organizing the creation of knowledge in dialoguing ba is selecting individuals who have the right mix of specific knowledge and capabilities" (Nonaka and Konno, 1998).

2.5.3 Systemizing *ba*

This type of *ba* is defined by collective and virtual interactions and offers mainly a context for the combination of existing explicit knowledge. The latter can quite easily be transmitted to a large number of people in written form. Information technology such as online networks, groupware, documentation and databanks offer a virtual collaborative environment for the creation of systemizing *ba*.

Things such as electronic mailing lists and newsgroups that are these days used by many organisations in which participants can answer questions to collect and disseminate knowledge and information or exchange information (Nonaka and Konno, 1998).

2.5.4 Exercising *ba*

Its main function is to offer a context for internalization. Individuals include explicit knowledge that is given through via virtual media (written manuals or simulation programs**).** Exercising *ba* synthesizes the transcendence and reflection that comes in action, while dialoguing *ba* achieves this through thought (Nonaka and Konno, 1998).

There are two dimensions of interactions: firstly, the type of interaction and secondly, the media used in such interactions. Each *ba* offers a context towards a specific step in the knowledge-creating process and therefore one has to understand the different types of *ba* and how they interact with each other.

2.6 Knowledge assets

Knowledge assets, figure 6, are all the inputs, outputs and the moderators in the process of creating knowledge. This is the basis for knowledge creation. These assets are firm-specific resources that are indispensable to create value for the firm. For example, trust among organisational members is created as an output of the process and, at the same time, it moderates how *ba* functions as a platform for the whole process. Despite the fact that knowledge is considered to be one of the most important assets for a firm that wants to create a sustainable competitive advantage, there is not yet an effective system or tools for evaluating and managing knowledge assets. Although a variety of measures have been

proposed existing accounting systems are not good enough for capturing the value of knowledge assets, owing to the tacit nature of knowledge.

Knowledge assets must be built and used internally in order for their full value to be realized, because they cannot be readily bought and sold. Another difficulty in measuring knowledge assets is the fact that they are dynamic. They are both inputs and outputs of the organisation's knowledge-creating activities; hence, they are constantly evolving. Taking a snapshot of the knowledge assets that the organisation owns at one point in time is never enough to evaluate and manage them properly (Nonaka and Teece, 2001).

There are four categories (types) of knowledge assets that can be used to understand how knowledge assets are created, acquired and exploited (Nonaka and Teece, 2001):

- experiential
- conceptual
- systemic
- routine

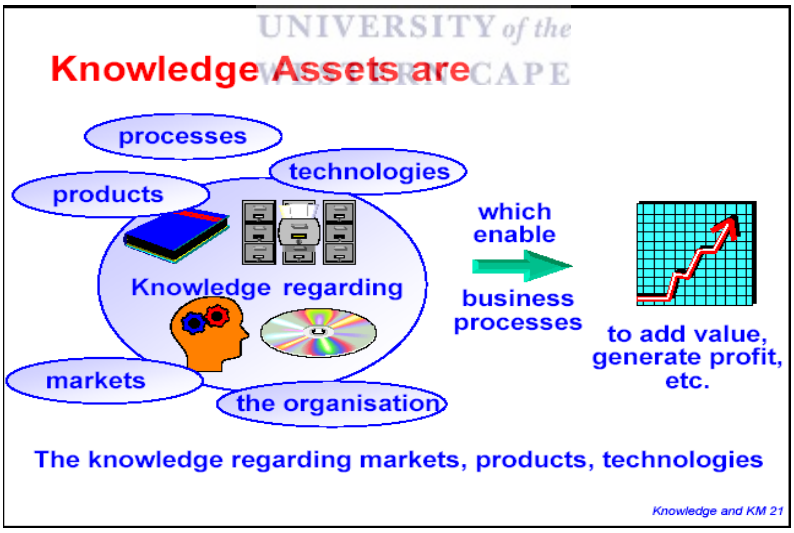


Figure 6: Knowledge Assets

Source: Mackintosh, A.,Kingston, J. & Filby, I. (1999)

2.6.1 Experiential knowledge assets

These consist of shared tacit knowledge, which is built by means of shared, hands-on experience between the members of the organisation, and among the members of the organisation and its customers, suppliers or affiliated firms. Skills and know-how that are acquired and accumulated by individuals in experiences at work are examples of experiential knowledge assets. Emotional knowledge, such as care, love and trust; physical knowledge, such as facial expressions and gestures; energetic knowledge, such as the sense of existence, enthusiasm and tension; and rhythmic knowledge, such as improvisation and entertainment, are also examples of such knowledge assets.

Because it is tacit in nature, experiential knowledge assets are difficult to grasp, evaluate or trade. Firms have to build their own knowledge assets from their own experiences. Its tacit nature is what makes experiential knowledge assets the firm specific and difficult-to-imitate resources that give rise to a sustainable competitive advantage to a firm.

2.6.2 Conceptual knowledge assets

"These consist of explicit knowledge expressed through images, symbols and language which are based on the concepts held by customers and members of the organisation. Brand equity, which is perceived by customers, and concepts or designs, which are perceived by the members of the organisation are examples of conceptual knowledge assets. As they have tangible forms, conceptual knowledge assets are easier to grasp than experiential knowledge assets, though it is still difficult to grasp what customers and organisational members perceive exactly" (Nonaka and Teece, 2001).

2.6.3 Systemic knowledge assets

These assets consist of systematized and packaged explicit knowledge, such as explicitly stated technologies, product specifications, manuals and documented and packaged information about customers and suppliers. Legally protected intellectual properties, such as licenses and patents, also fall into this category. A characteristic of systemic knowledge assets is their transferability that can be done with relative ease. This is the most visible type of knowledge asset and current knowledge management focuses primarily on managing systemic knowledge assets, such as intellectual property rights.

2.6.4 Routine knowledge assets

The tacit knowledge that is routinized and is embedded in the actions and practices of the organisation make up routine knowledge assets. Know-how, organisational routines, business processes and organisational culture in carrying out the daily business of the organisation are examples of routine knowledge assets. By means of continuous exercises, certain patterns of thinking and action are reinforced and shared among organisational members. Sharing the background of, and stories about, the company also helps members form routine knowledge. A characteristic of routine knowledge is that it includes practical knowledge.

Brooking (2000) argues that an organisation's intellectual capital consists of market assets, human centred assets, infrastructure assets and intellectual property assets. The knowledge assets she defines as having a strong resemblance to the knowledge assets described by Nonaka and Teece is as follows:

- Market assets are similar to Conceptual knowledge assets,
- Human Centred Assets are the same as Experiential knowledge assets,
- Infrastructure Assets have the same characteristics as Routine knowledge assets and
- Intellectual Property assets are similar to Systemic knowledge assets.

For the purposes of the research problem statement, this thesis will use the knowledge assets described by Nonaka and Takeuchi (1995) as the standard.

2.6.5 The role of knowledge assets in knowledge creation

The four types of knowledge assets described above form the basis of the knowledge-creating process. To manage knowledge creation and to effectively exploiting it, a company has to map its stocks of knowledge assets. However, cataloguing the existing knowledge is not enough. As stated above, knowledge assets are dynamic, and new knowledge assets can be created from the existing knowledge assets (Nonaka and Teece, 2001).

In the past different mechanisms have been used to transfer and create knowledge and even today new mechanism and technology comes into existence much quicker. Now that we

have an idea of how knowledge is created the next section will address how the different mechanisms and technology can facilitate the knowledge creation process.

2.7 The role IT plays in the Knowledge creation process

Knowledge transfer strategies that succeed in making tacit knowledge more explicit through the use of IT make it possible for easier imitation by competitors. This negates an advantage gained by the more rapid dissemination of information. Given the potential negative outcomes from trying to codify tacit knowledge and making it explicit, it is important to identify which knowledge transfer strategies are most appropriate and what technologies are available to facilitate it. Carvalho & Ferreira (2001) and Marwick (2001) have identified KM software categories that act as enablers for knowledge creation and transfer based on the SECI process of Nonaka and Takeuchi (1995). The KM software category typology is proposed, as follows:

1. Intranet and Extratanet based systems
2. Electronic document management (EDM)
3. Groupware
4. Workflow
5. Artificial intelligence-based systems
6. Business intelligence (BI)
7. Knowledge map systems
8. Innovation support tools
9. Competitive intelligence tools
10. Knowledge portals.

Apart from the ten categories identified above Harry (2002) had identified following six that will add considerable value in the SECI process and discussed it in conjunction with on the work done by Carvalho & Ferreira (2001):

11. Computer Based Training (CBT)
12. Video conferencing
13. Voice over IP
14. Computer Simulation

15. Supply Chain Management (SCM)
16. Customer Relationship Management (CRM)

The application software is discussed in terms of their contribution to the SECI process as proposed by Nonaka and Takeuchi (1995).

Socialization	Externalization
Knowledge map systems Knowledge portals Video conferencing Voice over IP Customer Relationship Management	Groupware Workflow Artificial intelligence Knowledge portals Supply Chain Management Customer Relationship Management
Internalization	**Combination**
Innovation support tools Knowledge portals Computer Simulation Supply Chain Management Customer Relationship Management	Intranet-based systems Electronic document management (EDM) Workflow Business intelligence Competitive intelligence tools Knowledge portals Computer Based Training (CBT) Simulation Customer Relationship Management

Table 1: IT and the SECI process

Any organisation who plans to implement one or more of the KM application software categories discussed above should have an information technology infrastructure in place to support it. The infrastructure should include networking facilities, computer hardware and operating software and support personnel. Managing the Information Technology component can be a tough task considering all the planning involved to obtain the correct infrastructure to focus the IT strategy in support of the business strategy of the organisation.

Bytheway, Edwards and Ward (1995) propose the following model for managing the IT component that supports the business strategy.

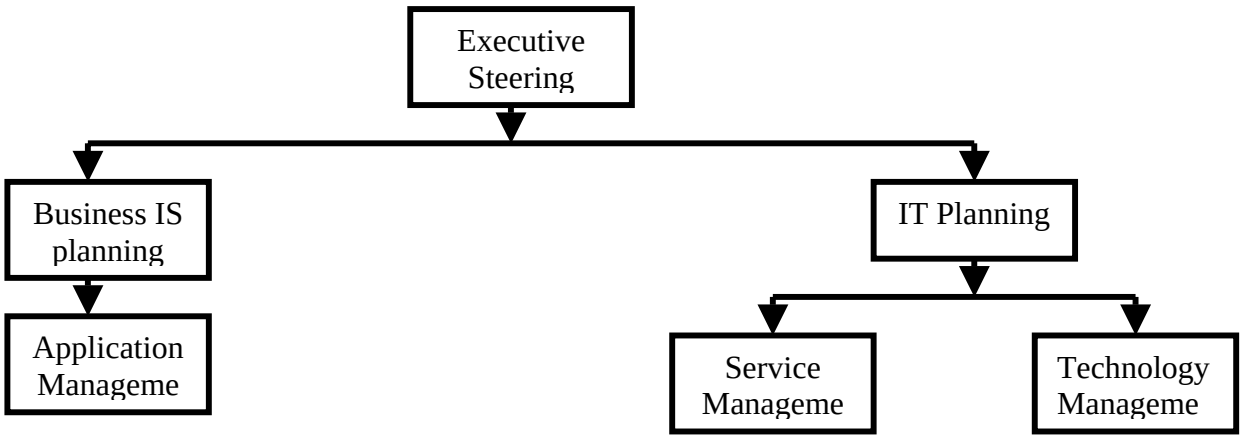


Figure 7: IT Management Framework

Source: Bytheway, Edwards and Ward (1995)

- **Executive Steering committee and Business IS planning**

First the organisation needs to establish an executive steering committee that will be responsible for the central IT planning of the organisation as well as establishing the appropriate organisational IT/IS responsibilities and relationships that this involves:

- Interpreting business and corporate strategy and agreeing overall IS/IT policies;
- Establishing priorities, resolving contention, agreeing overall expenditure and authorising major investments;
- Setting the overall direction and monitoring business critical IS/IT projects;
- Agreeing the degree of centralisation/decentralisation, allocating overall responsibility and establishing the right culture.

The business information systems planning, they argue, is an integral part of the business planning process for a single organisational unit or major business function, such as finance or knowledge management. It involves the following activities:

- Co-ordinating and prioritizing all IS activities in the business area, including agreeing on budgets, approving proposals and resource allocation to particular projects.
- Identifying business needs, opportunities and potential threats and assessing the IS implications.
- Ensuring user resources are adequately supplied and appropriate people are assigned to manage the projects.

- Ensuring the appropriate benefits are identified and achieved, and that business changes associated with systems are manage successfully.

The third and final KM component, i.e. people, form part of the steering committee and business IS planning, but will be discussed as an individual component later in the chapter.

The following section will concentrate on managing the IT component.

- **IT planning**

IT planning is the line responsibility of the IT senior manager. Whichever technology is chosen to facilitate the KM process the IT management team will have to deal with the following:

- Interpreting external IT trends to the benefit of the organisation;
- Ensuring resources are deployed to meet the business priorities;
- Developing the IT resources and services in line with demand and within the policies agreed
- Managing the supply of technology and specialist bought-in services to the organisation
- Ensuring that technical risks are commensurate with the business benefits and risks of major investments.

IT planning's responsibility is essentially that of a supply side management. Business IS planning deals with demand side issues and the Executive Planning Committee must resolve or reconcile any demand and supply imbalances. If an organisation decides to undertake a KM initiative, initiated by Business IS planning, it is the responsibility of the steering committee to communicate the IT needs of the KM initiative to the IT planning group.

If the KM initiative is approved by the Steering committee and it is communicated to IT planning, business planning and IT planning need to manage the following processes either individually or as shared responsibility.

- **Application management**

User management leads the application management process. After identifying the type of IT, using the SECI process, to facilitate the KM process, the organisation must decide what technology to apply to satisfy their KM needs. This involves the following activities:

- Identifying the needs, benefits and costs of a new application, helping management to make informed decisions.
- Managing projects and install systems to ensure it meet business needs
- Ensuring business changes are understood and implemented and ensuring that user resources are appropriately deployed
- Ensuring specialist resources are deployed to achieve the project objective.

- **Technology management**

It is the responsibility of IT planning to ensure that the hardware, operating systems software and telecommunications are properly managed. This is a highly specialised area and involves the following:

- Understanding technology developments and formulating options and informing others of the implications.
- Planning and managing the introduction of new technology (and the migration away from obsolescent technologies) to minimise the risk to existing and future business applications.
- Supporting the service groups in managing the technology changes associated with changing demand from the business side.
- Ensuring that technical problems can be resolved expeditiously either within the organisation or in conjunction with the suppliers.

- **Service management**

This can be wholly the responsibility of the IT department or it can be a shared responsibility with the business units, depending on the size of the organisation. Service management involves the following activities:

- Translating needs into technical and resource implications and developing overall skills and methods accordingly.
- Monitoring performance to agreed service levels and delivery targets.

- Ensuring technology is acquired and tested to minimise the risk of application failure.
- Bringing appropriate (internal or external) specialist resources together to satisfy system requirements.

From Table 1 it is evident that information technology alone will not foster creativity. *Tacit* knowledge, the core of creative thought, is mostly created through personal interaction with other individuals. Most information technology solutions only support the transfer and creation of *explicit* knowledge.

Managing the people component requires a different management technique than the IT component. The next section will discuss how it should be managed.

2.8 The role HR plays in the Knowledge creation process.

As stated in Chapter One Soliman and Spooner (2000) argued that human resources management could create a culture that encourages the free flow of knowledge for meeting organisational goals. Despite the increasingly important role that HRM has played in the structure of organisations in recent years, there are still areas wherein it can progress even further to improve the organisation's competitive position in its industry. As computers and information access pervade so many occupations, they change the nature of work, the nature of the workforce and the organisation's expectations of the workforce.

Because all four of the processes in the SECI knowledge conversion model of Nonaka and Takeuchi are important in knowledge management and the aims to foster organisational knowledge creation, this thesis must seek to understand how it might be possible to support all of them with technology and training methods, or a combination of both. Although early generations of knowledge management solutions (solutions typically integrate several technologies) focused on explicit knowledge in the form of documents and databases, there is a trend to expand the scope of the solutions somewhat to integrate technologies that can, to some extent, foster the use of tacit knowledge despite the expert opinion that considers this difficult or impossible to do. Despite these trends, there are still significant shortfalls in

the ability of technology to support the use of tacit knowledge, for which personal interaction is still the touchstone of effectiveness.

Morello and Caldwell (2001) distinguished between 3 types of knowledge workers (task based, skill based, innovation focused), based on the kind of knowledge that is being applied or generated, the relevant scope of the knowledge and the potential impact and value the knowledge have to the organisation. Morello and Caldwell (2001) argue that given the appropriate context, leadership, motivation and support, individuals and groups can regularly move between the three types of knowledge work as their core element of the roles, occupations and careers evolve (See Fig 9).

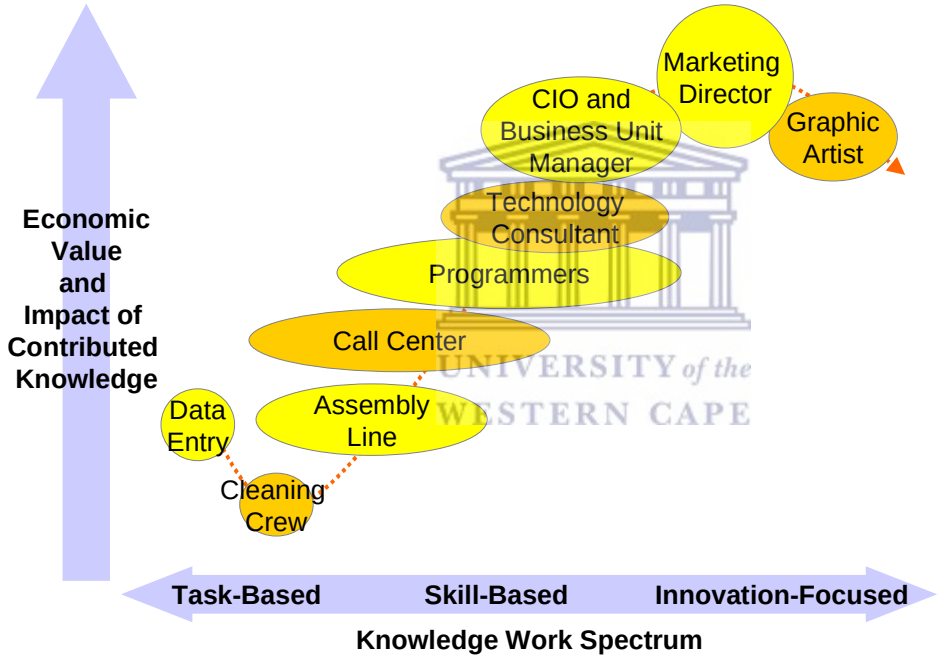


Figure 8: The Spectrum of Knowledge Work

Source: Morello and Caldwell (2001)

2.8.1 The types of Knowledge worker

2.8.1.1 Task-Based Knowledge Work

Morello and Caldwell (2001) argue that task-based work typically revolves around explicit operational processes, pre-engineered routines, well-defined responses and administrative

activities. Processes are defined explicitly and great emphasis is placed on how the worker fits in the organisation in task-based knowledge organisations. Workers are trained to use integrated tools and techniques for navigating and improving operations.

2.8.1.2 Skill-Based Knowledge Work

"Skill-based knowledge work is characterised by a blend of tacit and explicit knowledge domains. It encompasses domains of knowledge that are well defined, prescribed easy to demonstrate and is conducive to hands-on training and apprenticeships. Skill-based knowledge workers contribute value through the speed and proficiency with which they learn and apply new skills, so they want to keep their skills in up to date with the market requirement." (Morello and Caldwell, 2001). Skill-based knowledge workers are well in demand in the IT industry who focus on skill-based knowledge, especially in technical support, system administration and basic programming

2.8.1.3 Innovation-Focused Knowledge Work

"*These type of knowledge workers is characterised by tacit knowledge, high creativity, intense collaboration, communities of practice, high improvisation and extensive role versatility. Success here depends on knowledge workers' generating appropriate solutions to unique situations, markets or customers. Marketing leaders, business managers, business analysts, web artists and judges live largely in the realm of innovative knowledge, which is highly improvisational and highly interpretive.*" (Morello and Caldwell, 2001).

"*Organisations that concentrate on skill-based knowledge must design and invest in explicit training programs, identify desired outcomes, actions and techniques and create a program for turning tacit knowledge into explicit knowledge. Many IT practitioners focus on skill-based knowledge, especially in technical support, system administration and basic programming. Organisations that reward or hire people purely for their discrete skills, however, should not expect their IT practitioners to operate as creative knowledge workers. Indeed, as the IT labour market has demonstrated during the past five years, many skill-based workers are uncomfortable and ill-equipped operating within the realm of innovation work*" (Morello and Caldwell, 2001).

Innovation-based knowledge organisations must provide tools, infrastructure and education that will enable people to find relevant sources of expertise, access relevant information and collaborate effectively with others to generate solutions. In this arena of knowledge work especially, the workers themselves are the primary engines for innovation, implying that executives and managers must turn their attention to developing an environment that increases opportunities for creating value. Businesses that force innovation-focused knowledge workers to assume greater administrative and operational activities will cripple the workers' effectiveness by alienating them through monotonous work.

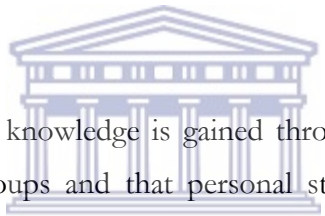
Depending on the business unit within the organisation's structure and the type of knowledge work performed, it is the task of the Human Resources Department to develop employees to perform the knowledge work required from them. The nature of the business environment and industry that the organisation operate in can motivate the use of the knowledge creation process (discussed earlier in this chapter) to investigate methods and techniques to transfer and create knowledge from a Human Resource perspective.

Although technology will bring about a thorough change in the working and training conditions for the majority of workers, employees will always crave for human contacts or social interaction. The organisation should, apart from deciding on the type of IT to facilitate the KM process, implement IT solutions to support traditional training methods and techniques to foster the knowledge creation process in a social environment where technology fails to deliver without human interaction. Depending on the type of organisation and type of knowledge work, employees often move between tacit and explicit knowledge domains. In this section the SECI process will be applied to traditional methods of knowledge creation. This section will investigate KM process from the Human Resource perspective.

Swanepoel (1998) and Torrington (1994) discuss the following training methods to transfer skills and create knowledge inside and outside an organisational environment. Swanepoel (1998: 491-498) states that "*once the training objective is clearly defined, formulated and cognizance has been taken of the learning principles, the appropriate training method can be chosen. Some of the methods can be used on the job; whole other can be more appropriately used off the job*

These methods include the following:

- On-the-job training
  - Coaching
  - Committee assignments
  - Job rotation
  - Understudy assignments or Apprentice
  - Secondments
  - Acting up
- Off-the-job training
  - Sensitivity training (Diversity training)
  - Team building
  - Behavioural-modeling
  - Case study
  - Simulation methods



Harry (2002) argues that a lot of knowledge is gained through the individual's interaction with peers and other interest groups and that personal study and self development can facilitate the SECI process in the same way as on and off the job methods do. These methods include:

- Personal study/Self development
  - Lectures
  - Communities of practice (COP)
  - Extra mural activities

Harry (2002) had identified Human Resource initiatives and that act as enablers for knowledge creation and transfer based on the SECI process of Nonaka and Takeuchi (1995). Table 2 demonstrates how the Human Resource Department's initiatives can support the different types of knowledge workers. It will particularly focus on the initiatives that are currently common practice to support the KM process discussed earlier in the chapter.

Socialization	Externalization
Coaching Communities of practice Acting up Secondments Sensitivity training Team building	Lectures Secondments Team building
Internalization	**Combination**
Coaching Understudy assignments Job rotation Secondments Acting up Sensitivity training Team building Behavioral-modeling training (memes) Lectures	Simulation Customer Relationship Management Secondments Acting up Case study Committee assignments

Table 2: HR and the SECI process

From Table 2 it is quite evident that most of Human Resource initiatives supports the transfer and creation of tacit knowledge.

Thus, taking the potential contribution from both IT and Human Resource management, as evidenced in Table 1 and Table 2, we see important aspects of each to consider when a KM initiative in undertaken. Both can contribute to the knowledge creation process, but with different emphasis as shown by the content of the tables.

2.8.2 Cultural Issues in Knowledge Sharing

This chapter has highlighted many factors that provide grounds for some optimism when we consider how technology can facilitate in knowledge management. Even when they may meet only occasionally, or even never, technology can assist teams to share experiences on

line, to build and share tacit knowledge and to work effectively together, even if the efficiency is less than in face-to-face meetings. Technology will clearly become more important when dealing with information overload. Techniques such as summarization can reduce the load of persons attempting to find the right documents to use in some task.

However technology cannot foster a culture of knowledge sharing. Morello and Caldwell (2001) argue that when knowledge workers are given the tools, support, leadership and motivation appropriate for their particular roles, they are generally effective and that competencies, collaboration, trust and culture are critical success factors to share their experience and enhance their potential for superior performance.

Individual competencies enable knowledge workers not only to excel in whatever role they play, but also to elevate the economic impact and value of their role. Competencies are the traits that characterise superior performance, not only of individuals, but also that of organisations.

The most promising innovations occur in the context of team-based collaboration, brainstorming and projects (Morello and Caldwell, 2001). Collaboration brings two or more people together to exchange ideas, learn concepts and create solutions that are superior to, and more valuable than, those that any one person could create alone. Hence, it is more than cooperation and more than coordination. Collaborative work gathers its strength from diverse opinions, highly charged and authoritative people, and an equally strong sense of purpose. It gets its support from strong leaders, well-designed technological tools and collaborative applications for sharing and capitalising on knowledge. Executives and managers should concentrate on facilitating, enabling and investing in an environment that encourages collaboration.

Accept for competencies and collaboration trust can be regarded as a very important factor in knowledge management. Knowledge workers all have two basic roles i.e.:

- to do the work for which they are responsible for and
- to take action when "normal" processes must be changed.

At the heart of those roles is trust. In a knowledge management environment, trust plays a major role. If knowledge workers don't trust each other, little or no knowledge will be transferred to and from the knowledge conversion processes to form new knowledge. Nonaka states that (Chapter Two) *ba* is a shared mental space. It can be physical, like an office or other shared business space. It can be virtual, using e-mail, or teleconferencing. It can be mental, based on shared experiences or ideals. *Ba* can also be a relationship of people sharing common goals or experiences such as in a community of practice. Simply stated *ba* is a place for knowledge creation. To remain in a productive knowledge conversion spiral, knowledge creation's four modes of interaction and five enablers have to interact in some concrete place, with integrated form. Knowledge workers who trust each other don't hesitate to share their emotions and experience. Organisations that do not trust their knowledge workers to make decisions on the spot will miss opportunities and inhibit the economic potential of those workers.

Of all the factors that might attract knowledge workers to employers, culture is the most elusive and arguably most important. It represents the values and belief systems that organisations portray through their transparent everyday dealing with people, customers, opportunities and decisions. Individuals want a sense of belonging (Maslow's Hierarchy of needs) - one of the five basic human needs. They want to feel part of the organisation by portraying it to the outside world. They want to be recognised and belong to an organisation that fosters a trustworthy, knowledge sharing culture. Culture is made up of beliefs, actions and symbols (Morello and Caldwell, 2001). Beliefs form the invisible foundation; actions are partially visible and partially hidden; and symbols are visible. The belief system of knowledge work, which includes esteem in the individual, servant leadership, employability and collaboration, cannot be developed painlessly or quickly. Organisations should take a thorough look at beliefs, actions and symbols. Does the reality of the organisations culture attract or repel knowledge workers?

Greenberg (1999) states that organisational culture is created through the following factors:

- Company founders, who often process dynamic personalities, strong values, and a clear vision of how their organisation should operate.
- The organisation's experience with the external environment.

- Shared interpretation of events and action on the part of the organisation's members, developed through contact between groups of individuals within the organisation.

Cultural values are transmitted through symbols, stories, jargon, ceremonies and statements of principles between the organisation and its members. An organisation's culture is changed through factors such as shifts in the market conditions, introduction of new technological initiatives within the organisation, altered government policies, composition of the work force, mergers and acquisitions and restructuring within the organisation (Greenberg, 1999).

Möller and Svahn (2003) state that the individualism and collectivism dimension of cultural variation is regarded as the major distinguishing characteristic in the way that different societies analyse social behaviour and process information. They state that individualism is a cultural pattern consisting of individuals who view themselves as independent with their own preferences, needs, rights, and contracts. Collectivism, in contrast to individualism, refers to a cultural pattern that consists of closely linked individuals who see themselves as belonging to one or more collectives (e.g. family, organisations, social groups) and who are motivated by the norms, duties, and obligations.

Thus, it can be argued that the collectivism-individualism dimension strongly influences what kind of information and knowledge people prefer and are more prepared to process and share. This can have a great influence on the sharing and creation of knowledge through the SECI process on the premise that collectivists are more sensitive to relatively tacit knowledge. Individualist cultures on the other hand are more likely to focus on knowledge as relatively explicit attributes of phenomena. Individuals are more concerned with rationality than collectivists are. Communication tends to occur primarily with in-group members in collectivist cultures, while in individualist cultures people communicate more easily with anyone within the organisation, and also across organisational boundaries.

Möller and Svahn (2003) stated that the vertical and horizontal dimensions of culture add an important aspect to the collectivist–individualist classification. They argue that people in vertical cultures consider their "*self*" to be different from that of others in terms of social

status, whereas people in horizontal cultures consider their "*self*" to be more or less the same as that of others.

Möller and Svahn (2003) state that this distinction is a reflection of management where people in vertical cultures more easily accept, and even expect, authority, and accept the privileges that go with rank, whereas people in horizontal cultures emphasise equality.

This is a typical example of the South African business sphere where people from black ethnic groups function much more efficiently in a team than people of mixed ethnic origins or white ethnic groups, because of their emphasis on equality. The norm with white ethic groups in South Africa is to function as independent individuals who don't need to belong to a group or collectivist culture.

Bhagat *et al.* (2002) and Triandis as cited by Möller and Svahn (2003) argue that the vertical–horizontal division also influences information processing and knowledge sharing. Based on their argument they suggest that communication takes place along more hierarchical lines within organisations in vertical cultures, whereas cross-hierarchy and cross-organisational communication should meet fewer barriers in horizontal cultures. Bhagat *et al.* (2002) and Triandis suggest that the four cultural patterns derived by combining these dimensions—vertical–individualistic (VI), vertical–collectivist (VC), horizontal–individualistic (HI), horizontal – collectivist (HC)—strongly influence how information and knowledge may be selectively transferred and processed.

VERTICAL- INDIVIDUALISM	VERTICAL-COLLECTIVISM
France	China
Germany	India
United Kingdom	Korea
United States	Singapore
HORIZONTAL-INDIVIDUALISM	**HORIZONTAL-COLLECTIVISM**
Australia	Japan
Denmark	
Sweden	

Table 3: Cultural influences in the organisation
Source: Möller and Svahn (2003)

Table 3 clearly supports the theories of Nonaka and Takeuchi (1995) that was based on their theory of the knowledge creating companies. Japanese companies have a cultural pattern that consists of closely linked individuals who see themselves as belonging to one or more collectives and who consider themselves more or less the same as that of other individuals in the company. In Japanese organisations communication have very few barriers and sharing knowledge occur cross hierarchies. From the Table 3 above it is evident that KM in South Africa, with its abundance of cultures that occupy all four quadrants, won't adhere to a generic KM framework but one that can change and adapt to suit all the different organisational cultures.

2.8.3 Knowledge management and the organisational structure

Organisations differ in structure function and capacity. These factors can influence the methods used for sharing knowledge in different organisations. See table for Table 12**.**

Structural	Functional	Capacity
The span of control for nodes in the command structure	Distribution of responsibility	Personnel differences that include level of experience, level of training or education.
The number of layers in the command structure	Distribution of information	The difference in communication systems and architectures
The method of connecting the nodes to each other.	Distribution of authority	The difference in information processing and architectures
The permanent or temporary (in the case of transformation) nature of the structure.	The level of uncertainty in command and reporting relationships	The difference in experience gained in the organisations operating environment

Table 4: Factors influencing the organisational structure

Source: NATO Code of Best Practice for C2 Assessment, 2000, available at: http //www.dodccrp.org/events/2000/CCRTS_Monterey/cd/html/nato/nato_cobp.pdf

Nonaka (cited in Prusak, 1997) makes an interesting analogy for how a knowledge organisation should work and what the organisational structure should be. An organisation's culture is largely influenced by its structure. The organisational structure can have a very diverse affect on the flow of knowledge throughout the organisation. Nonaka and Takeuchi (cited in Prusak, 1997: 99-133) argue that the bureaucracy and the task force, the two structures that form the bases off new structures, are not suitable for the new knowledge economy. They state that the bureaucratic structures work well when conditions are stable, since they emphasise control and predictability of specific functions, but can be extremely

dysfunctional in periods of uncertainty and rapid change. They also state that the task force, anorganisational structure designed to address the weakness of a bureaucracy, is flexible, adaptable, dynamic and participatory in nature but has limitations. Because of its temporary nature, new knowledge or know-how created in task force teams, is not easily transferred to other organisational members after the project is completed. It is not appropriate for the exploitation and transfer of knowledge continuously and widely throughout the organisation.

The matrix structure, although flat in nature, was derived from the task force and to some degree emulates the task force where limitations are concerned. Newman (1979) defines the matrix structure as a structure or design in which there is a set of projects or task structures based on the work demand of the organisation, changing as those work demands change. It is superimposed on a structure or set of structures concerned with the facilities or resources involved in the organisation.

Nonaka (cited in Prusak, 1997) makes an interesting analogy for how a knowledge organisation should work, based on the idea of "hypertext", the mechanism underlying the World Wide Web. He stated that *"in normal text you have words on a page, whether it is on paper or a computer screen. You can have text and graphics in the same way. The concept of hypertext is that you can also have links on a page, links that could give you other pages, programs, video links, or almost anything*". Nonaka points out that in collaborative teams, the role of members is to be the links to their home departments, not independent experts. Matrix organisations and project teams often think of their members as having limited capacities, rather than concentrating on their access to resources which define their usefulness to the team.

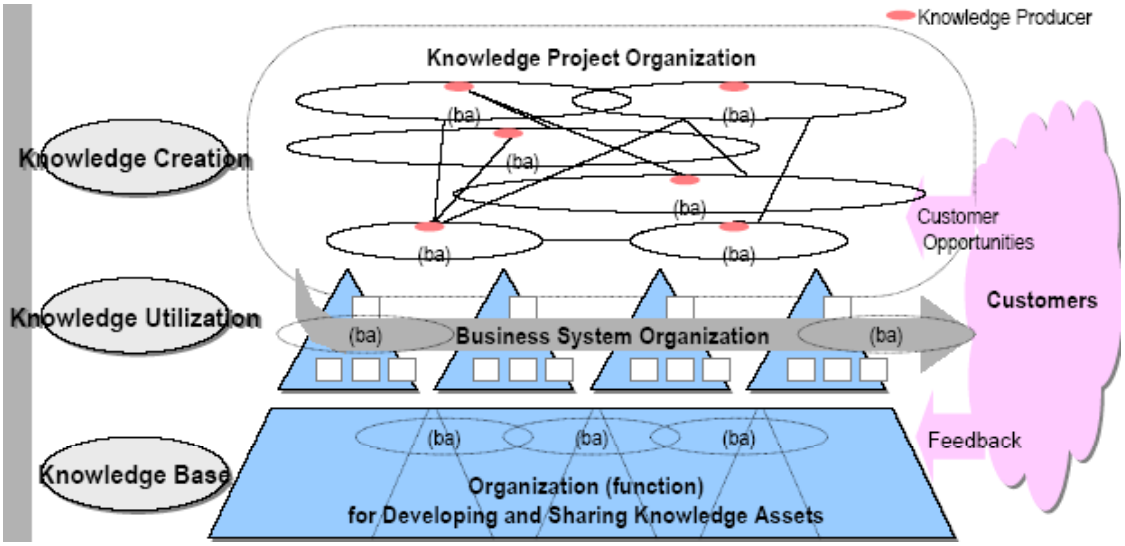


Figure 9: The hypertext organisational layers

Source: Prusak (1997)

The hypertext organisation is made up of interconnected layers or contexts that consist of the business systems layer, the project teams layer and the knowledge layer. The business systems layer is the central layer in which normal, routine operations are carried out. It is structured like a bureaucracy, since a bureaucracy is suitable for conducting routine work efficiently and is shape like a hierarchical pyramid.

The top layer is the project team layer where multiple project teams engage in knowledge sharing activities such as new product development. The knowledge layer is at the bottom of the hypertext organisation. In this layer organisational knowledge from the above two layers is re-categorised and re-contextualised. The knowledge layer does not exist as an actual organisational entity but should be embedded in the corporate vision, organisational culture and technology. Nonaka (cited in Prusak, 1997) argues that the hypertext organisation reaps benefits from both the task structure and the bureaucracy. He states that "*the bureaucratic structure efficiently implements, exploits and accumulates new knowledge through Internalization and Combination, while the task force is indispensable for generating knowledge through Socialization and Externalization. The efficiency and stability of the bureaucracy is combined with the effectiveness and dynamism of the task force in the hypertext organization*".

A hypertext organisation has the organisational capability to convert continuously and dynamically the knowledge contents generated by the bureaucracy and the project team, thus continuing the creation of new knowledge in the knowledge creation process.

According to Nonaka the hypertext organisation differs from the conventional matrix structure in the following regard:

- Organisational members in a matrix structure can belong or report to two structures at the same time whereas with the hypertext organisation members report to only one structure at a point in time.
- A matrix structure is not primarily oriented to suit the knowledge conversion processes while organisational knowledge flow naturally from the hypertext organisation, since each structure generates and accumulates knowledge differently.
- Knowledge content in a hypertext organisation is combined more flexibly across layers and over time.

Since projects are placed under direct control from top management, communication time and distance across top, middle and lower management in a matrix structure can be compressed. A hypertext organisation fosters middle-up-down management.

The hypertext organisation is an open system that also features continuous and dynamic knowledge interaction with customers and companies outside the organisation.

2.9 The importance of a knowledge management methodology in the organisation and its relationship with systems thinking.

Edvinsson (2003) argues that value creation in the knowledge economy is inextricably linked to radical change in both societal assumptions and business models. He states that a new organisational leadership agenda is evolving around the Intellectual Capital and KM of organisations, with the focus on:

- How to visualise the knowledge assets of organisations?
- How to develop intelligence flows within and between knowledge assets clusters?
- How to cultivate efficiency and renewal of the knowledge assets of organisations?
- How to capitalise on knowledge assets, by new innovative social systems?

In support of the above arguments a KPMG knowledge management survey (2003) for the year 2002 and 2003 state that knowledge management is approaching a higher maturity level. The majority of respondents, who participated in the research, indicate knowledge as a strategic asset. There is a growing board/management involvement. Knowledge management is becoming explicitly linked with the capturing of missed business opportunities and the scope of knowledge management is being extended. In the next two years, companies are expected to shift focus from internal to external knowledge sharing. The survey states that the three key challenges for the future deployment of knowledge management that stand out are:

- taking advantage of unexploited business opportunities,
- extending KM across customers, suppliers and partners,
- assuring successful implementation.

The survey states that 78% of respondents are of the impression that they are currently missing out on emerging business opportunities by failing to successfully exploit available knowledge. The survey also emphasises that there is a clear need for methodologies and tools to exploit key knowledge domains across critical business functions and processes. This includes finding the right strategy to develop employee support for realising knowledge-driven corporate strategies. Facilitating employees in their daily work processes is a key challenge for every knowledge management project. The survey states that there is a series of factors that have to be taken into account to assure successful KM implementation but assuring successful implementation requires a knowledge management methodology that will be implemented throughout the whole organisation.

Senge (1990) states that there are five disciplines seen as the cornerstone of a learning organisation and that the concept of knowledge transfer, including *systems thinking* as the fifth discipline, should be encouraged at all times. He claims that the cornerstone of any learning organisation the fifth discipline – systems thinking should feature most prominently. This is the ability to see the bigger picture and to look at the inter-relationships of a system as opposed to simple cause-effect chains thereby allowing continuous processes to be studied rather than single snapshots. The fifth discipline shows us that the essential properties of a

system are not determined by the sum of its parts but by the process of interactions between those parts.

This is the reason systems thinking is fundamental to any learning organisation; it is the discipline used to implement the disciplines. Without systems thinking each of the disciplines would be isolated and therefore not achieve their objective. The fifth discipline integrates them to form the whole system. However, the converse is also true – systems thinking cannot be achieved without the other four core disciplines: personal mastery, team learning, mental models and shared vision.

De Moor and Smits (2002) argue that a key similarity between Senge's systems thinking and Nonaka and Takeuchi's SECI model is that both models are based on cyclical thinking. They state that Nonaka and Takeuchi introduced a cyclical process applied to the creation of knowledge within organisations whereas Senge introduces a fundamental way of systems thinking based on the behaviour and disturbances of cyclical processes.

The SECI process is a cyclical process of knowledge creation. The process leads to an increasing quantity of tacit and explicit knowledge. These knowledge types are distributed among members of a community. In order to keep the flow and creation of old and new knowledge there should be a good balance of interaction amongst all four SECI processes. Supporting this balance the community should be kept motivated and the inefficient use of technology should be eliminated (such as using Outlook when the intranet is a better medium for sharing information of a static nature that may lead to new knowledge creation.

Rubenstein-Montano, Liebowitz, Buchwalter, McCaw, Newman and Rebeck (2001) argue that the available KM frameworks are not consistent with systems thinking and have limitations in the following areas:

- the frameworks are prescriptive in nature and thus center on knowledge management tasks and the frameworks do not address the notion of double-loop learning.
- there is a lack of cohesiveness across frameworks,

- there is no single definition of what constitutes a knowledge management framework and
- there are many concepts that are common to multiple frameworks, but the ordering or structure of the frameworks varies.

After reviewing the methodologies discussed from the findings of Rubenstein-Montano *et al.* (2001), it was found that no single methodology were suitable for the purpose of this thesis since most of them either don't or partially suit the requirements set out by t Rubenstein-Montano *et al.* After further reviews of KM methodologies, some methodologies that were not available during the period that Rubenstein-Montano *et al.* (2001) published their findings, a methodology was discovered that could be adapted to suit the requirements mentioned above and also the cultural diversity of South Africa discussed in section 2.8.2. The P^2-KSP methodology described by Kim, Yu and Lee (2002) was the best suited to satisfy and adapt to these requirements.

Rubenstein-Montano *et al.* (2001) argue that the frameworks tend to be task based (primarily prescriptive in nature) and neglect other aspects of knowledge management and stated that "*they do not provide a comprehensive, holistic approach to knowledge management as dictated by systems thinking"*. They further argue that descriptive and hybrid (combination of descriptive and prescriptive) methodologies "*acknowledge non-task oriented aspects of knowledge management such as cultural factors, linking knowledge management to strategic business objectives and the need to include feedback loops for responding to changes in the knowledge management environment*". The P^2-KSP methodology is a hybrid methodology and takes into account the business environment (both external and internal), knowledge requirements, the KM strategy and the KM architecture designs. A change in the business environment will result in a change in the planning and implementation of the other steps that follow since these changes in the business environment can dictate how the other components should change.

"*The second finding*", as stated by Rubenstein-Montano *et al.* (2001), "*addresses learning in knowledge management frameworks.* Argyris and Schön (as cited by Rubenstein-Montano *et al.*, 2001) distinguish between double- and single-loop learning where single-loop learning is that which organisations do for corrective purposes. Typical example would be Affirmative

Action policies in organisations. Argyris and Schön (as cited by Rubenstein-Montano *et al.*, 2001) argue that "*double-loop learning is generative; that is, double-loop learning involves learning on a more fundamental level where basic assumptions are changed*". Feedback loops can be can be adjusted not just on the main components but also on the sub-components in the P^2-KSP methodology. Through the inclusion of feed back loops in sub-components as well as the main components of the P^2-KSP methodology an environment for double-loop learning can be established. This means that what was learned on a lower or higher level in an organisation can shared with other areas in the organisation to determine if it can benefit that specific area. Both single and double loop learning can be established in the P^2-KSP methodology.

"Findings three and four relate to the notion that there is a lack of cohesiveness in knowledge management initiatives" as stated by Rubenstein-Montano *et al.* (2001). Since there is no clear standard (or the lack of it) to what constitute to the structure of a knowledge management framework it creates an opportunity to use the P^2-KSP methodology to work towards a standard. For the purpose of this thesis the first two findings will be regarded as the most important considerations when choosing a methodology that is closely related to the systems thinking concept.

Overview of the Knowledge Strategy Planning: methodology (P^2-KSP)

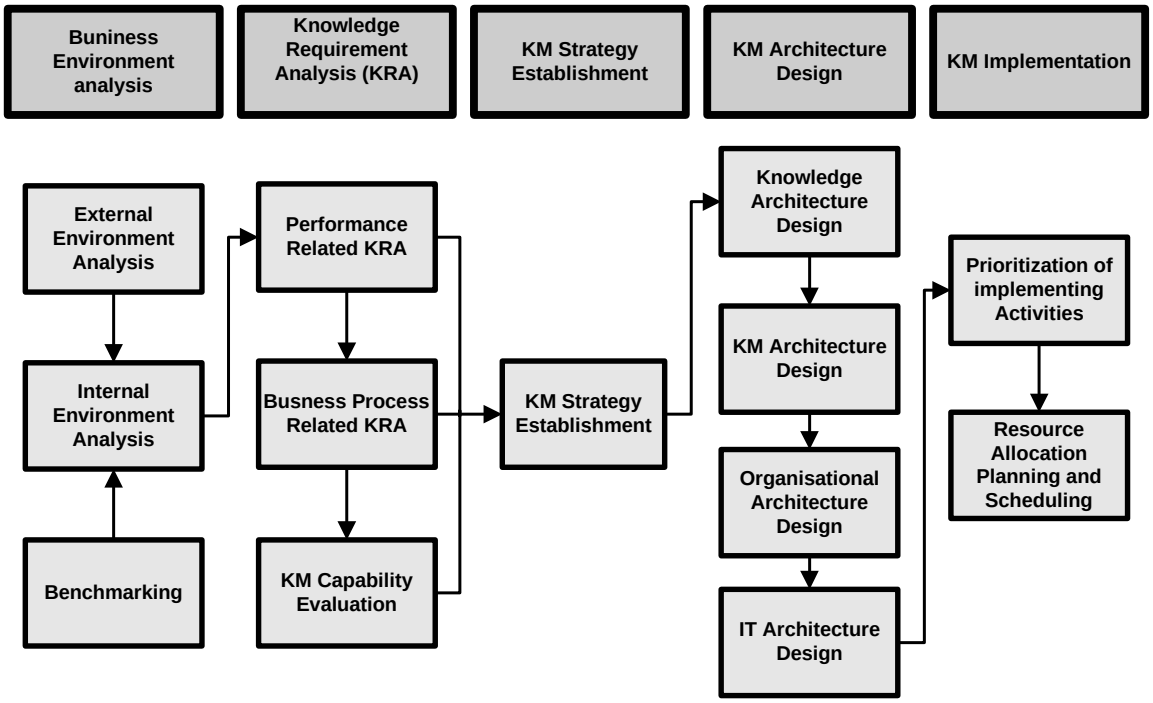


Figure 10: P^2-KSP methodology
Source: Kim, Yu and Lee (2002)

2.9.1 Business Environment analysis

Kim, Yu and Lee (2002) state that during environmental analysis, the strengths, weaknesses, and opportunities of an organisation can be identified from internal and external points of view and Based on these results, an organisation can recognise where it is and project where it should go in the future.

2.9.2 Knowledge requirement analysis

Kim, Yu and Lee (2002) state that "*Knowledge requirement analysis is the most fundamental component of a knowledge strategy planning process because its results determine the directions and details of an organisation's knowledge management. In this phase, various types of knowledge, whose strategic potential seems to be maximised when managed appropriately, are identified. The P2-KSP methodology identifies and classifies knowledge by analysing organisational performance systems and business processes simultaneously*". Kim, Yu and Lee argue that firstly, a planner examines various measures or indicators of the organisational performance system. Then, knowledge items are identified according to each measure or indicator. They also state that the balanced scorecard or its derivatives can be a

good source for such measures and that business processes are also the main subjects of performance measurement. "*After identifying knowledge requirements, it is important to investigate how well they are actually being managed. The purpose of the knowledge management capability evaluation is to investigate the current state of knowledge management and capability of using knowledge assets. Results of the evaluation can include the quality and quantity of each knowledge item, the maturity of organisational culture, a level of managerial or IT support, etc.*" as stated by (Kim, Yu, Lee, 2002).

2.9.3 Knowledge management strategy establishment

In this phase, the long-term knowledge management goal and strategies are set up based on the outputs of previous two phases (Kim, Yu, Lee, 2002).

2.9.4 Knowledge management architecture design

The knowledge management architecture is the most important and substantial outcome of knowledge strategy planning according to Kim, Yu and Lee (2002).. They state that "*the knowledge management architecture of the P2-KSP methodology plays the critical role of a blueprint for implementing knowledge management"*. They further state that the knowledge management architecture integrates the following four individual architectures, which are interrelated:

- Knowledge architecture, which incorporates both of knowledge and expert maps,
- Knowledge management process architecture, which defines knowledge management activities and their relationships;
- Organisation architecture, which designs an organisation's structure for seamlessly carrying out knowledge management processes; and
- Information technology architecture that integrates information technologies or tools for supporting knowledge management.

2.9.4.1 Knowledge architecture

The knowledge architecture is a result of classifying organisational knowledge by one or more dimensions. Unlike Kim, Yu and Lee, (2002) who focus on tacit, implicit or explicit knowledge, this thesis will take a different approach for classifying knowledge by focusing on knowledge assets. For the purpose of this thesis we will only focus on knowledge assets that have either a tacit or explicit dimension to it or both for the incorporation into the knowledge architecture design. These knowledge assets can be divided into four categories

that are either experiential, conceptual, systemic or routine knowledge assets as discussed earlier in this chapter**.**

In the case of experiential knowledge assets it is hard to access or transfer it without being in contact with the person possessing it. To resolve such difficulty, an expert map reveals the source of the knowledge as an expert possessing the knowledge, instead of the knowledge itself.

2.9.4.2 KM architecture

Kim, Yu, Lee, 2002) argue that the knowledge management process architecture defines a variety of processes involved in a life cycle of knowledge, from its creation to termination and recreation. They state that the KM processes can be largely summarised into:

- creation/acquisition,
- registration/storage,
- sharing/utilization and
- updating/termination.

The above processes as discussed by Rubenstein-Montano, Liebowitz, Buchwalter, McCaw, Newman and Rebeck (2001) earlier are very prescriptive in nature. For the purpose of this thesis the following section will propose a KM architecture framework based on the work done by van der Spek and de Hoog (1995) and the knowledge creation process of Nonaka and Takeuchi (1995).

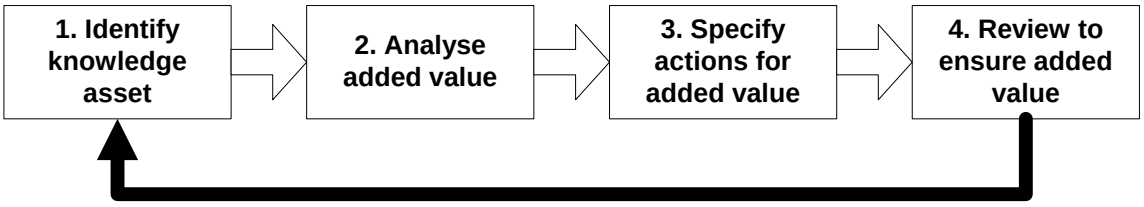


Figure 11: KM Framework

Source: van der Spek and de Hoog (1995)

- **Identifying Knowledge Assets**

Some organisations may find it difficult to categorise or identify their knowledge assets. Nonaka categorised four different types of knowledge assets that is commonly found in any organisation and was discussed in Chapter Two. That includes experiential, conceptual, systemic and routine knowledge assets. Through the categorisation of an organisation's knowledge assets according to the above-mentioned categories, it can be determined whether these knowledge assets are explicit or tacit. It can also determine if the quality of the knowledge asset is from a reliable and trustworthy source and that the availability of a knowledge asset depends on the times at which knowledge is available, the media in which the knowledge is held and the location of the knowledge.

- **Analysing Problems and Opportunities related to a Knowledge Asset**

Mackintosh, Kingston and Filby (1999) state that an important issue to address *is "how can managing this knowledge asset add value to the organisation?"* They argue that the answer is usually one of the following:

- by relieving a knowledge bottleneck,
- by plugging a knowledge gap",
- by providing better quality knowledge or
- by communicating the knowledge better.

Mackintosh, Kingston and Filby (1999) state that after describing the types of problems that can occur in an organisation, it is necessary to identify whether any of these problems may be present in an organisation. In order to do this the following known business management techniques can be applied:

- SWOT analysis,
- value chain analysis,
- process simulation,
- checklists of bottlenecks.

- **Selecting the actions that will ensure Knowledge Asset are managed.**

When the knowledge assets within an organisation are identified, the organisation must decide on the relevant type of action to take to manage these knowledge assets. Using the

SECI model, the organisation can determine the type of IT application that is discussed in Chapter Five. However, the management of the IT component is not part of managing the KM component. It should be viewed as totally separate from managing the KM component and managing it will be discussed later in this chapter.

- **Reviewing the Actions**

After deciding on the type of action that should be taken to manage the knowledge assets, the organisation should review the action continuously to ensure that the knowledge asset is sustained and that new knowledge is constantly being created. Should the chosen action deviate from the process, the organisation should restart the whole process to ensure that the knowledge assets is sustained and developed.

After establishing a framework for knowledge management processes, detailed activities and their relationships within each process are to be defined. It serves the same purpose as building a process model of knowledge management. The details of each process vary according to the type of knowledge asset targeted in the knowledge architecture. The knowledge management process architecture also reflects organisational policies, rules and procedures, all of which aim at routinising and creating a knowledge management culture within an organisation.

2.9.4.3 Organisational architecture

Kim, Yu and Lee (2002) state that the "*organisational architecture defines the role of each knowledge management team responsible for performing or supporting knowledge management processes and a program for managing Human Resources contains plans for bringing up knowledge workers through incentives such as a reward system, training programs, or the establishment of communities for networking with internal and external experts*". An organisational structure that is designed according to a hypertext organisation (discussed earlier in this chapter) can have a catalytic affect on knowledge creation and transfer within the organisation.

2.9.4.4 Information Technology architecture

Kim, Yu and Lee (2002) define the information technology architecture as a blueprint of a knowledge management system, namely, a technical infrastructure for knowledge

management. They argue that a knowledge management system can be either a stand-alone information system or the combination of various information-technology applications. In this thesis a knowledge management system consist of three components, i.e. the people, the IT, and the KM process. The KM system defines various components of a knowledge management system and their relationships. To design the information technology architecture, functional requirements of a knowledge management system should be identified in advance by considering the other three architectures and the KM components.

2.9.5 Knowledge management implementation planning

Managing the Knowledge creation process and the IT component is just one subsection of a KM initiative. The people component can be the most critical component of the three. If there is no support from top management and if the stakeholders resist the change, then it can mean the end of the initiative or a failed initiative resulting from a poor implementation attempt.

According to Kim, Yu and Lee (2002) the four architectures of the P2-KSP methodology are not independent, but interrelated to each other. They also state that knowledge management cannot be implemented by any of the four architectures, but requires an integrated approach comprehending all four architectures.

The last phase of the P2-KSP methodology is setting up feasible plans for implementing the four knowledge management architectures by considering the resource restrictions or other organisational constraints. In this phase the project or program plan for the knowledge management implementation are produced and it is normally followed by a prototype or pilot system.

2.10 SUMMARY

This chapter has reviewed the literature on knowledge management and its related areas of interest that contribute to the production of knowledge and the management of a knowledge creation environment. The previous sections in this chapter had an in depth discussion on the dimensions and characteristics of knowledge and how it is created. However, understanding the management of knowledge is synonymous with confusion in

many industries. It is not the knowledge itself that need to be managed but the producers of the knowledge and environment that the knowledge is created in to insure that good quality knowledge assets are produced. In order to answer the three research questions posted in section 1.3 of Chapter One the organisation should first seek to understand its current environment, this includes:

- **Understand the nature of the business environment**

If the organisation has a thorough understanding of its business environment then it will be effortless to determine what strength and weaknesses set it apart or let it lag behind its competitors.

- **Understand how knowledge is created and transferred within the organisation.**

By understanding its strength and weaknesses or those of competitors it can decide on what actions to take to improve the quality of knowledge assets in its environment. This depends on whether the organisation understands the organisational knowledge creation cycle.

- **Understand the role that IT plays in the KM environment**

From the discussion in Chapter Two on Information Technology it is evident that IT have a very important role to play when it comes to knowledge management. The management of the IT component is very important to create a knowledge-sharing environment. IT investment can be minimised or can be more effective if the organisation know to what extent IT can contribute to the KM environment.

- **Understand the role that HR can play in KM environment.**

This Chapter also clearly indicates that Human Resource Management's role in the organisation is very important aspect of the enhancing the KM environment. Employees have different methods of sharing knowledge, based on their cultural background, with their colleagues. The HR department can minimise knowledge gaps that are often caused by a very high staff turnover of experienced people.

- **Understanding the current internal knowledge management practice and methodology.**

Finding a KM methodology to suit an organisation's needs may be a cumbersome task. This is the most important and most complicated step since the KM methodology should

integrate the HR, IT and business strategy. It is important to first seek what the current KM methodologies and practice are in the organisation before a decision can be made on a specific methodology.

2.11 CONCEPTUALISATION

The conceptual framework gives an overview of the main areas that will be studied for this thesis in a graphical and then narrative form. This is most easily done after a list of research questions have been constructed, which has been done in Chapter One of this thesis. The first research question revolves around how organisations can apply the unified knowledge creation process to capitalise on managing knowledge and how this process can add value to their competitive environment. This thesis will also seek to find the most appropriate methodology that is aligned with systems thinking, in managing the SECI process within an organisation.

The conceptualisation has served as the basis for formulating questions for interviewing the persons responsible for managing their respective practice areas in the organisation end will act as the medium to collect data for this thesis.

Chapters One and Two of this thesis provided an introduction to the subject, which include research problem, which were covered by a critical review of current thinking in the second chapter. The purpose of this section is to display the conceptualisation that will allow us to answer this thesis' research questions. The reader will also be provided with a frame of reference, which has emerged from the conceptualisation and will be presented at the end of the section.

As stated earlier, the conceptualisation above is what will allow us to solve this thesis' research problems. The frame of reference, which results from this conceptualisation, is what will guide the data collection for this thesis.

Knowledge is created between the interaction of tacit and explicit knowledge. New knowledge is created on the boundaries of the old. The SECI process explains how tacit and explicit knowledge interact to create knowledge that can be of a tacit or explicit nature. New

knowledge can't be created if there is not adequate sources of tacit and explicit knowledge for this reason, Nonaka introduces the concept of *ba,* that introduce a context for knowledge sharing and creation, whether it be a physical or virtual context. Tacit and explicit knowledge should interact with each other in a shared context in order to create new knowledge and, thus, is dependent on the *ba* concept. The result of this interaction in a shared context or space is the creation of knowledge assets. Knowledge assets are the product of SECI process and the concept of *ba.* An organisation can determine the type of knowledge assets that exist in the organisation. Knowledge assets can be either of explicit or tacit nature or a combination of both. Based on the organisations knowledge asset needs, new knowledge can be created by the introduction of the *ba* concept.

An organisation can foster knowledge management initiatives through its departments. An organisation may have one or many IT departments with one or many Information and Communication Technologies (ICT). An organisation may also have one or many Human Resource departments with one or many training methods employed within the organisation. An organisation may have a KM methodology that is managing one or more Knowledge creation process. The Knowledge creation process can be facilitated by one or more IT and Human Resource initiatives, but can only be managed by one methodology in an organisation. This paper will discuss and explain how the knowledge creation process can be managed and how the organisation can influence and support the knowledge creation process. The emerged frame of reference is presented graphically below (see Figure 12). The next chapter will discuss the research methodology.

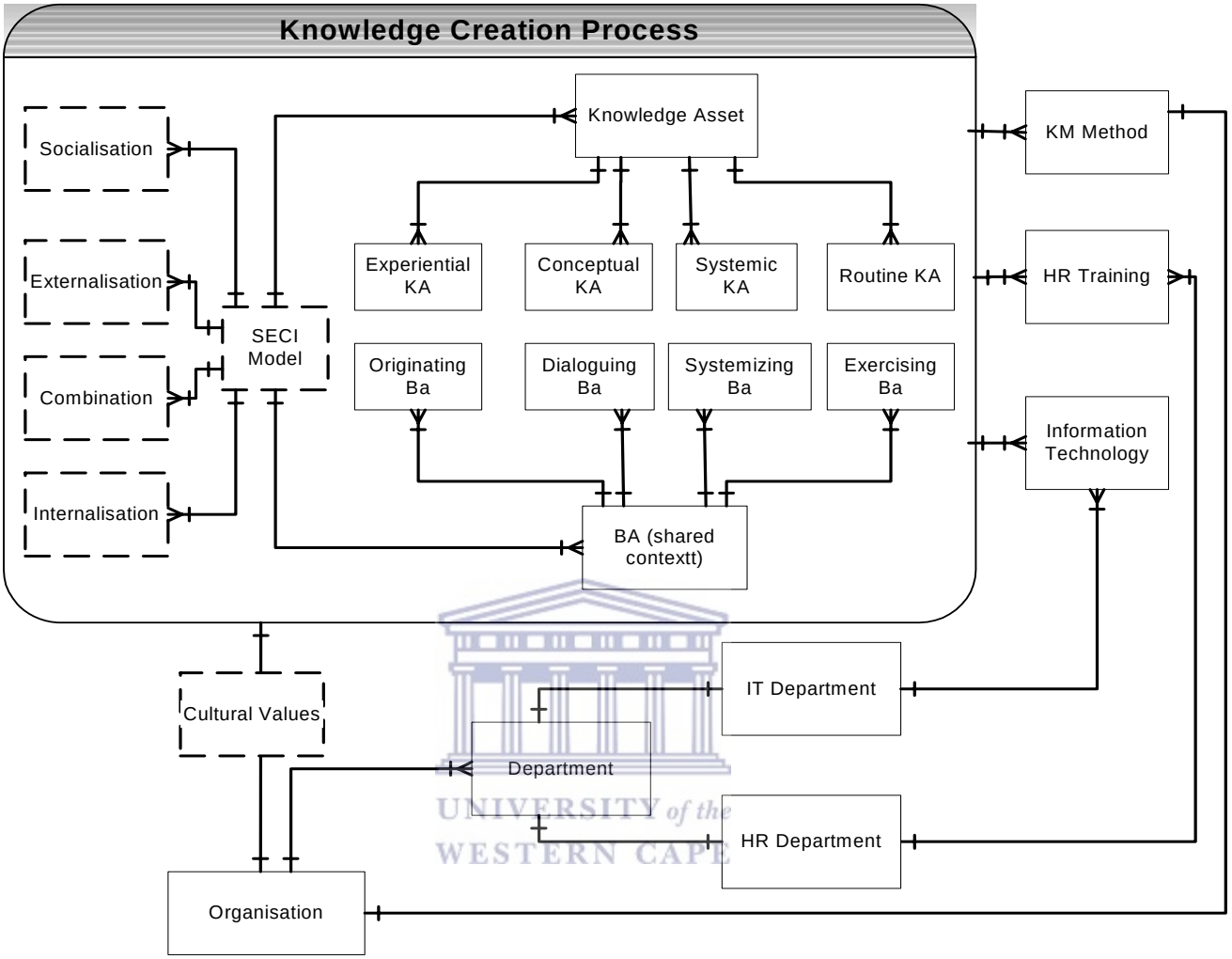


Figure 12: Authors' own construction of the conceptual framework.

3. CHAPTER 3 - Research Methodology

3.1 METHODOLOGY

The main purpose of this study is of an explanatory nature. The thesis will compare how the knowledge creation process model (SECI) of Nonaka and Takeuchi (1995) could be applied in practice. Only knowledge creation and transfer will be investigated in a highly knowledge intensive industry. The SECI model will be compared with the already existing knowledge management initiative in a professional service organisation with a highly rated knowledge sharing culture in South Africa. This chapter will describe the research design and how it will be approached. The data collection method, sample selection as well as validity and reliability issues will be presented. In conclusion of this chapter a graphical overview of the research methodology will be provided.

This research design was adopted and modified from the work done by Fuchs and Hanning (2001).

3.2 RESEARCH PURPOSE

Sekaran (2003) state that research studies can either be exploratory in nature or descriptive or may be conducted to test hypotheses and that the case study is also a method of solving research problems. Yin (1994), however, states that case study method can be divided into three general purpose categories for carrying out research, that is

- Exploratory
- Descriptive
- Explanatory

Exploratory studies is undertaken when not much is known about the situation at hand, or no information is available on how similar problems or research issues has been solved in the past (Sekaran, 2003).

Descriptive research is undertaken in order to ascertain and be able to describe the characteristics of the variables of interest in the situation (Sekaran, 2003). The goal of

descriptive research is to offer the researcher a profile or to describe relevant aspects of the phenomena of interest from an individual, organisational, industry-oriented, or other perspective. It is known what need to be researched but not the answers (Sekaran, 2003).

Explanatory research is useful for studying relations between causes and symptoms. The researcher tries to identify the factors, which together cause a certain phenomena (Fuchs & Hanning 2001).

The research purpose of this thesis is mainly descriptive due to the fact that it was stated in the research problem statement that this thesis want to gain a better understanding of how the SECI process can add value to the competitive environment of the organisation. In this thesis a number of variables connected to the issue of how the knowledge creation process can be used as a competitive advantage will therefore be described. However, this thesis is also somewhat explanatory. This due to the fact that the researcher identify the factors, that act as enablers for knowledge creation or facilitates the knowledge creating process in the organisation. In Chapter Two a methodology was introduced that is closely aligned with systems thinking to manage the knowledge creation process and its environment. Towards the end of the thesis authors' own conclusions are presented by answering the research questions, this thesis is beginning to explain the issues that have been described. This makes the study mainly *descriptive* but with *explanatory* and *exploratory* influences.

3.3 RESEARCH APPROACH

Fuchs & Hanning (2001) state that there are two methods to choose from when conducting research in social science: "*qualitative* or *quantitative"*. They argue that the most important difference between these two approaches is the use of numbers and statistics in the quantitative approach while the qualitative approach focuses on social aspect of life and the meaning people attached to it. The choice of approach depends on the problem definition as well as on what kind of information that is needed and that these two approaches can also be combined.

This thesis has a qualitative approach since the research purpose requires that the phenomenon should be studied in depth. This approach is suitable due to the fact that the researcher wanted to gain a better (i.e. deeper) understanding of how an organisation may use the knowledge management as a competitive advantage. Since this thesis focused on a qualitative research approach, the research strategy will be presented in the next section.

3.4 RESEARCH STRATEGY

There are a number of different ways in which one may conduct social science research. Yin (1994) lists five primary research strategies: Experiments, surveys, histories, analysis of archival information and case studies. Each of these strategies has certain advantages and disadvantages. However, these advantages and disadvantages depend upon three conditions:

- the type of research questions asked
- the control an investigator has over actual behavioral events
- the focus on contemporary as opposed to historical phenomena

The purpose of this thesis is to investigate how a South African organisation can use knowledge creation process of Nonaka and Takeuchi (1995) as a competitive advantage tool. Due to this we do not require the control over behavioral events, which rules out *experiments* as a research strategy. Furthermore we want to focus on recent developments within the chosen area, which rules out the *historical* strategy. This strategy is also ruled out due to the fact that Yin (1994) states that this method is suitable only when no relevant persons are alive to report. He states that "*surveys* or the *analysis of archival records are quantitative in nature"*, they are furthermore advantageous when the research goal is to describe the incidence or occurrence of a phenomenon or when it is to be predictive about certain outcomes. Given the research questions the case study approach is the most appropriate method for this research. In general, case studies are the preferred strategy when "how" or "why" questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context. This fits neatly with the above-mentioned nature of this explanatory study. A case study approach is particularly useful because it permits the collection and presentation of more details and softer data.

It should be noted that the case study approach adopted in this study relies primarily on the data collected through interviews with subjects, rather than direct observation of the subjects during the performance of their daily communication tasks.

3.5 DATA COLLECTION

The data collection process for case studies is more complex than those used in other research strategies. If the researcher chooses to conduct a case study he needs to maintain, what Yin (1994) refers to as, a methodological versatility. This versatility is not necessarily required when using other strategies. The researcher further needs to follow certain formal procedures to assure quality control during the data collection process. Data for case studies may and will be collected through the following six different sources:

- documentation
- archival records
- interviews
- direct observations
- physical artifacts

Yin (1994) proposes that no single source of evidence has a complete advantage over the others and states that " *a major strength of case study data collection is the opportunity to use multiple sources of evidence*".

Due to the fact that this thesis is a qualitative and not a quantitative study the utilization of *archival records* as a source of evidence will be excluded from this study. Participant observation is also ruled out as possible sources of evidence for this case study, due to limitations regarding time. This leaves this thesis with five sources of evidence, interviews, documentation, direct observations, archival records and physical artifacts. Data may also be divided up into primary and secondary data.

Yin regards the interview as one of the most important sources of case study information. According to Yin (1994) there are three different types of interviews, these are:

- Open-ended
- Focused

- Survey

Most commonly, case study interviews are of an open-ended nature, in which an investigator can ask key respondents for the facts of a matter as well as for the respondents' opinion about events (Yin, 1994). In a focused interview the respondent is interviewed for a short period of time. In such cases, the interviews may still remain open-ended and assume a conversational manner, but the interviewer is more likely to be following a certain set of questions derived from the case study protocol (Yin, 1994). The third type of interview entails more structured questions, along the lines of a formal survey. Such a survey can be designed as a part of a case study.

Yin (1994) concludes that overall, interviews are an essential source of case study evidence, because most case studies are about human affairs. These human affairs should be reported and interpreted through the eyes of specific interviewees, and well-informed respondents can provide important insights into a certain issue.

For this thesis interviews were chosen as the main source of evidence. The type of interview that was found to be the most appropriate was the *open-ended* interview. This is due to the fact that only limited amount of time with the interviewees were allowed. The questions that were asked were of an open-ended nature that was followed in the interview guide (appendix 1).

The interviews were conducted on a face-to-face basis or over the telephone with the interviewees during the data collection period. The researcher used an interview guide (appendix 1) to conduct interviews with the Human Resource department, Information Technology department and the EPI-USE management. During interviews, the researcher would first explain what the KM is and what the research is all about. After making sure that the interviewees understood what the KM is about, the Interviewer would then talk to the interviewee about their role and position in the organisation. This is to ensure that the interviewee is comfortable before the actual questions were being asked. The interview questions were derived from previous research done by Carvalho & Ferreira (2001) Marwick (2001) and Harry (2002). The interview questions were formulated around the SECI process of Nonaka and Takeuchi (1995). Respondents were asked a series of questions

based on the role or position in the organisation to determine how their particular area of interest was or could facilitate the SECI process.

The following individuals were interviewed during the period of May to October 2003:

Person	Role at EPI-USE	Date of data collection	Data collection method
Mr. James Brits	SAP HR team strategy Manager	08-Aug-03	Email, telephonic
Mr. Johan de Beer	Human Resource manager	May-July 2003	Email, telephonic interview
Mr. Jan van Rensburg	IT manager.	July-October 2003	face-to-face interview
Mr. Jaco Niewoudt	PSA administrator	26 May 2003	face-to-face interview
Mr. Heinrich Portwig	Knowledge management consultant	15 October 2003	Email, telephonic interview
Mr. Nico Thirion	Alternate company director in Cape Town	July-October 2003	face-to-face interview
Mrs Ilze Joubert	SAP HR and Payroll coach	14 October 2003	telephonic
Mr. Nicolai van der Me rwe	SAP Training and development manager	08 October 2003	Email, telephonic and face-to-face interview
Marinda Biljon	HR assistant	10 June 2003	Telephonic interview
Mr. Thys de Bruyn	Senior SAP consultant	07 October 2003	Telephonic interview

Table 5: Data collection table

According to Yin (1994) documentary information is likely to be relevant to every case study topic. This type of information can take many forms and should be the object of explicit data collection plans. The different types of documentation are:

- Letters, memoranda
- Agendas, announcements and other written reports of events
- Administrative documents
- Formal studies

For case studies, the most important use of documents is to confirm and augment evidence from other sources (Yin 1994). As mentioned above he discusses the importance of maintaining a methodological versatility in order to gain a better quality of the case study.

Yin (1994) further states that one of the major strengths of the case study is that it enables the researchers to use multiple sources.

Consequently Yin (1994) calls the use of multiple sources, when conducting a case study, for triangulation. In order to, as suggested by Yin (1994), triangulate evidence for this thesis; documentation and direct observation was used along side with interviews. Direct observation was conducted throughout the period of research in the organisation. Documentation on the company background and marketing material was collected to from archival and historical records, the intranet and the internet to support the organisational analysis.

3.6 SAMPLE SELECTION

Selective sampling is used in qualitative case studies and that it involves purposive sampling. Purposive sampling implicates that the information units should be selected based on theoretical purpose and relevance. This implies that it must be assumed that the phenomenon or problem exists within the sample of information units.

For this thesis the research questions and conceptualisation provided the researchers with a rather high complexity for each case. In order to focus effectively and to fulfill the explanatory, descriptive and, the somewhat, exploratory purpose of the research, it was decided that two cases were to be included in the sample. The sampling of these two case studies involved four phases. These were:

- The selection of industry
- The selection of company
- The selection of organisational department
- The selection of appropriate persons to interview

For this thesis it was found to be suitable to carry out research in two different organisational departments, this is in order to find out whether the departments can facilitate and act as enablers for the knowledge creation process through the implementation of new initiatives and technology and to find a relevant sample size suitable for this study.

Industry Sector

The organisations chosen for this study operates in the Enterprise Resource Planning software implementation market in the Information and Communication (ITC) industry sector in South Africa. This market has witnessed exponential growth in the last decade; and technologically, it is regarded as a very sophisticated and knowledge intensive industry. Consequently, organisations in this market are expected to have highly intelligent individuals with a very broad knowledge base in their respective areas of specialisation.

The organisation have re-iterated, during a presentation to its employees, the importance of having a effective and sound KM strategy implemented that is aligned with the organisation's business strategy. The contact persons for this data collection was as follows:

- Mr. James Brits – SAP HR team strategy Manager
- Mr. Johan de Beer – Human Resource manager
- Mr. Jan van Rensburg- IT manager.
- Mr. Nico Thirion – alternate company director of the organisation and the Cape Town office branch manager
- Mrs Ilze Joubert - former HR and Payroll coach
- Mr. Nicolai van der Merwe- Training manager
- Mrs Miranda van der Merwe – HR assistant

3.7 DATA ANALYSIS

Yin (1994) writes that the ultimate goal of analysing data is to treat the evidence fairly, to produce compelling analytic conclusions and to rule out alternative interpretations. Yin (1994) writes that before data may actually be analysed, a researcher using case studies may choose from two general analytical strategies, relying on theoretical propositions and developing a case description.

Relying on theoretical propositions is according to Yin (1994) the most common strategy. This means that the researcher derives his research questions from previous research done by Carvalho & Ferreira (2001), Marwick (2001) and Harry (2002). The data collected is then

compared to the findings of previous studies. This strategy helps the researcher to focus on relevant data and to ignore irrelevant data. Developing a case description is according to Yin (1994) less preferable than the use of theoretical propositions. This strategy may serve as an alternative to theoretical propositions when little previous research has been done (Yin, 1994).

This thesis will primarily rely on theoretical propositions and will partly rely developing a case description where the research material is not adequately suitable to support the findings. This is due to the fact that it was desirable, and it was possible, to derive research questions from previous research and studies and literature on the subjects involved in this thesis. Furthermore it was desirable to compare the data that was found to the findings of current and previous literature on the subject.

For each research question data was reduced via a within-case analysis. The within-case analysis was conducted by comparing empirical findings to the existing theories that were displayed in the conceptualisation. Thereafter data was further reduced and displayed in a cross case analysis. The cross case analysis was done by comparing the findings, and detecting possible similarities and differences from the HR and IT perspectives. In Chapter fFve where the conclusions were drawn, the different meanings of the research are discussed. These was done by restating the research question and then answer the question, based on the findings of this thesis. The following section will present the quality standards of this study.

3.8 QUALITY STANDARDS: VALIDITY AND RELIABILITY

Due to the fact that a research design is supposed to represent a logical set of statements, one can also judge the quality of any given design according to certain logical tests. (Yin, 1994). According to Yin (1994) four tests exist when judging the quality of the design of a research. These four tests are:

- Construct validity
- Internal validity
- External validity

- Reliability

Construct validity includes the establishment of correct operational measures for the concepts being studied. Yin (1994) writes that there are three tactics available in order to increase construct validity. The first is to use multiple sources of evidence during the data collection. The second tactic is to establish a chain of evidence. This should also be done during the data collection. The third and final tactic is, according to Yin (1994), to construct a case study report, which is reviewed by the key-informants.

For this thesis, document,s interviews and direct observation have been used as sources of evidence. The documentation has however only been used complementary to the interviews and has been included in the analysis. To establish a chain of evidence is, according to Yin *"to allow an external observer-the reader of the case study, for example- to follow the derivation of any evidence from initial research questions to ultimate case study conclusions"*

.

Throughout this research, citations to all the sources that have been made. The draft report has furthermore been reviewed by a supervisor, three proof-readers as well as by fellow academic students. Regarding the most suitable and knowledgeable persons to interview efforts were made to find these within each case, this has been described under the section that discusses sample selection. Most of the interviews were conducted in Afrikaans, this due to the fact that the respondents were of Afrikaans heritage. These interviews were later translated into English, which includes the risk of translating errors. However, if the interviews had been conducted in English, that might have led to misunderstandings and a less free flow of the conversation/interview.

Internal validity is used for establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from false relationships. It should be noted that internal validity is a concern only for causal or explanatory studies, where an investigator is trying to determine whether event x led to event y (Yin, 1994). Due to the fact that this thesis is mainly descriptive, no further consideration has been taken to internal validity.

To increase external validity, Yin (1994) emphasises the importance of using replication logic in multiple-case studies. He further states that a theory must be tested through replication of the findings in similar surroundings, where the theory has specified that the same results should occur. Once such replication has been made, the findings can be generalised to a greater number of surroundings. In this research the findings have been reached by testing the relevant theory in two different cases.

Yin (1994) states that reliability demonstrates that the operations of a study - such as the data collection procedures - can be repeated. Yin (1994) further states that the objective should be to make sure that, if a later investigator followed exactly the same procedures as described by an earlier investigator and conducted the same case study all over again, the later investigator should arrive at the same findings and conclusions. It is concluded by Yin (1994) that the goal of reliability is to minimise the errors and biases in a study. In this thesis the researchers have tried to carefully explain the procedures of the research, in this, as well as in every other chapter. The data collected for each of the cases as well as the structure of the thesis has been made in a way so that following researchers or readers can retrieve any desired material. However, when conducting interviews, personal biases may to some extent have been present although an effort was made to formulate relevant questions that would neither lead nor influence the respondent in any way.

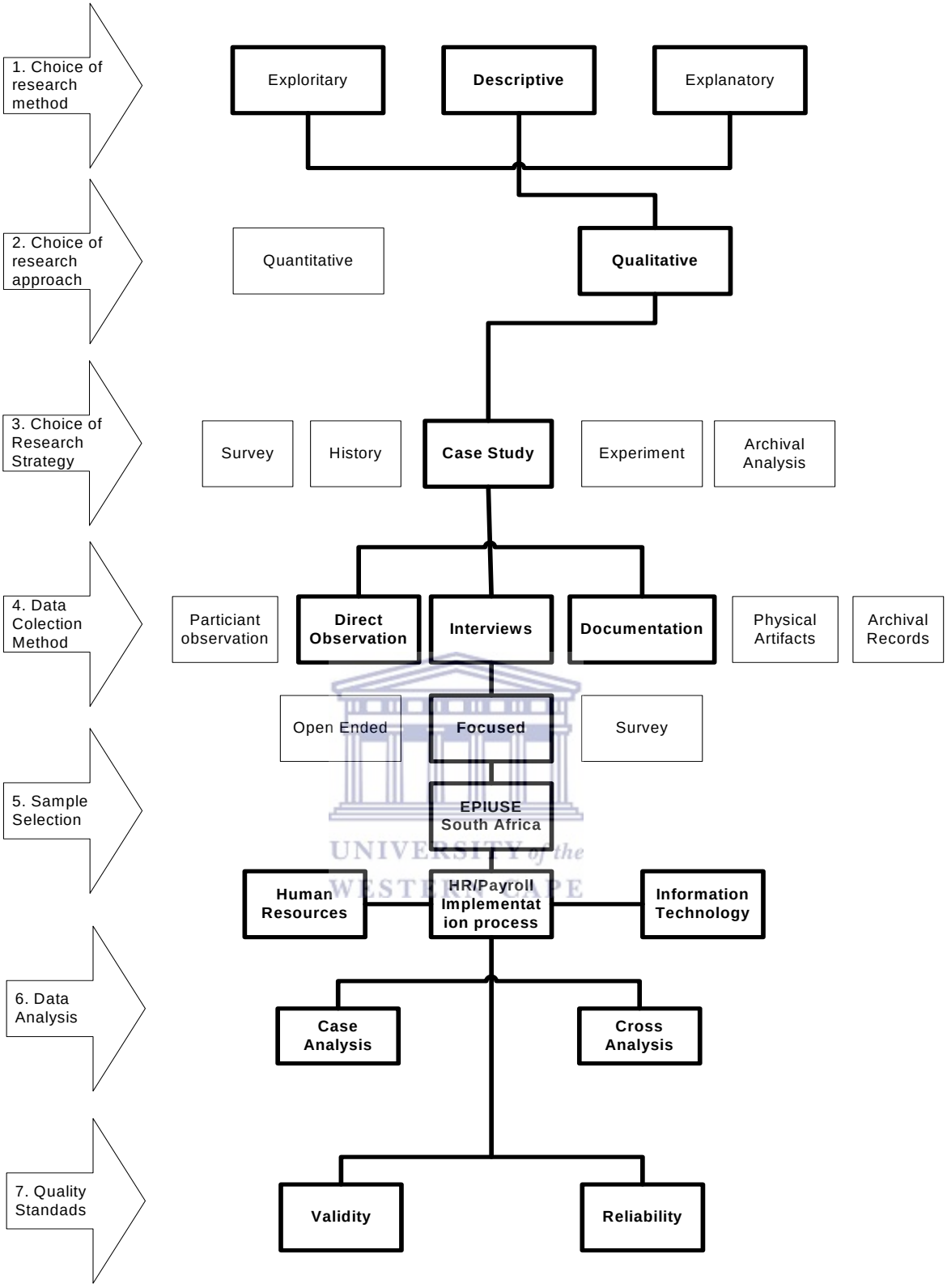


Figure 13: Authors' construction of the Research Methodology Framework.

3.9 SUMMARY

Consistent with the exploratory nature of this study and the `how' and `why' research questions posed a case study research methodology was adopted. This methodology enabled the collection and presentation of more substantial details in relation to the subject's media choice. As with all research studies there are limitations, but the use of the interview questionnaire approach to collect the data and the systematic, detailed presentation of the analysis would nonetheless enrich our understanding of chosen research method.

4. CHAPTER 4: Results - Data Presentation and Discussion

The previous chapter discussed the methodology adopted for this research and the logic behind the choice of data collection methods. This chapter will present the results of the data gathered as it emerged from the set of guidelines in the summary from chapter two that includes:

- Understand the nature of the business environment that EPI-USE operates in.
- Understand how knowledge is created and transferred within EPI-USE
- Understand the role that IT plays in the KM environment at EPI-USE
- Understand the role that HR can play in the KM environment at EPI-USE
- Reviewing the current KM practices and methodologies.

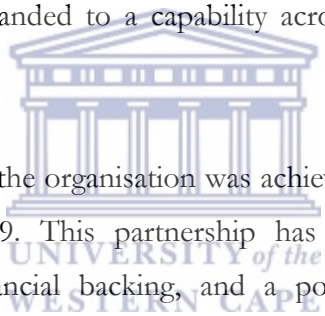
The data were collected through interviews, observation, archival and policy documents and other media sources. It will start with the background and analysis of the organisational environment, followed by an analysis of the organisation's core business process in terms of the knowledge creation process and the role IT and HR play in facilitating knowledge creation and sharing in the organisation.

The following data was collected through a series of interviews with Mr. Nico Thirion, alternate company director, during the period of May to October 2003. The next section will give an overview of the organisation and will analyse and scrutinise its environment that give rise to inception of this thesis. It will describe the environment that the data collection will occur in for this thesis to solve the research question, that is a comparative analysis of one of EPI-USE's core business process, the HR and Payroll implementation process, as it conform to the knowledge creation process of Nonaka and Takeuchi (1995). After the data for section 4.1, 4.2 and 4.3 was gathered and structured it was reviewed by Mr. Nico Thirion, to get accurate possible account of the EPI-USE business environment

4.1 Understand the nature of the business environment: Background and history of the organisation.

EPI-USE is an autonomous South African company specialising in the design, development, integration, implementation and life cycle support of information systems that create business excellence (http://www.EPI-USE.com).

The EPI-USE Group is a worldwide software and services organisation, with a focus on company-grade technology. The organisation has its roots in the Unit for Software Engineering founded at the University of Pretoria, South Africa, in 1982. EPI-USE was commercialised in 1994 on the technology wave created by SAP in South Africa, and specifically through the co-development with SAP of the South African payroll. It is through this relationship that EPI-USE rapidly developed into a prominent worldwide player in the SAP world, initially with an exclusive focus on Human Resources (HR) and Payroll systems. More recently, this has been expanded to a capability across all areas of SAP (EPI-USE Company Policy Document).



The next level of development in the organisation was achieved through the introduction of a private equity partner in 1999. This partnership has yielded great benefits to the organisation through strong financial backing, and a powerful worldwide human and corporate network. The organisation today comprises highly talented information technology professionals delivering a focused ranged of specialised technology solutions to clients across a number of industries. EPI-USE now has operations in North America, Africa, the United Kingdom and Europe and is led by a young, dynamic and highly motivated management team ((http://www.EPI-USE.com)).

Through their proprietary software and their alliances with leading worldwide technology vendors, they offer technology solutions to address their clients' needs in the area of Human Resources, Business Intelligence, IT Facilities Management and Information Systems Risk Management. Implicit in all of their technology offerings is a strong e-services dimension, to assist their clients to take advantage of the benefits inherent in electronic business. The iLab business unit was established to acts as a business incubator for new business ventures and is coupled to a venture capital fund. This is designed to allow them to capitalise on

opportunities to develop enhancements to their lines of business, and continually improve their service offerings to clients.

EPI-USE is a highly focused and successful business. They are committed to strong corporate governance and have implemented best-practice methods to ensure the protection of all their stakeholders (Internal policy document, 2002).

4.1.1 Business Philosophy

Their highly talented professionals focus on delivering a range of specialised technology solutions designed to enhance shareholder value, across a number of industries.

Through the use of highly innovative methods and tools grounded in the philosophy of Value Based Management (VBM), EPI-USE are in a position to assist their clients to ascertain the impact of their services on the value of their businesses. Their core purpose is to design, develop and deploy superior technology solutions that enable business people to use information that will contribute to their success (http://www.EPI-USE.com).

4.1.2 Values

According to Mr. Thirion EPI-USE has a set of core values that is regarded as the essential and enduring believes of their business, and that they use to attract and retain the highly professional staff. These values (Internal policy document) include:

- Excitement about innovation
- Confidence in their abilities
- Integrity – representing trust, honesty and respect for the individual
- Self actualisation
- Commitment in meeting clients' expectations.

These values are supported by the following operational goals (Internal policy document):

- Only the best and brightest professionals are recruited into EPI-USE
- They are committed in building the personal and human capital of their professionals
- They are committed to expanding their worldwide reach, with a focus on profitability, and in a sensible and manageable fashion

- Their professionals are committed to speed and quality of service
- They strive to use their collective strength around the world more effectively
- Quality of life is of crucial importance.

4.1.3 Business focus

The EPI-USE Group is an international software and services business, with strong well established global operations. Their strategy is to meet their clients' needs in terms of advisory services, technology deployment and the outsourced operation of existing or newly deployed information technology for business critical non-core processes (Internal policy document).

4.1.4 Internal Business environment analysis

This section will look at the business environment analysis and the industry competitive analysis of EPI-USE. It will discuss the current position of the organisation by investigating its external and internal business environments. This will include analysis of the organisation's stakeholders, their expectations, internal and industry analysis.

4.1.4.1 Competencies

The following are some of the competencies that EPI-USE possesses:

- Managerial expertise capable of taking projects through the project life cycle.
- Technically skilled staff with necessary expertise able to deliver business solutions.
- It is a recognised South African market leader in Human Resource Systems.
- It has good coverage in Southern Africa, United Kingdom and United States.
- The ability to acquire and implement new technologies quickly.
- Experience in various Information Technology markets
- Alliances/Joint ventures with other companies to allow for access to valuable technology, competencies and geographical markets.
- Technically skilled staff, that focused on Open Source Architecture that allows for the development of software applications on almost any computer based platform (platform independent software applications).

4.1.4.2 Tangible Resources

EPI-USE has a staff complement of over 250. The majority of them are highly skilled with extensive experience in the Information Technology Industry and other related industries. The staff worked in a well-equipped building in Pretoria with a very good infrastructure that serves as head office. Other EPI-USE South African offices are located in Cape Town and Johannesburg. Their international offices are located in the United Kingdom and the United States of America (http://www.EPI-USE.com).

4.1.4.3 Complementary Resources

EPI-USE has many years of Information Technology experience and has a well established brand name in South Africa. EPI-USE has a very good relationship with the University of Pretoria and thus has access to prospective and highly motivated and talented graduates.

The company is constantly investing in upgrading its customer service. EPI-USE engaged in extensive partnerships and joint ventures across various sectors nationally and internationally. They are also in a good position to make use of external partnerships where additional skills are required.

4.1.4.4 Underlying Capabilities

According to the EPI-USE corporate website the company is at forefront of new technologies and capable of adopting solutions from a wide variety of technology providers and has the skills and expertise to take projects from conception through to completion (http://www. epiuse.com).

4.1.4.5 Stakeholders and Expectations

The following factors contribute to the EPI-USE's need to seek better, smarter and more efficient business processes to compliment its business model.

- **Customers**

Customers expect that the systems that have been installed should facilitate the efficient running of their business processes. The efficiencies gained must then allow for cost saving that will filter through to their income statements.

Information sharing among various stakeholders is becoming more and more import in both the public and private Sector. This has lead to the need to integrate legacy and planned systems.

Business also has many legislative requirements to contend with, especially in the Human Resource and Payroll systems environment. The new promulgated Electronic Communications and Transactions Act (2002) will impact on the way business is done in South Africa. It is but one of a host of government initiatives to promote the use of Information Technologies in South Africa.

In the light of recent events in South Africa and abroad much more emphasis is placed on the social awareness of the business partners and relationship building with clients than in the past. Though business concerns are still of paramount importance, EPI-USE wants to be sure that their partners act in a socially responsible manner. To this extent businesses expect their partners to be actively involved in their environments. Vendors are also expected to assist in capacity building and help business to become self-sufficient in business critical areas.

- **Suppliers**

Following the first democratic elections of 1994 many technology suppliers expanded their presence in the South African market. These suppliers expect South African vendors to meet their respective quarterly and annual revenue targets for them to maintain their preferred status and position in the market. After a recent spate of bad service deliveries from certain suppliers, greater emphasis is now placed on supplier selection to protect the image of the vendor company.

- **Partners**

The Business partners with whom EPI-USE engages, provide EPI-USE access to technologies and resources to which EPI-USE would otherwise not have access. These partners often have access to geographical markets that allow EPI-USE to increase its geographical reach.

- **Workforce**

The workforce provides true competitive advantage for EPI-USE, which is a service oriented company and which uses its people to deliver that service. Employees expect and deserve to be treated fairly and be provided with the tools and training to deliver superior service. To be successful EPI-USE must continue to provide their people with recognition of their contributions and opportunities for growth and personal improvements. These initiatives will insure that future prospective employees that fit the organisational culture will be attracted.

4.1.5 External Business environment analysis

Industry and Competitive Analysis

This section will analyse and discuss the dominant market characteristics, which are the driving forces for change in organisations, and EPI-USE's competitive environment in terms of Porter's Five Forces (Porter, 1980).

4.1.5.1 Dominant Market Characteristics

Although EPI-USE is the market leader in the South African SAP R/3 HR and Payroll implementations, the services offered by EPI-USE is highly differentiated from its competitors in terms of the level of skills available for certain core functional areas within the SAP HR environment. The products and services offered by competing companies is slowly gaining momentum in saturating the HR market niche.

Legislative requirements and reporting have placed a lot of strain on organisations to deliver the required legislative reports to government organisations, such as employment equity reporting and income tax reporting. E-commerce and Internet billing is gaining greater importance in both the South African and international markets. Awareness is growing of the potential use of smart card and Internet security and the advantages there-of. Companies already doing business as well as new business entrants on the Internet are realising the benefits of e-commerce intelligence in gaining and retaining customers and giving employees online access to their personal data. This allows for a lot of growth opportunities in the

Customer Relationship Management market and HR and Payroll employees self-service market.

The government is currently busy with a drive towards building new, and expanding existing Communications- and Information Technology infrastructure. In February 2001 a third license was granted to enter the ever growing and lucrative cellular network market and a second national fixed line operating licence was granted in September 2004 (www.finance24.co.za).

The government is placing a big emphasis on service delivery and the use of Information Technology to assist them in their goals. The Western Cape's local government plan to implement the smart city initiative is demonstrative of South Africa's quest to improve service delivery and to be a major player in the worldwide economy.

4.1.5.2 Driving forces for organisational change

Both Government and Business are now, more and more, expecting business partners to be socially responsible. The government's initiative of economic enablement is expected to lead to market growth. Socio-economic restructuring particular corrective action, e.g. Employment Equity, Economic Empowerment and the National Growth, Development and Reconstruction Strategies are expected to create significant business opportunities.

Shifts in government decision making, prioritisation, spending (including financial discipline) is also expected to benefit from the Information Technology Industry. Typical shifts include welfare, education, poverty alleviation, telecommunication and media. There are windows of opportunity in government driven business over the short and medium term, followed by an expected upturn in the industrial-commercial sector.
Huge infrastructure investment is expected from the different government initiatives mentioned above.

Business opportunities exist in emerging African markets. Recent events in Africa have led to some countries like the Democratic Republic of Congo, Rwanda and Liberia move

towards democratic government systems with South Africa playing a major role in mediating some these events.

4.1.5.3 Porters 5 Forces

This section will discuss factors that impact on Industry that EPI-USE operates in according to Porter's Five Forces (Thompson, 1997).

- **Rivalry**

Rivalry between competitors is extremely high with competitors being differentiated in terms of product functionality, and the ability to deliver products on time and on budget.
International players are entering the S.A market while exiting IT companies are starting to move into the same markets as EPI-USE occupy.

- **Ease of Entry**

In order to acquire quality contracts, potential competitors need to fulfill various criteria. Customers are expecting superior solutions that have been tried and tested. They expect vendors to have a history of successful implementation with the skills, technical ability and infrastructure to ensure success. This makes the niche markets EPI-USE occupies difficult for new market entrance to penetrate successfully.

- **Substitutes**

Within the niche market EPI-USE occupies, there are very few companies that provide the products and services required to satisfy these markets. The main reason for this is that EPI-USE does not only supply services but also an infrastructure, if needed or on request, and the ability to ensure a successful implementation. EPI-USE can thus take a project from conceptualisation, implementation and right through to post implementation support.

- **Bargaining power of suppliers**

To a large extent EPI-USE's business is dependant on technologies licensed from third party vendors. For these technologies EPI-USE acts as an integrator, who customises the acquired technologies of the various vendors according to the clients needs. This makes EPI-USE extremely vulnerable to the actions of technology suppliers.

- **Bargaining power of buyers**

A large portion of EPI-USE's business is attained through tendering for contracts in both the public and private sector. This process allows clients to dictate the terms of business to a large extent. The limited number of vendors of a high calibre in S.A does have a great influence on the balance of power in favour of the service provider.

4.1.5.4 SWOT Analysis

This section will analyse EPI-USE's business environment in terms of strength, weaknesses, opportunities and threads (Thompson, 1997:223)

- **Strengths**

The EPI-USE staff is technically advanced and highly skilled. This is realised through constant efforts to enhance training and a good corporate culture within the company. The managerial staff has a wealth of expertise gained through years of experience in the Information Technology industry. EPI-USE has experience in a wide range of Information Technologies from a broad range of technology providers.

- **Weaknesses**

EPI-USE experienced the loss of highly skilled consultants due to various factors and the company seems unable to address these factors successfully. This resulted in loosing out on an abundance of experiential knowledge assets. Not enough emphasis is currently given to ensure the successful completion of a post-mortem analysis at the end of projects. The reputation that they have build up over the years, according some clients observations, were that they are a hit and run company that often fails to build relationships with clients and business partners. This is a strong contradiction to what is stated in their marketing material.

- **Opportunities**

The National Archives Act of 1996 requires that the government sector must comply with legislation. Through this act, important opportunities arise in national, provincial and local governments to archive documents and other information sources electronically. SAP R/3 expected worldwide growth to provide opportunities for EPI-USE to grow skills for the export market. Emerging companies that arise through black empowerment spin-offs create opportunities for EPI-USE to create partnerships/consortiums to expand business and

have access to new markets. There are opportunities to create Intellectual Property related software for local and international markets.

SAP R/3 and EPI-USE are both tried and accepted brand names in South Africa that can feverishly exploit the opportunities that are arising on the African continent. There is a steep growth in the knowledge management application market that will aim to satisfy the organisation's intellectual capital needs (Gartner, 2003).

- **Threats**

International suppliers are opening offices in South Africa. Other major IT companies are moving into markets in which EPI-USE operate. Government contracts require stricter adherence to Employment Equity provisions. Fluctuation of the Rand Exchange rate may reduce capital budget expenditure on software licenses and maintenance.

4.2 Understanding how knowledge is created and transferred within EPI-USE: Data Collection through observing the Development Life Cycle phases.

Through observations of the researcher, while being part of the EPI-USE implementation team, it was established that the different phases in the Systems Development Life Cycle uses different knowledge assets and occur in different types of physical environment (Ba). The next section discusses the researcher's observations as it conforms to the knowledge creation process. This will introduce the HR and Payroll systems implementation process as it has evolved over the past eleven years at EPI-USE. It will also identify the different types of knowledge assets and *ba* that are used in the different phases and continue with a discussion of the HR and IT department's contributions to the knowledge creation process at EPI-USE.

During the course of this study the researcher worked at EPI-USE as an employee and was fortunate to observe and be part of a fully completed systems development life cycle. According to an internal marketing document, and as observed by the researcher, the SAP HR & Payroll group's business activities are organised in three distinct, yet complementary phases. These include pre-sales, development and maintenance.

During the pre-sales phase, the HR & Payroll groups' SAP implementation and consulting skills are brought to market. Once a sale has been secured, many activities during the development phase bring the promised SAP functionality to the client's environment. Maintenance, the last business process among those mentioned, ensures that the customer's SAP implementation is serviced when needed.

The development process, which is the focus of this discussion, consists of the five distinct life cycle phases of the VALUESAP methodology (figure13). The VALUESAP methodology is a methodology used by EPI-USE to implement the SAP HR and Payroll packages. Although the phases of this life cycle are used to describe the business process that EPI-USE employs to deliver SAP HR & Payroll implementations, the process followed conforms to a large extent to the VALUESAP methodology. In this respect, the implementation assistant of the VALUESAP tools presents a generic project plan, which has been adapted by EPI-USE for HR & Payroll projects. The EPI-USE process is tailored according to the customer's needs and budget constraints. The phases in this VALUESAP-like process model are followed rigorously on all implementation projects. The methodology consists of five phases, which are the:

- project preparation,
- business blueprint,
- realization,
- final preparation,
- go live & ongoing support

Figure 14: ValuaSAP Methodolgy
Source: www.sceis.sc.gov/content/ FAQ_files/image002.jpg

Each phase in the EPI-USE adaptation of the VALUESAP process model is elaborated and analysed according to the knowledge creation process of Nonaka and Takeuchi (1995) in the upcoming sections.

4.2.1 Project Preparation

In the preparation phase, the focus is on identifying and gathering the resources required to successfully completing a SAP implementation. Also, general project planning is performed, which culminates in the delivery of a project charter document. This document identifies:

- clear project objectives,
- top decision makers,
- internal and external project team members;
- roles and responsibilities to be assigned to the team members
- initial training requirements to be decided on; in terms of the initial project planning,
- risks and assesses them
- project assumptions and constraints and documents them,
- the project implementation strategy to be followed.

The customer subsequently reviews the project charter and when they accept it, work is commenced in the business blueprint phase.

4.2.1.1 Knowledge Assets in this phase.

Experiential knowledge assets from consultants, project managers, top management at EPI-USE and that of the client and supplier are deployed in this phase. Planning the project life cycle involves the identifying of all the experiential knowledge assets needed from the EPI-USE consultants and management team as well as those of the client for the rest of the project life cycle. Thus, past project planning experience from senior project managers and management and the involvement of the client in this phase is very important for the delivery of key milestones.

Depending on the magnitude of the project and the knowledge assets that are identified for the rest of the project life cycle stages, resources will be allocated according to the different phases in the project's life cycle.

4.2.1.2 Ba in this phase.

At EPI-USE dialoguing and systematic *ba* is deployed in the project preparation phase. Collective and face-to-face interaction amongst the project management team and the client is common and occurs in a physical location such as a boardroom or meeting room. Virtual interaction is common practice through out the project life cycle and is already deployed in the preparation phase. Most of the communication between EPI-USE and the client is via telephone, cell phone and electronic mail.

4.2.2 Business Blueprint

Before any real work can proceed, the customer's business requirements and SAP implementation scope must be determined and documented. This is done by working through a series of predetermined questions obtained from the ValueSAP question-and-answers database. Questions are selected based on the SAP module to be implemented and the components included in that module.

The answers obtained from such question-and-answer sessions are analysed and compiled in the form of a detailed functional specification (DFS) document. The DFS contains all the customer's functional requirements and is detailed in the sense that an SAP implementation can be directly realised using the information contained therein. The scope of the project can be determined quite accurately from the DFS. At this point, the project plan is updated, with the usual variables—scope, cost, and schedule being more accurately defined.

Subsequently, the DFS document is reviewed by the customer and the budget and scope reconsidered. Immediately following approval, end-user training is planned, and knowledge transfer to the project team is elected. Finally, before the realization of the functionality captured by the DFS can be carried out, the SAP basis team is tasked with the implementation, installation and configuration of both the necessary hardware as well as the SAP software.

4.2.2.1 Knowledge Assets in this phase.

Experiential knowledge assets from consultants and project managers at EPI-USE and that of the client are deployed in this phase. In the Business Blue Print Phase EPI-USE Functional Consultants start to be more actively involved in the project and need to start building relationships with the client. Consultants need to be confident, express the correct facial and body language, and ensure that relationships are being built on trust with the client. Depending on the type of client, private or public sector, building a relationship based on trust can be a difficult especially if the end-user resists change in their work environment.

The client are expose to new document procedures that include the use of templates with company logo's and symbols and the introduction of new concepts is common practice in the Business Blue Print phase and thus forms part of the conceptual knowledge assets used by the functional consultants.

Gathering data for the DFS involves conducting workshops with the client and screening policy and procedure documents and manuals. Functional consultants need to abide by the rules and regulations governing Intellectual property of the client. All these knowledge assets form part of the systemic knowledge assets used in the Business Blue print phase.

Routine knowledge assets include the mapping the of client's as-is and to-be business processes and the functional consultant's exposure to the different cultures and organisational routines, depending on the size of the client organisation.

4.2.2.2 'Ba' in this phase.

In the Business Blue Print phase all the four types of *ba* are deployed. Originating *ba* occurs when the functional consultants meet the end-user and start building a relationship with them, sharing cultural backgrounds and personal opinions. Dialoguing *ba* is used when a workshop is conducted to gather data for the DFS. Collective and face-to-face interaction amongst the functional consultants and the client is common and occurs in a physical location such as a boardroom or meeting room.

Virtual interaction is common practice through out the project life cycle and is also deployed in the business blue print phase. Emails and telephone calls are popular communication methods in the business blue print phase.

Exercising *ba* occurs when consultants use explicit information from emails or other documents to compile the DFS that will lead to the next phase, the Realization phase.

4.2.3 Realization

Immediately following the business blueprint phase, a set of documents containing the test scenarios is developed. These documents are used both in this phase and the final preparation phase for testing and validation purposes. Next, configuration of the SAP system begins. This involves implementing the functionality as presented in the project DFS and testing according to the relevant factory tests. This implementation, test cycle is followed for every requirement in the DFS until all has been covered. All the configuration and development is done on the development server (computer). After the completion of a certain section of configuration on the development server the changes are copied to the quality assurance server for proper testing that may include the actual users of the new system. If it is thoroughly tested the final product, without any defaults, are copied or transferred to the live server (production server) where the users are actively using the new system. The active usage of the new system only occurs after the final preparation phase . Supplementary actions throughout the realization phase are the production of training manuals by populating them with screen-shots. The functional consultant does knowledge transfers to the user.

4.2.3.1 Knowledge Asset in this phase.

Experiential knowledge assets from consultants and project managers at EPI-USE are deployed in this phase. In the Realization Phase EPI-USE functional consultants collaborate to a large extend with Technical Consultants to ensure that the higher level technical specifications are configured. Experiential knowledge assets are transferred to junior technical and functional consultants throughout this phase. Senior consultants are expected to ensure that junior consultants received the relevant knowledge to test the different scenarios and upgrade their knowledge assets.

The use of templates, such as the test scenario templates, and introduction of new concepts and symbols in the testing phase to ensure that the client knows what should be tested for and how to do it form part of the conceptual knowledge assets.

Setting up the authorizations for the different roles that the user will have access to on the system and gathering data for the DFS involve conducting workshops with the client to provide the functional consultant with screening policy and procedure documents and manuals. Functional consultants need to abide by the rules and regulations governing Intellectual property of the client. All these knowledge assets form part of the systemic knowledge assets used in the Business Blue print phase.

Functional consultants should ensure that the business processes in the testing phase are in tandem with those set out in the DFS and form part of the routine knowledge assets.

4.2.3.2 'Ba' in this phase.

In the Realization phase all the four types of *ba* are deployed. Originating *ba* occurs when the consultants and the project manager discuss project issues on a personal level. This usually occurs when a consultant is not satisfied with the current project environment or other issues relating to the project environment.

Dialoguing *ba* is used when a testing workshop is conducted. The Functional Consultant assists the client in the testing environment and discusses test results directly with the client. The functional consultant meets with the rest of the consulting team to discuss certain issues with regard to the testing phase.

Virtual interaction occurs when the consultant receives testing results from the client via email or submission in a network folder. Emails and telephone calls are popular communication methods during the configuration and testing phases.

Exercising *ba* occurs when consultants include explicit information, such as pay scale structures and legacy systems codes, from emails or other documents, in the configuration process.

4.2.4 Final Preparation

This stage is all about validating what has happened in the foregoing stages. It is also about, looking ahead, preparing for and planning the operational transition of the SAP system. Up to this point, the customer has not been involved in validating the functionality of their new system. In this stage, the focus is on the customer, proving to himself that the system works as he thought it would. Before the final preparation commences, a copy of the development server/system is prepared and transferred, together with a reasonably representative data set to the quality assurance server/system.

This is called user acceptance testing, and usually entails the following steps:

- review the factory acceptance test document,
- user testing,
- an electronic parallel run,
- a manual parallel run.

User testing involves populating all fields in every screen and verifying that the execution results are as expected. This is done in accordance with the factory acceptance test document. An electronic parallel run entails performing a payroll run on both the legacy system and newly implemented SAP system. The results for each pay slip are compared with regards to gross income and deductions. All rejections (non-conformances) are manually examined and corrected. The manual parallel run is executed by the customer for a period, usually not exceeding one month. During this time, pay slips are printed using both the legacy system and the SAP system, and examined for inconsistencies, errors and omissions. Throughout this phase, the end-users are trained to fulfil the specific role-based tasks they are assigned to perform and an application consultants train the super users. Changeover planning is performed, detailing the strategy and tasks to be performed to transition the system into a 'live' state. Both during the electronic and manual parallel runs, the customer

may inform EPI-USE of problems and desired modifications. These issues are implemented before the 'go live' date.

4.2.4.1 Knowledge Asset in this phase.

Since the launch and support strategy are re-iterated in this phase it is an essential stage where experiential knowledge assets from consultants and project managers at EPI-USE are deployed. In the Final preparation phase EPI-USE Functional consultants collaborate to a large extend with technical consultants to ensure that the system is ready to go live. Experiential knowledge assets are transferred to junior technical and functional consultants throughout this phase. Senior consultants are expected to ensure that junior consultants and the client receive the relevant knowledge to test the different scenarios and upgrade their knowledge assets.

Testing the systems requires the completion of test forms to confirm that a certain section or unit has been thoroughly tested. Again in this phase the use templates with company logos on it such as the Test Scenario templates form part of the conceptual knowledge assets used by the functional and technical consultants.

Functional consultants have to ensure that the business processes in the testing phase are in tandem with what was specified in the DFS. The functional and technical consultants are exposed to the different cultures and have to adapt to the different organisational cultures especially in a diversified work environment such as the public sector. The business processes and cultural adaptation form part of the routine knowledge assets.
Preparing and documenting User manuals for the client form part of the systemic knowledge assets used in the Final Preparation phase.

4.2.4.2 'Ba' in this phase.

In the Final Preparation phase all the four types of *ba* are deployed.

Originating *ba* occurs when the consultants and the project manager discuss project issues on a personal level. This usually occurs when a consultant is not satisfied with the current project environment or issues relating to the project environment.

Dialoguing *ba* is used when launch or changeover workshops are conducted. The Functional Consultant and Project manager assist the client in the changeover strategy and discuss possible problems and opportunities directly with the client. The Project manager meets his team to discuss certain issues with regard to the Final Preparation phase.

Virtual *ba* occurs when the consultants send and receive confirmation emails of the test results and changeover readiness. Emails and telephone calls are popular communication methods during the configuration and testing phases.

Exercising *ba* occurs when consultants use explicit information, such as analysing the test results from the User Acceptance Testing in the previous phase to ensure that the launch or changeover will satisfy the users expectations.

4.2.5 Go Live & Support

As the 'go live' date approaches, the changeover planning steps are executed. The actual 'go live' event happens extremely quickly relative to the entire project time; usually within a single day or over night. This is done by preparing a transport on the development system and moving that across to the production system. At the same time, the final data capture and migration from the legacy system to the SAP system is concluded. When the new SAP system has gone 'live,' the legacy system is shut down, never to be touched again. As this happens, operational support starts. For a period of more or less one month after the 'go live' date, EPI-USE consultants are ready to address any operational problems, inconsistencies or errors. Most user problems are encountered during the second payroll run due to retroactive calculations coming into play.

4.2.5.1 Knowledge Assets used in this Phase

Since most of the problems occur during this phase it is an essential stage where experiential knowledge assets from consultants and project managers at EPI-USE are deployed. The Go Live & Support phase incorporates all the other types of knowledge assets just as in the previous phase.

4.2.5.2 'Ba' in this phase.

The Go Live & Support phase incorporates all the other types of *ba* j just as in the previous phase.

To Summarize in a table:

Phase	**Knowledge Asset**	***Ba***
Project preparation,	Experiential	Dialoguing
		Systematic
Business blueprint	Experiential	Originating
	Systematic	Dialoguing
	Routine	Systematic
	Conceptual	Exercising
Realization	Experiential	Originating
	Systematic	Dialoguing
	Routine	Systematic
	Conceptual	Exercising
Final preparation	Experiential	Originating
	Systematic	Dialoguing
	Routine	Exercising
	Conceptual	
Go live & ongoing support	Experiential	Originating
	Systematic	Dialoguing
	Routine	Systematic
	Conceptual	Exercising

Table 6: *Ba* and knowledge assets in the implementation phases.

4.3 Understanding the role that IT plays in the KM environment at EPI-USE: Information Technology Interview Results

This section will look at the data gathered on the Information Technology department and the role the department play in knowledge creation and sharing at EPI-USE. The data presented are based on the interviews conducted with Mr. Jan van Rensburg, the IT manager within the EPI-USE South Africa group. According to Mr. van Rensburg the information systems and technology was managed by EPI-USE consultants before 1996 and was not a fully functional department. A full time employee was appointed to give more structure to the internal Information technology function in 1996. The Information Systems/Technology department expanded in 1997 to form a more integrated and functional IT department. At the end of 2002 internal IT was merged with IT solutions, an EPI-USE business unit, since the IT department serve the same task as IT solutions. The core function of the internal IT department is to implement and maintain infrastructure for the EPI-USE South Africa group of companies and to serve the needs of the end user. External IT provides outsourcing services to external clients.

The IT department structure:

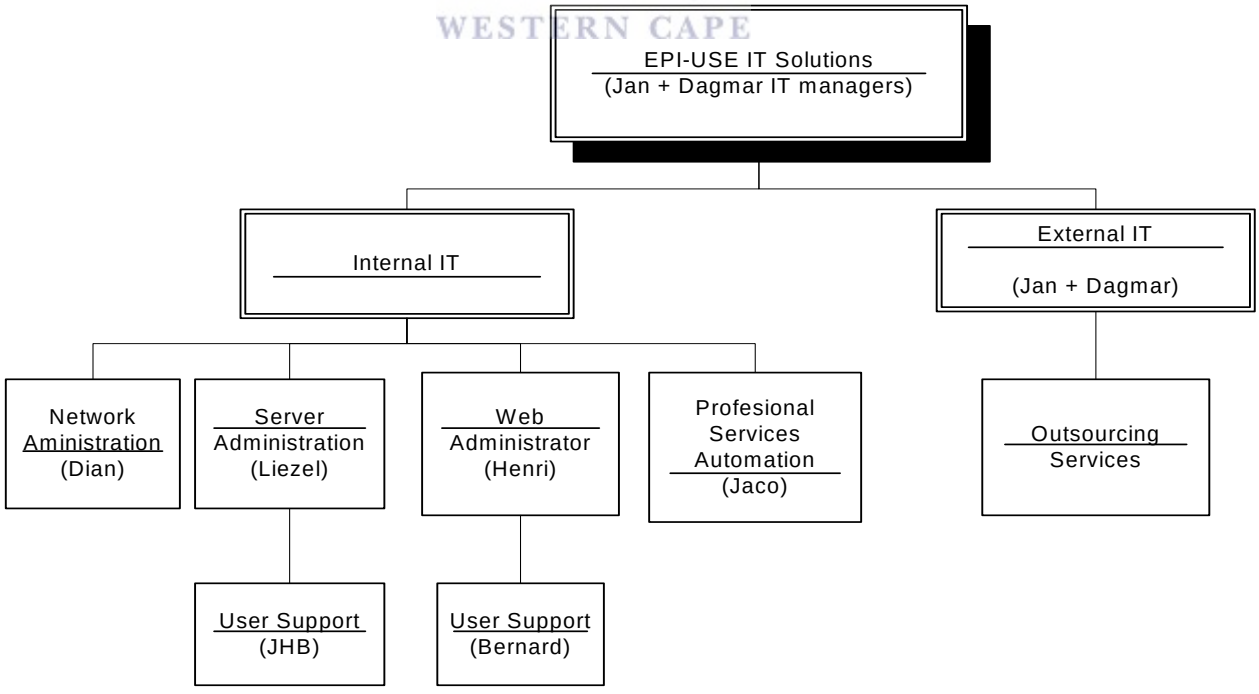


Figure 15: The IT department structure

Person responsible	Function
Dian Brits	Network Administrator
Liezel Welman	Server Administrator
Henri van Blerk	Web Administrator
Jaco Niewoudt	Professional Services Automation
Jan van Rensburg and Dagmar Noome	Outsourcing Services

Table 7: IT personnel responsibility and function

The software categories that form part of the IT architecture at EPI-USE, as stated by Mr. Van Rensburg, are composed of the following applications that act as enablers for knowledge transfer:

- Intranet and Extratanet based systems
- Groupware
- Knowledge portals.
- Professional Services Automation (PSA)
- Computer Based Training (CBT)
- VALUESAP methodological tool

The application software is discussed in terms of their contribution to the SECI process proposed by Nonaka and Takeuchi (1995).

4.3.1 Intranet and Extranet Based Systems

Mr. van Rensburg stated that the Intranet's main function at EPI-USE is to facilitate information storage and sharing. Selected personal information off employees is stored on the intranet and the intranet also acts as a library for professional information. The consultants at EPI-USE actively use the EPI-USE Intranet for various tasks and access to work related information.

4.3.2 Groupware

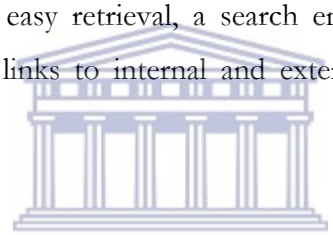
Groupware is a very popular application at EPI-USE. Mr. van Rensburg states that the most popular uses for groupware at EPI-USE are email and the public folder facility, a Microsoft

Exchange application using MS Outlook to send and receive messages, and the synchronous Yahoo chat facility. He stated that EPI-USE are currently considering to getting rid of Microsoft exchange and replacing it with application software like Lotus notes.

4.3.3 Knowledge Portals

According to Mr. van Rensburg a knowledge portal functionality is embedded into the design of EPI-USE's intranet. EPI-USE consultants have access to a wide variety of information and solutions relating to their area of specialiation on the intranet. Although some areas of specialisation need to be updated on the intranet, the portal functionality can be accessed from both inside or outside EPI-USE. The EPI-USE portal integrates miscellaneous information sources, providing a standard interface to the consultants.

Common elements contained in EPI-USE portal design include the classification of information categories that help easy retrieval, a search engine that searches for contact details of other consultants and links to internal and external web sites and information sources.



4.3.4 Computer base training (CBT) programs

Mr. van Rensburg stated that the IT department is providing the infrastructure for computer base training (CBT) programs. These are created for internal use by one of the EPI-USE business unit's EGEDI to provide training material for consultants. These CBT are often used to give junior consultants the bigger picture of a specialisation area, e.g. Payroll CBT or Personnel development CBT. However it was also evident, from what he said, that CBT was not used to any great extend throughout EPI-USE.

4.3.5 Professional Services Automation (PSA)(EVOLVE application)

Mr. Jaco Niewoudt, the person responsible for Professional Services Automation system or generally known as the EVOLVE system in EPI-USE, stated that EPI-USE does not use the current EVOLVE system to its fullest potential. Due to certain integration problems some of the sub modules are not adequately suited for certain functions like the project

management integration with Microsoft Project. According to Mr. Evan Jones, Evolve administrator at EPI-USE United Kingdom, only the invoicing, time and expense modules are actively used in EPI-USE. Mr. Thys De Bruin, senior consultant, commented that the EPI-USE management still has to decide whether to replace the current PSA system with a new system.

Apart from the core functions of the PSA systems, which is time and billing, project management and resource management, the following applications software can be incorporated in the PSA systems to form a very good knowledge management application and will be discussed next:

- *Knowledge Map Systems*
- *WorkflowManagement Systems (WMS)*
- *Business Intelligence (BI)*
- *Innovation support tools*
- *Competitive Intelligence (CI) tools*
- *Supply Chain Management (SCM)*
- Customer Relationship Management (CRM)

- **Knowledge Map Systems**

Knowledge maps work like yellow-pages that contain a "who knows what" list. A knowledge map does not store knowledge. The map just points to people who own it, creating opportunities for knowledge exchange. A standard knowledge map is fed with the skill profiles and of competencies of the members of an organisation. The knowledge map provides an expert locator feature that helps users to find the experts best suited to work on a specific problem or project. A knowledge map categorises an organisation's expertise into searchable catalogs. Using a knowledge map, it is easier to identify people in terms of the team members they have worked with, what they know and how proficient they are at a given task.

- **WorkflowManagement Systems (WMS)**

Rob Allen (2001) describes workflow as" *The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules".*

Standardised business processes are supported by workflow systems that regulate the information flow from person to person, place to place and task to task in the every day processes and activities that required ordered and structured information. Workflow can be segmented into the following categories:

- Production Workflow, that manage large numbers of similar task and optimise productivity.
- Autonomous Workflow management systems are separate pieces of application software that provide the workflow functionality and are supported by database management systems and message queuing middleware such as Microsoft SQL server or IBM's MQ Series integration software.
- Embedded Workflow systems are only functional if they are embedded with the another system. A good example would be an Enterprise Resource planning (ERP) system. The result of a payroll run is automatically posted to the financial accounting model within the same ERP system or an external application.
- Administrative Workflow systems define the processes. Many processes can run concurrently but they need to be distinguished from each other in order to avoid confusion.
- Collaborative Workflow systems focus on teams working together towards a common goal. Collaborative workflow systems can support teams working closely together or dispersed from each other.
- Ad-Hoc Workflow maximises flexibility in areas where input and security are not of major concern. The users usually own the processes in the Ad-Hoc workflow system.

- **Business Intelligence (BI)**

The EVOLVE PSA system has an integrated BI component. Business Intelligence (BI) solutions, according to Gundersen, and Platnick (2001), enable organisations to accurately

track and analyse past performance. BI solutions extend an organisation's current data capture systems by providing tools to enable managers to track and analyse past performance more accurately. BI solutions provide users with the ability to quickly analyse why things happened and focus on patterns and trends. BI systems may consist of some or all of the following technologies:

Front-end systems: DSS (Decision Support Systems), EIS (Executive Information Systems) and OLAP (On-Line Analytical Processing) tools;

Back-end systems: data warehouse, data mart and data mining.

Data Base Management Systems (DBMS) are the basis of a BI solution. First, the operational data generated by business transactions are extracted from the DBMS, filtered by some criteria and then migrated to the data warehouse. After this BI back-end loading step, the front-end tools are able to identify hidden patterns inside the data and the user is free to build his own queries and strategic reports. BI is strongly focused on decision-making. Some BI systems specialise on information related to clients, making an interface with CRM (Customer Relationship Management) systems and enhancing database marketing policies.

- **Innovation support tools**

Innovation is the application of new ideas to products or services. The results of innovation can be observed by the number of new patents, design modifications of existing products and development of new products. Innovation support tools are software that contribute to knowledge generation during the product design process. These tools intend to create a virtual environment that stimulates the multiplication of insights and are especially used in industrial R&D (Research and Development).

An innovation support tool may include different features: technical database where patents, articles and research projects are recorded. Providing information suited to feed the explicit knowledge combination is frequently the starting point of innovation. By using this kind of tools, the R&D professional tries to acquire existing knowledge in order to apply it to a new context (combination). Computer Aided Design (CAD), commonly used in the automotive industry, is an innovation support tool that designs new automobile models (O'Brien, 1997).

- **Competitive Intelligence (CI) tools**

Competitive Intelligence is the purposeful and coordinated monitoring of your competitor(s), wherever and whoever they may be, within a specific marketplace. Your competitors are those firms that you consider rivals in business, and with whom you compete for market share. Competitive intelligence (CI) aims at systematically feeding the organisational decision process with information about the organisation's competitive environment in order to learn about it and to take better decisions in consequence. In contrast to Business Intelligence (BI), CI depends heavily on the collection and analysis of qualitative information (Carvalho & Ferreira, 2001).

There are five steps in the CI cycle:

- Planning and direction: this step is related to the identification of questions and decisions that will drive the information gathering phase.
- Published information collection: search of a wide range of sources, from government fillings to journal articles, vendor brochures and advertisements.
- Primary source collection: this step is related to the importance of gathering information from people rather than from published sources.
- Analysis and production: transformation of the collected data into meaningful assessment.
- Report and inform: delivery of critical intelligence in a coherent and convincing manner to corporate decision-makers.

Evaluation done on the CI software products offered on the market and has concluded that they offer better support to the second and fifth steps of the CI cycle. However the other steps are very human-based and are only slightly benefited by technology.

During the second step, software agents perform the automatic collection of timely information from news feeds and search the Internet and corporate intranets for information from Web sites and internal documents. These agents are also called crawlers because they constantly scan the Internet and intranet for any new information about competitors, alerting the user when new data is found. On the fifth step, CI tools accelerate the dissemination of reports by sending e-mails reports according to users' preferences.

- **Supply Chain Management (SCM)**

Supply chain management is defined by Gormly (2002) as "the planning and execution of supply chain activities, ensuring a coordinated flow within the enterprise and among integrated companies". She states that the primary objectives of SCM are to reduce supply costs, improve product margins, increase manufacturing throughput, and improve return on investment.

These activities include the sourcing of raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels and, ultimately, delivery to the customer. Gormly (2002) states there are five basic components for supply chain management. These are;

- **Plan**

  This is the strategic portion of supply chain management. You need a strategy for managing all the resources that go toward meeting customer demand for your product or service. A big piece of planning is developing a set of metrics to monitor the supply chain so that it is efficient, costs less and delivers high quality and value to customers.

- **Source**

  Choose the suppliers that will deliver the goods and services you need to create your product or service. Develop a set of pricing, delivery and payment processes with suppliers and create metrics for monitoring and improving the relationships. And put together processes for managing the inventory of goods and services you receive from suppliers, including receiving shipments, verifying them, transferring them to your manufacturing facilities and authorizing supplier payments.

- ***Make***

  This is the manufacturing step. Schedule the activities necessary for production, testing, packaging and preparation for delivery. As the most metric-intensive portion of the supply chain, measure quality levels, production output and worker productivity.

- ***Deliver***

  This is the part that many insiders refer to as "logistics." Coordinate the receipt of orders from customers, develop a network of warehouses, pick carriers to get products to customers and set up an invoicing system to receive payments.

- ***Return***

  This is the problem part of the supply chain. Create a network for receiving defective and excess products back from customers and for supporting customers who have problems with delivered products.

Supply chain management software consist of a variety of software applications models. Each of the five major supply chain steps previously outlined composes dozens of specific tasks, many of which have their own specific software. Integrating the different software pieces together can be a nightmare.

Supply chain planning (SCP) software uses mathematical algorithms to help you improve the flow and efficiency of the supply chain and reduce inventory. SCP is entirely dependent upon information for its accuracy.

Supply chain execution (SCE) software is intended to automate the different steps of the supply chain. This could be as simple as electronically routing orders from your manufacturing plants to your suppliers for the raw materials you need to make your products.

- **Customer Relationship Management (CRM)**

CRM is defined by Payne (2000) as *"the creation, development and enhancement of individualised customer relationships with carefully targeted customers and customer groups resulting in maximising their total customer life-time value"*. There are many technological components to CRM, but thinking about CRM in primarily technological terms is a mistake. The more useful way to think about CRM is as a process that will help bring together lots of pieces of information about customers, sales, marketing effectiveness, responsiveness and market trends.

The idea of CRM is that it helps businesses use technology and human resources to gain insight into the behavior of customers and the value of those customers. If it works, CRM can give the following benefits to the organisation:

- provide better customer service
- make call centers more efficient
- cross sell products more effectively
- help sales staff close deals faster
- simplify marketing and sales processes
- discover new customers
- increase customer revenues

4.3.6 VALUESAP tool

Mr. Thys De Bruin stated that VALUESAP is the implementation solution provided by SAP for the 4.6c version. VALUESAP integrates several components that work in conjunction to support the rapid and efficient implementation of the SAP system. The components that make up the VALUESAP Methodology are tools, services, and project-related knowledge.

The VALUESAP tool is a hybrid between a document management application and an expert system. Electronic Document Management (EDM) systems are repositories of important corporate documents. EDMs provide an organisation with the tools to create, manage, control, and distribute electronic documents. In the context of EDMs a document is essentially defined as a file (http://www.worldox.com/; 2002). A file, in this sense, is an electronic, digital container for information. A document can be any type of file, fax, e-mail, HTML form, computer report, paper, video or audio, spreadsheet, image or any other discrete, identifiable information unit that can exist within a computer system.

The VALUESAP tool allow consultants to update, upload and download documents from the system and also provide them with the necessary information to make decisions in

certain phases of the project life cycle. Mr. Thys De Bruin, senior consultant, stated that the VALUESAP tool is not widely used within the organisation.

Mr. Van Rensburg stated that one of the bigger challenges for the IT department is to find a method or tool to manage the gigabytes of information that the consultants dump on the intranet during projects and after finishing projects. He mentioned that a very good document management system might solve the problem. He follows an open door policy with the other business units where IT issues are concerned to speed up feedback and decision- making.

4.4 Understanding the role that HR can play in the KM environment at EPI-USE: Human Resources Interview Results

This section will present the data gathered on the Human Resource department.The information is based on the interview conducted with Mr. Johan De Beer, who is the Human Resource manager within the EPI-USE South Africa group of companies. Mr. Johan De Beer and Mrs. Marinda van der Merwe, the HR assistant, are responsible for the Human Resource function at EPI-USE. According to Mrs. van der Merwe the HR function is split as follows:

Mr. De Beer	**Mrs. Van Der Merwe**
Payroll	Skills Development
Personnel Development	Employment Equity (EE)
Performance Appraisals and Evaluations	Leave/Payroll
Strategic HR Planning and Reporting	Recruitment
	Personnel Administration

Table 8: HR function responsibility by person.

According to Mr. Johan De Beer the traditional function of Human Resource department at EPI-USE was administrative in nature and did not serve the needs of the employees at EPI-USE, South Africa. The Starz program, an initiative from the HR department that has been discontinued, was designed as an incentive to keep employees motivated to produce high

quality work. These programs was not sufficient to recognise the intrinsic needs of the employees. The Starz program was based on a materialistic reward system and often ignored the employee's quest for self-actualisation. In 2002 Mr. De Beer and his team introduced the Professional 121 program. The aim of the program was to create the ultimate consultant at EPI-USE, a consultant that is adequately suited for the consulting environment. In the quest to develop the ultimate consultant a series of training and development programs and tests were conducted.

Employees at EPI-USE engage in 3 types of knowledge transfer methods these are:

- On-the-job training, which is any training that occurs while the employee is actually working
- Off-the-job training
- Personal study/ Self development

4.4.1 On-the-job training

On the Job training at EPI-USE has many forms. The quest to create the ultimate consultant means that no specific method will suit all the employees' needs. According to Mr. De Beer the following on-the-job training methods are currently employed in EPI-USE.

4.4.1.1 Coaching

At EPI_USE coaching is intended to improve an employee's work performance and confidence. According to Mrs. Ilze Joubert there were 3 coaches for the different divisions at EPI-USE; Mr. Phillip Stofberg for the SAP Tech division, the Software Solution division got their own coach and Mrs. Joubert herself the coach for the SAP HR and Payroll division. The coaches, like Mrs. Joubert the former HR and Payroll coach, is trying to improve the performance of consultants, both junior and senior, who is already competent and who is gaining experience in a specific skills area. Coaching is centered on job performance. The EPI-USE senior consultants coached junior consultants about problems encountered at the client and possible solutions. Not all employees have a coach; the more experienced employees tend to develop themselves without the help of a coach. At the start of the each project a coach is usually appointed directly or indirectly to the junior consultants. Coaches can be consulted at a physically location or virtually. Coaching is a one-to-one relationship

between the coach and the employee on a daily basis. Coaching is a continuing activity. One of the advantages of coaching is that it provides immediate feedback on performance to consultants. Coaches are very open and direct when assessing the consultants problem areas and very responsive to help with corrective action.

4.4.1.2 Understudy assignments or Apprentice

A person who acts as an assistant to someone else may be termed an understudy or an apprentice. Apprenticeships have similar features to coaching, but this method is a full-time mentor-understudy arrangement where coaching is only periodic. According to Mr. De Beer EPI-USE trainee consultants, the apprentices, work with the mentor on a daily basis to learn how the job is done when they are assigned to projects. Trainee consultants work with experienced consultants on a project for at least 6 months on an apprenticeship bases at EPI-USE. After 6 months these trainee consultants' skills are evaluated and assessed to determine if they can be promoted to the next consulting level.

4.4.1.3 Acting up

Acting in a certain position higher then the employee's current position is defined as acting up (Torrington and Weightman, 1994). Mr. De Beer stated that on occasions an employee acts in other positions to cover for an absent employee or a vacant position. By acting in the position the employee is expose to new responsibilities and new skill requirements in the particular position. At EPI-USE resources allocation is of great concern during the project preparation phase and often consultants get the opportunity to enhance their skill by acting in a position or area if there is a shortage of resources.

4.4.2 Off-the-job training

Training offered at locations away from the job is called off-the-job training. The reason for conducting of-the-job training at EPI-USE, according to Mr. De Beer, is to get the employees away from the workplace which minimises distractions and allows employees to devote their full attention to the training offered. Organisations conduct their own off-the-job training programs or send managers to universities or consulting firms. Commonly used off-the-job methods are discussed below.

4.4.2.1 In house lectures and workshops

Training at EPI-USE is not wholly owned by the Human Resource function but is the responsibility of the practice leaders that conduct it in collaboration with the Human resource function. According to Mr. De Beer the Human Resource function conducts a series of psychological test throughout the organisation to determine the strengths and weaknesses of consultants. Mr. Nicolai van der Merwe is then informed about the weaknesses. Mr. van der Merwe stated that training needs are catered for on a need to know basis. He said that there are no long term training schedules only short term schedules since training needs vary over periods of time. Either he himself or the most experienced consultant in a specific area through a lecture or a workshop conducts technical training (by means of a lecture or a workshop. The primary vehicles for training are lectures, workshops and coaching/mentoring (that were discussed previously). Mr. van der Merwe stated that currently most of the training needs evolved around developing the consultants' soft skills. There is a great need for public speaking and presentation skills amongst consultants. These skills are either acquired in-house or though an external expert in the field. Experts in the specific field are invited to hand in proposals to train consultants in the specific area where EPI-USE lack the expertise. The successful candidate will either conduct training remotely or in-house depending on the agreement between EPI-USE and the successful candidate. Most of the in-house workshops at EPI-USE are interactive but there are workshops or lectures that are without much audience participation.. A good example of in house training and workshops is the EPI-USE Fridays. The EPI-USE Friday concept was introduced to develop the soft and technical skills of the consultants and usually starts with a general meeting by the manager. The morning session consists of technical training followed by soft skills training and then lunch. After lunch issues raised by clients and possible solutions are discussed generally.

4.4.2.2 Team building

Team building at EPI-USE is a common phenomenon. Team building is scheduled twice a year with one team-building event held in each semester. According to Mrs. Joubert it is an important event that focuses on social activities that form part of the EPI-USE culture. Typically team building at EPI-USE includes activities like goal-setting, development of

interpersonal relations, role analysis to clarify roles and responsibilities. Team building sessions help group members to understand their strengths and weaknesses and also give consultants the opportunity to learn more about each other.

4.4.2.3 Case study/Post-mortem analysis

Mr. van der Merwe stated that after each project the project team or part of the project team is invited to analyse the causes of problems that were encountered on during the different phases of the project. The EPI-USE team members are required to analyse completed projects, identify and discuss the problems encountered, and recommend possible solutions for future projects, thus doing a postmortem analysis on the project. A case study can be purposeful in the following regards:

- It shows trainees that there are usually no easy solutions to complex organisational problems.
- Trainees realise that different perspectives and solutions to the same case may be equally valid.
- Case studies help managerial trainees develop their problem-solving skills.

Not all the team members participate these discussions. This means that it is not possible to gain a true reflection of the problems that were encountered on completed projects.

Off-the-job training can also include lectures but for the purpose of this thesis this aspect is discussed in the next section.

4.4.3 Personal study / Self Development

4.4.3.1 Further academic study

Mr. de Beer stated that there are a number of consultants currently furthering their academic qualifications. Consultants pursue both undergraduate and postgraduate studies and both are within a business context. This means that consultants who further their studies might participate in lectures, workshops, group discussions and self study and research activities.

4.4.3.2 Communities of practice (COP)

EPI-USE recently established 2 groups of Communities of Practice, one technical group and one functional group. Both participate in discussing similar problem areas or topics but from different perspectives (technical perspective and functional perspective). Functional consultants email the COP members if they need advise or if they want to share a solution with other consultants. The COP often generates different solutions to requests from consultants and the client is encouraged to explore the options and implement the most suitable solution. It is the more senior consultants that respond to the COP most of the time and this might prohibit junior consultants from contributing, because they feel that their contribution may not be valued. If this is the case it can deprive the COP of valuable and innovative contributions from junior consultants.

4.4.3.3 Extra mural activities

Includes all the activities the individuals participate in to enhance his/her knowledge in a certain area that is not gained from the individuals working environment. This may include workshops, hobbies, sport and recreational, professional membership, focus groups, charity work etc. According to Mr. de Beer most of the EPI-USE consultants participate in some sort of extra mural activity.

4.5 Understanding the current knowledge management practice at EPI-USE.

Finding a KM methodology to suit an organisation's needs may be a cumbersome task. This is the most important and most difficult step since the KM methodology should integrate the HR, IT and business strategy.

According to Mr. James Brits, there are no formal KM methods that are applied within EPI-USE. Heinrich Portwig, an EPI-USE consultant, was originally assigned to analyse and implement a KM solution at EPI-USE. He, together with a team of other consultants, developed the ICOSPHERE, a type of document management tool, to intelligently manage the volume of consultant documentation on the EPI-USE network. The ICOSPHERE tool was never implemented as a fully functional knowledge management tool and the focus was shifted away from the technology component to the people component. The Communities

of Practices was introduced at EPI-USE. Mr. James Brits state that EPI-USE is currently using COP for knowledge exchange and review sessions. The audit trail of the Community of practice discussions is stored on the Intranet for later access. He stated that the EPI-USE's KM strategy is supporting the EPI-USE business strategy because the communities of practice focuses on the issues EPI-USE want to resolve and the issues are determined by EPI-USE's strategic objectives supported by their strategic initiatives. Mr. Brits also stated that no other KM initiatives are defined for the future. Apart from the COP and the other initiatives discussed above, EPI-USE has no formal KM methodology that incorporates the organisation as a whole. The implementation of a KM management technique will be discussed in the next chapter.

4.6 Summary

The business environment EPI-USE is competing in is very competitive. The organisation has very good internal processes and policies in place. The management at EPI-USE follows an open door policy when it comes to external or internal issues that must be addressed. This open door policy often results in too many issues that need to be adhered to and the real needs and concerns of the organisation's knowledge producers (the employees) are often overlooked. The consequences of this might be the dissatisfaction of employees who therefore sequentially might not contribute their true value of knowledge assets to the knowledge creation process.

It is evident that knowledge management activities are spread throughout the different units at EPI-USE. Of particular significant is the fact that the SAP HR and Payroll and SAP Tech business units conduct their own training which formerly would have been the function of the HR department. This gives the business units the opportunity to train their consultants according to their specific needs and then afterwards inform the HR department about the progress to update the consultant's profile. Both HR and IT departments can make significant contributions to the knowledge creation process if they understand what and how they can contribute to the KM environment.

Although a lot of the literature in Chapter Two places emphasis on the HR and IT departments contributions to the KM environment it was evident that other functional

departments within EPI-USE indirectly contribute to the existence of a KM environment. Apart form its financial relationship with the rest of the other business units the Financial department provides the budget for KM initiatives at EPI-USE. It was also evident that very little is contributed from the Financial department, apart from the budget, to encourage or promote a KM environment. Their main concern is the financial matters of the organisation. The same can be said about the Marketing department. Although EPI-USE's main offices are in Cape Town, Johannesburg and Pretoria the marketing team are situated at the Pretoria office. This means that very little is known about current and prospective clients at the Cape Town office or other locations apart from the information that the Cape Town management team provide. This leave the door open for a dedicated marketing team or person at the at the Cape Town office that can provide the consultants with valuable information about their current and prospective clients needs. This can result in providing better training for consultants that are geared at providing solutions to serve the needs of current and prospective clients.

All the knowledge assets and *ba* defined by Nonaka and Teece (2001) are deployed throughout the SDLC. EPI-USE has a very extensive portfolio of knowledge assets and is actively searching for better methods to manage it; this is evident through the introduction of the COP and development of the ICOSPHERE tool. The organisation itself is not aware of the existence of all these assets and how these should be managed.

The following software applications were identified within EPI-USE.

IT software applications
Intranet
Groupware
Knowledge portal
VALUESAP tool
Computer Based Training
Evovle PSA system

Table 9: IT software applications

The following HR initiatives were identified within EPI-USE.

Human resource initiatives
Coaching
Understudy assignments or Apprentice
Acting up
In house lectures and workshops
Team building
Case study/Post-mortem analysis
Further academic study
Communities of practice (COP)
Extra mural activities

Table 10: Human resource initiatives

The next chapter will discuss how the above results can facilitate the management of knowledge through the use of the unified knowledge creation process of Nonaka and Takeuchi (1995).

5. CHAPTER 5: DATA ANALYSIS AND CONCLUSION

In this section the data that has been gathered for the purpose of this thesis will be presented. As discussed in Chapter Two, this thesis focuses on finding answers to the three questions in Chapter One.

5.1 Question One: How do HR and IT facilitate the KM processes?

5.1.1 The role IT plays in the Knowledge creation process at EPI-USE.

This section will analyse the data gathered and discussed in the previous chapter from the Information Technology department.

Apart from the IT categories that facilitate the knowledge conversion process identified by Carvalho & Ferreira (2001), this thesis will include the following two technologies that can add considerable value in the SECI process at EPI-USE:

- Professional Services Automation (PSA)
- VALUESAP methodology tool

The application software is discussed in terms of its contribution to the SECI process proposed by Nonaka and Takeuchi (1995).

5.1.1.1 How does the Intranet facilitate the SECI process?

The Intranet at EPI-USE facilitates the SECI process of Combination. Explicit knowledge is changed into more complicated and systematic sets of explicit knowledge e.g. company policy and procedure templates. Knowledge is gathered from inside the organisation and then added, prepared or processed to form new knowledge. Although EPI-USE does not have an Extranets, it can facilitate the SECI process of Combination and can enhance EPI-USE's competitive position. Explicit knowledge, gathered from outside the organisation, is also changed into more complicated and systematic sets of explicit knowledge e.g. product

specifications documents and benchmarking. Knowledge is gathered from outside the organisation and then added, prepared or processed to form new knowledge.

5.1.1.2 How does Groupware facilitate the SECI process?

Externalization of tacit knowledge is induced by dialog and collective reflection. Groupware helps this process by permitting collaboration and exchange of non-structured messages. Discussion groups and online chatting are common groupware applications that make the gradual articulation of tacit knowledge possible at EPI-USE. Teams form discussion groups and communicate via Microsoft Exchange applications and individuals chat in real time with each other using Yahoo! Messenger. In some cases Socialization occurs, as people work together on the same projects.

With technology evolution, as groupware systems offer support to visual and sound interaction, the interaction and externalization of the tacit dimension of knowledge will be increasingly present with writing or typing still the predominant way of communication in groupware.

There have to be proper policies in place, which is the case at EPI-USE, for the use of groupware because it can easily be abused or misused. Remote access to groupware can be limited depending on the client environment.

5.1.1.3 How does the knowledge portal facilitate the SECI process?

An EPI-USE consultant can search in a portal for information in a portal about a product or service that a major competitor provides and use the information to prepare a presentation to bid for a contract. Explicit knowledge is used to form more complicated explicit knowledge that is supported by the Combination process, e.g., before a presentation to a client the consultant realises that the organisation does not have the necessary skills for a specific area on the project, the consultant or project manager search for resumés of people with expertise in the specific area. The project manager will search for people with the relevant capacity of tacit knowledge to perform the task, with a view to including them in the

project team (Socialization). After winning the bid and completing the project the consultant will update the knowledge portal with his/her experiences (Externalization). Tacit knowledge is transformed into explicit knowledge for the use of other organisational members. Junior consultants use the explicit knowledge in the knowledge portal to form new tacit knowledge (Internalization). Portals support all the SECI processes.

5.1.1.4 How does Computer Based Training (CBT) facilitate the SECI process?

CBT concentrate on the combination and Internalization process of the knowledge conversion spiral. A consultant using a CBT program can transform explicit knowledge into more complicated explicit knowledge and by applying the explicit knowledge new tacit knowledge can be created.

The use of CBT applications can be a good method for consultants to acquaint themselves with new technological tools and applications depending on the career stage the consultant is currently occupying and their learning styles. CBT applications are a good means by which a junior consultant can become acquainted with a new technological tool or application that they might use with a client. The more senior consultants prefer a hands-on approach with regard to new technological tools and applications. Once the junior consultants are acquainted with the new tool they want to exercise their gained knowledge in an actual environment (life environment). This may result in placing constraints being placed on the hardware and software resources that EPI-USE can provide to their consultants.

5.1.1.5 How does the Professional Services Automation (PSA) facilitate the SECI process?

The current PSA system at EPI-USE is not adequately suited for the EPI-USE environment. A suitable PSA system can incorporate most of the applications stated by Carvalho & Ferreira (2001) and Harry (2002), as discussed in Chapter Four, and can serve the knowledge management environment of EPI-USE. Apart from the core functions of the PSA systems, which are time and billing, project management and resource management, applications software discussed in Chapter Four can facilitate all four SECI processes if they are

incorporated in the PSA system. The value that the application software could add to the SECI process at EPI-USE will be discussed in the following paragraphs.

Socialization is described as a process where experiences are shared and common mental models and abilities created. A knowledge map is a way of using technology to bring together people with common interests. It offers opportunities to put complementary expertise in touch, more experienced people in contact with beginners. Knowledge maps facilitate tacit knowledge exchange because they provide a faster expert search and increase the chance of personal meetings. This bring together process can probably result in face-to-face contacts that promote shared experiences and learning by observation, imitation (socialization), as well as by the combination of explicit knowledge.

Workflow Management Systems (WMS) facilitate both the SECI processes of Externalization and Combination. Since the main objective of WMS is to establish and to accelerate the business process flows, it is an indication that business processes are explicit. Workflow systems usually automate parts of the handwork processes, portfolio managers, use tacit knowledge to decide which investments would be best suited to gain maximum returns on an investment. With the adoption of workflow systems, the best way to perform this process is widely discussed by portfolio managers and significant parts of it can be formatted. WMS can be part of EDMS or groupware.

BI systems excel in the job of sorting, categorising and structuring information, facilitating the reconfiguration of existing as well as the creation of new information. BI supports the combination process, as it may result in new explicit knowledge being shared by the organisation.

CI tools concentrate on the combination and Internalization processes of the knowledge conversion spiral. They act like a probe on information sources: the information that is obtained is filtered and classified before dissemination, so it is disseminated in an suitable format to facilitate combination. Explicit knowledge is transformed to form tacit knowledge. Information is gathered from explicit sources, analysed and compiled to form more complicated explicit knowledge.

SCM facilitates both the SECI processes of Externalization and Internalization. SCM processes are explicit and are supported by SCM software. SCM systems usually automate parts or all of the manual processes. Store managers, rely on the SCM software to automate the organisation's daily material requirements and locate reliable suppliers based on the input they provide. The store manager creates new tacit knowledge while monitoring the material requirements and evaluating supplier performance and reliability. SCM can be part of ERP systems or integrated with it. Although SCM might not be a requirement for the PSA system at EPI-USE currently, it might be a something to consider for future use.

CRM facilitates the SECI processes of Socialization, Externalization Combination and Internalization. CRM processes are explicit and are supported by CRM software. Sales staff can communicate directly with customers, thus gaining the opportunity to improve their tacit knowledge about the customer's needs and inform marketing about possible marketing strategies. Sales people, rely on the CRM software to automate the organisation's daily sales requirements and help them close deals faster. CRM software can provide sales people with trends in the purchasing pattern of customers. Sales people can provide possible sales strategies based on reports received from the CRM system.

The current PSA system is not fully compliant with the EPI-USE project environment and there are various integration problems. Most of the functionality is not used by EPI-USE. Although the IT department is planning to replace the PSA system, in EPI-USE case the EVOLVE system, senior management can not find any justification to invest in a better PSA system. An upgraded PSA system could provide EPI-USE with much needed improvements they need around the project management environment.

5.1.1.6 How could the VALUESAP tool facilitate the SECI process?

Document management can facilitate the SECI process of Combination. Explicit knowledge is changed into more complicated and systematic sets of explicit knowledge e.g. company policy and procedure templates. In the previous section EDM systems are presented as explicit knowledge stores. In some organisations, document management can be the initial step to further KM. DM systems deal only with the explicit dimension of knowledge.

Documents are an efficient way to exchange explicit knowledge that, organised and combined, can lead to new knowledge. In organisations, members combine their explicit knowledge by exchanging reports, memos and a variety of other documents. Although the tool is available for use in this organisation it is not widely used by consultants. The tool can be very beneficial when best practices need to be documented after completing an implementation.

5.1.2 The role HR plays in the Knowledge creation process at EPI-USE.

This section will discuss the data gathered data on case of the Human Resource department. The data presented is based on the interview conducted with Mr. Johan De Beer, who is the Human Resource manager within the EPI-USE South Africa group of companies.

5.1.3 How do the HR initiatives facilitate the SECI process?

5.1.3.1 How does Coaching facilitate the SECI process?

Coaching incorporate the SECI processes of Internalization and Socialization. The one-to-one relationship between the coach and employee facilitate the tacit knowledge sharing. The observation of the employee by the coach to evaluate the employee's performance for improvement is explicitly done. The coach will advise the employee on how to improve overall performance (tacit).

5.1.3.2 How does apprenticeship facilitate the SECI process?

Socialization and Internalization are the dominating SECI processes. Line managers are sharing their tacit knowledge with the apprentice who is currently in on apprenticeship program within the organisation. The apprentice is exposed to explicit knowledge such as Shop floor processes, manuals and policy documents. They use the explicit knowledge to enhance the tacit capacity.

5.1.3.3 How does Acting up facilitate the SECI process?

Acting up incorporates the SECI processes of Socialization, Combination, Internalization. In the new environment the employee will be expose to a new set of responsibilities and skills required to do the job. Social interaction with fellow colleagues and subordinates, enabling

the sharing of to share knowledge with regard to the current environment is crucial to development of the necessary skills needed for the job. The employee acting in the senior position can gather explicit information (company policy documents, recommendations from subordinates) to implement new methods and procedures. Reading up on literature and company documents regarding the new position can enhance the acting employee's knowledge of the duties and responsibilities demanded in the senior position.

5.1.3.4 How team building facilitates the SECI process?

Socialization is the dominant SECI process in team building programs. In the social environment team members share their emotions and experiences on and sometimes of the job with each other. Tacit knowledge is transferred from one individual to another in a team building exercise.

5.1.3.5 How does the post-mortem analysis/case study facilitate the SECI process?

The case study provides stimulating discussion and opportunities for individuals to defend their analytical and problem-solving abilities. Individuals, by discussing methods for problem solving, share their tacit knowledge with each other in a social environment and by reading or reviewing related literature sources, thus formulate ideas on how to solve the problem. The dominant SECI processes are Socialization and Internalization.

5.1.3.6 How does a lecture facilitate the SECI process?

A lecture with one-way communication (only the lecturer talking) can be explicit and will form part of the SECI process of Combination. If there is interactive participation (participation from both the lecturer and the audience) a lecture can be part of the Socialization or Internalization process.

5.1.3.7 How does the Community of Practice facilitate the SECI process?

In COPs members are sharing their experiences in their field of expertise. They share their every day problem solving solutions and also those problems that are still unsolved. Tacit knowledge is shared, thus COPs support the Socialization process.

The next section will discuss the how the above knowledge transfer methods from the two perspectives compliment each other and how they differ from each other.

5.1.3.8 How do extra mural activities facilitate the SECI process?

With extra mural activities the individual is allowed to participate and share their experience in their area of interest. They socialize and participate in activities that interest them, thus sharing tacit knowledge. It supports the Socialization process.

Summary

Socialization	Externalization
Knowledge portal Knowledge map Evovle project management tool (PSA)	Groupware Knowledge portal Evovle project management tool (PSA)
Internalization	**Combination**
Knowledge portal Computer Based Training (CBT) Evovle project management tool (PSA)	Intranet VALUESAP methodological tool Knowledge portal Computer Based Training (CBT) Evovle project management tool (PSA)

Table 11: IT applications supporting the SECI process

Socialization	Externalization
Coaching Understudy assignments or Apprentice Acting up Team building Case study/Post-mortem analysis Further academic study Communities of practice (COP) Extra mural activities	Further academic study
Internalization	**Combination**
Coaching Understudy assignments or Apprentice Acting up Case study/Post-mortem analysis Further academic study	Acting up In house lectures and workshops Further academic study

Table 12: HR initiatives supporting the SECI process

All the knowledge conversion processes are catered for at EPI-USE from the perspective of both Human Resources and Information Technology. The next step is to find a methodology to manage the unified knowledge creation process of Nonaka and Takeuchi (1995) and Nonaka and Konno (1998).

5.2 Question Two: What type of KM methodology is aligned with systems thinking, and how can it be implemented to facilitate a KM initiative at EPI-USE.

As discussed in Chapter Two, section 2.8.3, organisations differ in structure function and capacity. These factors can influence the type of KM methodology that can be introduced to an organisation. There are many KM methodologies of which very few have been tried and tested. Most of these KM methodologies do not look at the organisation as a whole and its systems thinking environment. Organisations are sometimes biased when implementing KM strategies by aligning KM strategies with business strategies without taking into account the current business environment. There is also a lot of focus on explicit knowledge thus undermining the importance of tacit knowledge as in the case of EPI-USE. The KM methodology must take the organisational factors in Table 12 into consideration, must suit the organisations needs and be aligned with strategic business initiatives. One such methodology that can be modified to comply with the above requirements and was discussed in Chapter Two is the P2-KSP methodology. As will be discussed it can provide an adequate balance of managing both the explicit and tacit components of knowledge.

5.2.1 Business Environment analysis

The business Environment analysis for EPI-USE was done in section 4.1.4 and section 4.1.5 in Chapter Four. The analysis of EPI-USE's business environment will give a good indication of the internal and external environmental challenges EPI-USE faces and EPI-USE would benefit tremendously from benchmarking or analysing other knowledge management cases if and when they want to renew their knowledge management continuously.

5.2.2 Knowledge requirement analysis

EPI-USE can perform its own identification of knowledge requirements by choosing one or more criteria by which knowledge can be classified. Mr. James Brits builds a balance scorecard for the SAP R/3 HR and Payroll business unit that my act as a good measure of what knowledge and experiences is required to achieve the objective for the business unit. Knowledge related to business processes or individual tasks is identified through

decomposing business processes similar to what was done in Chapter Four, section 4.2 A Knowledge asset that is identified can be decomposed to its lowest level. Business processes are also the main subjects of performance measurement. After identifying knowledge requirements it is important to investigate how well they are actually being managed.

5.2.3 Knowledge management strategy establishment

In this phase, the long-term knowledge management goal and strategies are set up based on the outputs of the previous two phases, as discussed in Chapter Two. The knowledge management initiatives at EPI-USE, according to Mr. James Brits, are aligned with the business strategy. EPI-USE needs to review and integrate their current HR, IT and KM strategies with their business strategy. This will incorporate inspiring and changing their employees mindsets of knowledge sharing, managing related processes, designing knowledge-based business units, securing necessary information technologies, and expanding knowledge management initiatives throughout EPI-USE.

5.2.4 Knowledge management architecture design

This section will discuss the knowledge management architecture design, how it complies with and is suited to the EPI-USE organisational environment knowledge architecture, which incorporates both knowledge and expert maps, Knowledge management process architecture, which defines knowledge management activities and their relationships, Organisation architecture, which designs an organisation structure for seamlessly carrying out knowledge management processes and Information technology architecture, which integrates information technologies or tools for supporting knowledge management.

5.2.4.1 Knowledge architecture

The knowledge architecture is a result of classifying organisational knowledge through one or more dimensions. To incorporate it in the knowledge architecture design, these knowledge assets can be divided into four categories that is experiential, conceptual, systemic or routine knowledge assets as discussed in the Chapter Two.

In the case of experiential knowledge assets it is hard to access or transfer them without contacting the person possessing it. To resolve such difficulty, an expert map reveals the source of the knowledge, an expert, instead of the knowledge itself. Dimensions for the classification are determined by taking account of the knowledge requirement analysis results and knowledge management strategies. For example, a departmental boundary can be one criterion for classifying knowledge if organisational structure is considerably stable. At the same time, knowledge assets of each department can be classified into tacit or explicit or both; this is an example of combining multiple dimensions for classifying knowledge assets. Once dimensions are selected, knowledge assets are arranged in the classification scheme. The knowledge architecture is updated or renewed by reflecting the patterns of using knowledge assets and changes in an organisational context

5.2.4.2 KM architecture

Kim, Yu and Lee (2002) argue that the knowledge management process architecture defines a variety of processes involved in a life cycle of knowledge, from its creation to termination and recreation. Knowledge management processes can be largely summarized into:

- **Identifying Knowledge Assets**

In some organisations it might be difficult to categorise or identify knowledge assets. By categorizing an organisations knowledge assets according to the categories proposed by Nonaka and Takeuchi (1995), it can be determined whether these knowledge assets are explicit or tacit and if the quality of the knowledge asset is from a reliable and trustworthy source. The availability of a knowledge assets within EPI-USE depends on the period that the knowledge is available, the media in which the knowledge is held and the location of the knowledge.

- **Analysing Problems and Opportunities related to a Knowledge Assets**

Knowledge Bottlenecks occur where there is a problem with knowledge availability. This is often because the knowledge is very specialised, and it resides in the heads of a few key individuals who are excessively busy at the best of times, and are not available at all outside normal working hours, which is a typical case at EPI-USE. However, knowledge bottlenecks may also arise if the source of the knowledge is not available at the location where it is

needed. Typical example in EPI-USE would be where the request for a certain service to a client has to be postponed or terminated due to the lack of resource availability which also constitute to knowledge gaps

Knowledge Gaps occur where the knowledge is usually not present within an organisation, the decision makers know that they need the knowledge but recognise that they do not have it. This may occur because: new knowledge has arisen which requires a generalisation of existing procedures; no one has investigated that area before; or because a key individual with unique knowledge has left EPI-USE.

Knowledge Quality issues usually arises when the knowledge is highly dynamic. Providing the best quality knowledge throughout EPI-USE therefore requires frequent updates to the knowledge, which may consume more time than the knowledge is worth, depending on the medium in which the knowledge is stored. It is also possible that knowledge quality issues may arise because the best available knowledge could not be used in EPI-USE.

Knowledge Communication may be the biggest practical problem of all. Getting information and knowledge to where it is needed is a problem that needs to be solved, but making the knowledge understandable is a bigger problem.

Having described the types of problems that can occur in an organisation like EPI-USE, it is necessary to identify if any of these problems may be occurring in the organisation. In order to do this the following known business management techniques can be applied:

- SWOT analysis,
- value chain analysis,
- process simulation and
- checklists of bottlenecks.

- **Select the actions that will ensure Knowledge Assets are managed.**

When the knowledge assets within an organisation are identified, EPI-USE must decide on the type of action to take to manage these knowledge assets. Using the SECI model, EPI-

USE can determine the type of IT application that was discussed in section 5.1.1 of this chapter that will facilitate the growth and management of the identified knowledge assets. However, the management of the IT component is not part of managing the KM component. It should be viewed as totally separate from managing the KM component and this will be discussed later in this chapter.

- **Review the Actions**

After deciding on the type of action that should be taken to manage the knowledge assets, EPI-USE should review the action on a continuous basis to ensure that the knowledge assets are sustained and that new knowledge is created. Should the chosen action deviate from the process EPI-USE should restart the whole process to ensure that the knowledge assets are sustained and developed.

After establishing a framework for knowledge management processes, detailed activities and their relationships within each process are defined. Those works are the same as building a process model of knowledge management. The details of each process vary according to which type of knowledge asset is being targeted in the knowledge architecture. The knowledge management process architecture also reflects organisational policies, rules, and procedures, all of which aim at routinizing and creating a culture of knowledge creation and transfer within an organisation.

5.2.4.3 Organisational architecture

Although the organisational architecture at EPI-USE is based on the Matrix structure there are a lot of evidence that it conforms to the Hypertext organisation as described by Nonaka. The output at EPI-USE is in the form of projects and is a good practical example of the matrix structure. At EPI-USE it is often the case that team members from different business units across the business system are brought together to form new project groups and is assigned exclusively to a project team until the project is completed.

Nonaka argues that the hypertext organisation reaps benefits from both the task structure and the bureaucracy. He states that the bureaucratic structure efficiently implement, exploits, and accumulates new knowledge through Internalization and Combination, while the task

force is indispensable for generating knowledge through Socialization and Externalization. The efficiency and stability, as stated in Chapter Two, of the bureaucracy is combined with the effectiveness and dynamism of the task force in the hypertext organisation.

A hypertext organisation has the capability to convert continuously and dynamically the knowledge contents generated by the bureaucracy and the project team. Thus continuing the creation of new knowledge in the knowledge creation process. The hypertext organisation is an open system that also features continuous and dynamic knowledge interaction with customers and companies outside EPI-USE. EPI-USE does not fully operate in a matrix structure, but has characteristics of a hypertext organisation.

5.2.4.4 Information Technology architecture

The current IT architecture at EPI-USE is well suited to cope with knowledge sharing within the organisation. Most of the IT typology discussed by Carvalho & Ferreira (2001) is present at EPI-USE. Consultants have remote access to information and expert advice. However new KM processes will be introduced if a KM initiative is undertaken and the IT infrastructure should focus on supporting these new processes as well as the current process flow of information. Some cause for concern might be the lack of IT spending from a senior management perspective. Although IT is expensive it is the organisational culture that can make or break any IT implementation.

5.2.5 Knowledge management implementation planning

This is the last phase of the P2-KSP methodology. In this phase the feasibility plans for implementing the four knowledge management architectures are set up after considering the resource restrictions or other organisational constraints. This phase produces the implementation schedule and the resource allocation plan. During this phase, a prototype or pilot system of knowledge management can be developed so as to test the feasibility of the knowledge management architectures within EPI-USE.

5.3 Question Three: How can the SECI process add value to the management of knowledge at EPI-USE?

Chapter Two critically appraised the model of the organisational knowledge-creating process consisting of three elements: SECI, *ba* and knowledge assets. Nonaka (2000) state that an organisation, in this case EPI-USE, can use its existing knowledge assets to create new knowledge through the SECI process that takes place in *ba*. Knowledge assets can be visualised according to the knowledge assets defined by Nonaka and Takeuchi (1995).

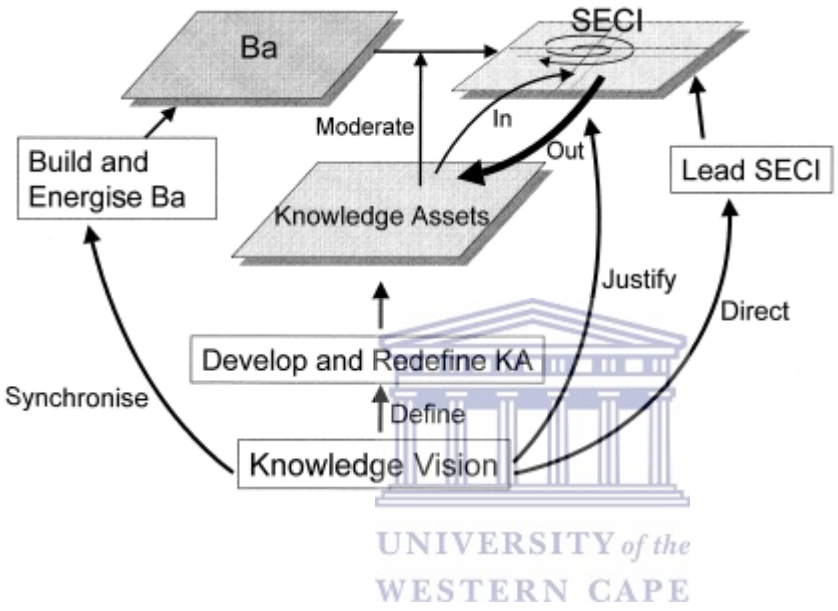


Figure 16: Interaction between SECI, *ba* and knowledge assets

Source: Nonaka I, Toyama R, Konno N, (2000)

After establishing the knowledge assets that EPI-USE possess, both on and off projects, the organisation can determine where the gaps are as discussed in section 2.9.4.2 Creating intelligent flows is part of the SECI process since the different knowledge assets can interact with each other through *ba* to create new knowledge assets. The knowledge created then becomes part of the knowledge assets of the organisation, which in turn becomes the basis for a new spiral of knowledge creation.

Nonaka gave guidelines on how to cultivate the efficiency and renewal of the knowledge assets in organisations but does not provide a methodology to manage the unified knowledge creation process. The P2-KSP methodology that was introduced by Kim, Yu and

Lee (2002) gave a very comprehensive overview of how the unified knowledge creation process of Nonaka and Takeuchi (1995) should be managed. Each time the business strategy changes the P2-KSP methodology can be adjusted to accommodate this change.

EPI-USE can capitalise on knowledge assets through a variety of new innovative social systems. These could include partnerships, alliances, charity events and trade shows. In a partnership EPI-USE can capitalise on the partner's skills base by teaming up EPI-USE consultants with the partner's more senior consultant to gain knowledge in areas where EPI-USE lacks expertise. Alliances can serve the same purpose as partnerships. Charity events may give EPI-USE consultants the opportunity to network with people in different fields. Through conversation new knowledge or ideas can be exchanged and it may be applicable to the EPI-USE business environment. Many ideas and prospective improvements can be gained through trade shows from the input of actual clients. Consultants can also gain knowledge that might be valuable to EPI-USE in a social context.

The concept of *ba* can also be structured in such a way that it will or can be advantageous to the EPI-USE business environment. The SECI process, through the concept of *ba* will create new knowledge assets and these knowledge assets will continue the spiral of new knowledge that will be created for future use at EPI-USE.

Nonaka I, Toyama R, Nagata A, (2000) argue that the knowledge-creating process cannot be managed in the traditional sense of management, which centres on controlling the flow of information. However as discussed in section 5.1 the SECI process can facilitate the IT and HR decisions made to support KM strategy at EPI-USE.

5.4 CONCLUSION

In the final section of this thesis, recommendations are made, which are based on the findings of this research, to managers of organisations who one day may need to implement a knowledge management strategy to create value and competitive advantage. The reader will also be provided with implications for theory and future research.

5.4.1 IMPLICATIONS FOR MANAGEMENT

The findings of this thesis indicate that there are a number of different initiatives for managing knowledge within the organisation that involved both the HR and IT departments, some of which the organisation is not aware off. These initiatives are important to consider when developing an organisation wide KM strategy.

5.4.1.1 Organisational factors to consider

- **Structural**

In mid 2004 a deal between EPI-USE and a BEE company have materialised and there might be structural changes to top management. This can also be seen as an opportunity to implement an organisation wide KM initiative. Top management have always followed an open door policy giving employees the opportunity to voice their concerns and give their opinions on certain initiatives.

- **Functional**

The levels of command and control are currently clearly defined at EPI-USE. However since most of the outputs at EPI-USE are project based and consultants move from one project to the other they may become complacent with the role they occupy on a specific project and this can result in confusion within command and control relationships.

- **Capacity**

Personnel differences that include level of experience, level of training or education can be a problem or an opportunity for implementing a KM initiative depending on the organisational culture and the individual's personality as discussed in the people factor later in this chapter. If the senior consultants are not willing to share their experience then this can surely be cause for concern. The difference in experience gained in the organisation's operating environment can also be a deterrent for knowledge sharing and creation. It is often the case that junior consultants have to sit and wait till a project arises for them to gained experience from the more senior consultants.

- **Environment**

Ergonomically the environment might not be suitable for sharing knowledge. EPI-USE have an open plan office environment this caters for the free flow of communication channels but can also be in inhibitor of knowledge sharing. Task based workers like clerical or admin

workers are more suited for this type of environment. Since most of the consultants are skill based knowledge workers and to some extent innovation focused, an open plan office might be a deterrent to the knowledge sharing environment since a lot of concentration is needed to come up with creative solutions to problems. Originally the SECI model originated from a task based environment. Operationalising the SECI model can be a complex issue since Nonaka and Takeuchi have based their theory on their experiences with large production organisations.

5.4.1.2 People factor

In 2003, as part of the HR department initiative to create the ultimate consultant through the Professional 121 program, EPI-USE undertook an organisation wide psychometric testing exercise. From the results it can be determine what personality types are best suited for the different knowledge sharing methods. E.g. an extroverted individual can easily share knowledge with another individual where as an introverted individual may find it difficult to share their experiences. Personality types can be a key factor when it comes to choosing the knowledge sharing initiative since each one can relate to a different learning style.

5.4.1.3 Culture

Ten years into a democratic South Africa some organisations still struggle to abide by the government's regulatory initiatives such as Black Economic Empowerment (BEE) and Affirmative Action. Although EPI-USE has a diversity of cultures the dominant culture is still the Afrikaner culture. The new BEE deal will surely be a challenge for management to foster a new organisational culture but will in turn be a good opportunity to foster a knowledge sharing culture.

The best KM initiative in the world will be worthless if it is unfavourable to the corporate culture. For example, if people are used to the freedom of choosing their work and working conditions, it is important not to choose a KM initiative that will destroy what people value most about their jobs.

5.4.1.4 Resistance to change

The most common reason for this is probably individual resistance, where new knowledge has arisen, but some decision makers prefer to do it the old way; if the top decision makers

are resistant to change, then the whole organisation will operate with sub-optimal knowledge. The next most common reason is probably information overload; there is too much information for a decision-maker to process in the time available.

5.4.1.5 IT factor

The cost of technology can be a major deterrent for certain KM initiatives. Purchasing cost, licensing fees and maintenance costs can be enormous. Choosing the best product on the market can also be complicated if the exact IT requirement of the KM initiatives are not well defined and this can result in a bad IT investment decision (as in the case of the EPI-USE ICOSPHERE product that has never been rolled out internally)

The implementation team should consult and communicate with the rest of the organisation as to which KM initiatives should be automated before, looking at software. They may find that this step alone, even if they do not choose any software, can eliminate KM pitfalls and can save the organisation time or money in a lot of IT investment decisions.

5.4.1.6 Management of KM environment

Knowledge on an individual level cannot be managed, it is up to the individuals themselves to gain and share knowledge in the organisation. However an environment can be created to foster knowledge sharing and creation. In order to do this the organisation should be informed about the knowledge assets it possesses and how to create an environment to develop this further.

This knowledge management is a very big area to implement in an organisation, the focus should not only be on the Information Technology or Information Systems component but should incorporate the organisation as a whole

This thesis investigated the degree to which EPI-USE conforms to the unified knowledge creation process from Nonaka and Takeuchi (1995), and how this process adds value to the management of the knowledge management components in the business environment. The thesis also shows how Human Resource (HR) and Information Technology (IT) management contributes to the management of knowledge in the organisation. Nonaka and

Teece (2000) stated that *ba* could be energised through autonomy, creative chaos, redundancy, requisite variety, love, care, trust and commitment. They did not propose a framework or methodology to manage all the components, which includes the SECI process, knowledge assets and *ba*. The thesis found the most appropriate methodology that is aligned with systems thinking to manage the unified knowledge creation process within an organisation and this was discussed in section 5.2.

5.4.2 IMPLICATIONS FOR THEORY

The overall purpose of this thesis was to gain a better understanding of how the work done by Nonaka and Takeuchi (1995) can and may be used to add value to the management of knowledge in a service orientated industry in South Africa. In order to fulfil this purpose, how EPI-USE conforms to the unified knowledge creation process (Nonaka and Takeuchi, 1995 and Nonaka and Teece, 2000) has been explored. In order to do this, the current knowledge creating processes and initiatives have been discussed, with the people responsible for a specific process or initiative, to find the gaps and to determine the strengths and weaknesses of the unified knowledge creation model. When the empirical data was analysed and the conclusions were drawn these issues were explained to the reader and by doing so the thesis has reached its purpose.

This research also pointed to the fact that all the SECI processes are currently catered for within the organisation and the new initiatives can be developed to focus on certain parts of the SECI process. The Japanese culture was one of the key factors that contributed to Nonaka and Takeuchi's theory on knowledge creation. Lessum and Nussbaum (1996) stated that the 1990s have brought about radical change in the economic sector in South Africa. They stated that cultural and economic regeneration have to go hand in hand in South Africa and to achieve this they have applied the work of Nonaka and Takeuchi (1995) as early as 1996 to the South African knowledge creation context. Similar to the Japanese culture, that was dominant throughout the findings of Nonaka and Takeuchi, the dominant culture in EPI-USE is the Afrikaner culture. This is a very good culture for sharing knowledge and fostering organisational visions and goals. However it will surely create a problem for EPI-USE to sustain the cultural influence the organisation has on achieving goals and objectives,

now that the government's Black Economic Empowerment and Affirmative Action policies require the integration of other cultural values within the organisation. This might result in the development of different initiatives to support the SECI process from the HR perspective to accommodate the different cultural values and beliefs that often form the core of knowledge creation according to Nonaka and Teece (2000).

5.4.3 IMPLICATIONS FOR FUTURE RESEARCH

The thesis has not covered all the aspects regarding using knowledge management as a value creation and competitive advantage tool. The topics that would be of interest for further research include:

- Evidence of this research pointed to the fact that the unified model works well with a dominant culture, like the Japanese culture and in this case where the Afrikaner culture is dominant within EPI-USE. Because of this, it would be of interest to see research carried out in the field of "applying the unified knowledge creation model (SECI, *ba*, knowledge assets) to a multi cultural organisation"

- The findings of this thesis have highlighted that there are numerous definitions for knowledge assets; one o is intellectual capital. However the main problem is the evaluation of this intellectual capital. There are currently no models or methods to evaluate the true worth of these assets. Because of this, further research within the area of "quantifying the value of intangible assets or intellectual capital" would be of interest. Since information systems and technology feed the knowledge worker with valuable information the value that IT adds to the organisation might also be determined.

- Professor Bently, popular writer on the subject of Systems Analysis and Design and head of Computer & Information Technology (CIT) Department at Purdue University, who is renown for contribution to the Systems Development buildings blocks acknowledge the fact that business drives the dimensions/perspectives of an information system and business knowledge should be improved by the design of better information systems (See Appendix 01). In order achieve this their focus

should include the people component and its integration in a broader systems development environment. Further research might include the role of the people component in knowledge management systems design and development.

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Internet

www.epiuse.com

Interviews

- Mr. James Brits – SAP HR team strategy Manager (Tel (012) 368 8400, Email: james.brits@epiuse.com)
- Mr. Johan de Beer – Human Resource manager (Tel (012), 368 8400 Email: johan.debeer@epiuse.com)
- Mr. Jan van Rensburg- IT manager. (Tel (021) 914 0281, Email: jan.van.rensburg@epiuse.com)
- Mr. Jaco Niewoudt – PSA administrator (Tel (021) 914 0281, Email: jaco.niewoudt@epiuse.com)
- Mr. Heinrich Portwig – Knowledge management consultant (Email: heinrich.portwig@epiuse.com)
- Mr. Nico Thirion – alternate company director of the organisation and the Cape Town office branch manager (Tel (021) 914 0281, Email: nico.thirion@epiuse.com)
- Mrs. Ilze Joubert - former HR and Payroll coach (Tel (012), 368 8400 Email: ilze.joubert@epiuse.com)
- Mr. Nicolai van der Merwe - Training and development manager (Tel (012) 368 8400 Email: nicolai.van.der.merwe@epiuse.com)

Other Sources

Internal Documents from the EPI-USE Group

7. APPENDICES

7.1 APPENDIX 01—INTERVIEW GUIDE

INTERVIEW GUIDE DATE:

1. BACKGROUND
    - ORGANISATIONAL BACKGROUND

    - POSITION OF THE INTERVIEWER IN THE ORGANISATION

2. THE PEOPLE INVOLVED IN INFORMATION MANAGEMENT/HUMAN RESOURCES

    - WHAT IS THE FUNCTION OF THE INFORMATION SYSTEMS/ HUMAN RESOURCES DEPARTMENT?

    - WHO IS INVOLVED IN THE DIFFEENT FUNCTION?

3. SOFTWARE APPLICATIONS/ HUMAN RESOURCES INITIATIVES

    - WHAT TYPE OF SOFTWARE APPLICATIONS/ HUMAN RESOURCES INITIATIVES IS CURRENTLY IN USE IN THE ORGANISATION?

    - WHAT PURPOSE DOES IT SERVE?

4. HOW ARE THE FUTURE TECHNOLOGY/ HUMAN RESOURCE NEEDS OF THE DIFFERENT BUSINESS UNITS SERVED?

5. WHAT DO YOU THINK WOULD THE FUTURE ROLE OF THE INFORMATION SYSTEMS/HUMAN RESOURCES DEPARTMENT BE IN THE ORGANISATION?

6. ADDITIONAL INFORMATION

7.2 APPENDIX 02-- EMAIL DATA COLLECTION

-----Original Message-----
From: Bentley, Lonnie D [mailto:bentleyl@purdue.edu]
Sent: 13 July 2005 16:18
To: Harry, Ricardo
Subject: RE: Enquiry about Knowledge managemnet
Sensitivity: Confidential

Ricardo,
What edition of our book are you using? Do you have the 6th edition? In the 6th edition we addressed this...albeit not as explicitly as you point out. I don't know that I feel it is so much of a need to change the life cycle itself, rather I think is more of a need to change our view of the product of Information System itself. Meaning to view information systems differently. Information systems have evolved from the early years where it was viewed more in terms of data processing, toward more focus on information, then more emphasis on it in terms of decision making, and now...as you mention - more emphasis upon them in terms of support for knowledge management. If you have access to our 6th
edition, you would see that our Information Systems Building Blocks (a conceptual representation of an information system - something we have refined over many editions) has evolved to recognize that a dimension/perspective of an information system is the business drivers...including the goal of improving business knowledge (see page 65, and others).

Good day,

Lonnie D. Bentley
Professor and Department Head
Computer & Information Technology (CIT)
Purdue University
Knoy Hall of Technology, Room 257
401 N. Grant Street
West Lafayette, IN 47907-1212
PH: 765-494-4545
Fax: 765-496-1212
www.tech.purdue.edu/cpt/

-----Original Message-----
From: Harry, Ricardo [mailto:rharry@pioneerfoods.co.za]
Sent: Wednesday, July 13, 2005 8:38 AM
To: Bentley, Lonnie D
Subject: RE: Enquiry about Knowledge managemnet
Sensitivity: Confidential

Thank you very much for you reply.

Just a thought. Currently we, as professionals are developing and implementing
information systems that consist of software and hardware. Do you think

that
we will reach the point where knowledge mamangement systems are designed
based on hardware, software and also the cultural context in which knoweldge are
shared. Meaning that before we can start with the SDLC we need the knowledge
sharing requirements before the information requirements. Will we ever be able
to develop systems that can store tacit knowledge if we do we may need a

different type of SDLC to do this.

Once again thank you very much for your reply

Ricardo

-----Original Message-----
From: Bentley, Lonnie D [mailto:bentleyl@purdue.edu]
Sent: 13 July 2005 15:15
To: Harry, Ricardo
Subject: RE: Enquiry about Knowledge managemnet
Sensitivity: Confidential

Hello Ricardo,
Thank you for you nice words and it is great to hear that our book serves as a good resource for you. You know I really wish that I could help you on recommendations for a Knowledge Management book, but I just don't know that market well enough. I would suspect that there aren't very many "textbooks" on that subject because the textbook market is probably pretty small. I would suspect that you are more likely to find books that were written for industry professionals. My only suggestion would be to search the web to identify professors that teach the subject
at some well respected universities and ask them for recommendations.

Again Ricardo, sorry I couldn't be of much help.

Lonnie D. Bentley
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-----Original Message-----
From: Harry, Ricardo [mailto:rharry@pioneerfoods.co.za]
Sent: Wednesday, July 13, 2005 8:09 AM
To: Bentley, Lonnie D

Subject: Enquiry about Knowledge managemnet
Sensitivity: Confidential

Hi Mr. Bentley

My name is Ricardo Harry and I am writing to you from South Africa.

I am currently a professional working as a systems/ business analyst at a very large South African company. In my second year at university we used the systems analysis and design textbook that you co-authored. I was very impressed with the whole indept information rich content of the
book on systems analysis. I am still using this textbook almost 6 years after I graduated with a B.Com Hons in Information Systems.

I am currently completing a Masters in Information Management and my thesis topic is Knowledge management
in a South African organisation. I would like to know if their exist similiar textbooks like the one you co-authored
on the topic of Knowledge management. I find the evolution of the Information economy very interesting and would like to pursue a Phd on the subject one day with the focus on analysis and design of knowledge transfer systems.

PS: Up till now your textbook was very helpfull in my career and it is still adding value to my 5 year professional career.

Kind regards
Ricardo
Web : http://www.pioneerfoods.co.za/
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